Pea foot rots

Lea Herold

Foot rot

- Poor root system
- Pale or yellow plants
- Stunted plants
- Impact on yield

- Compaction
- Water logging
- Poor soil health

➢Disease complex

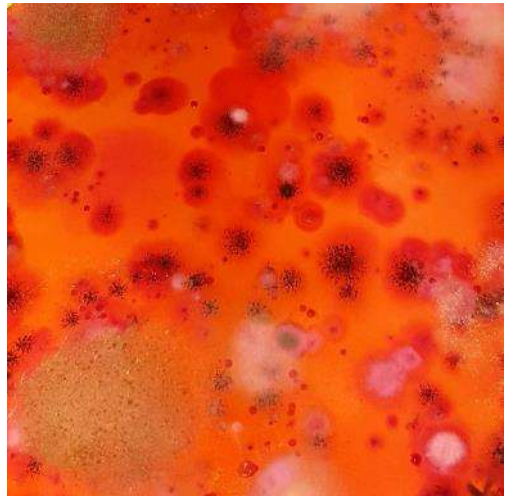
Foot rot pathogens

- *Fusarium solani* – red vascular tissue

- *Didymella pinodella* – black stem base

- *Aphanomyces euteiches* – soft roots, honey coloured

- Soil tests
  - Colony numbers – risk factor (*Fusarium* and *Didymella*)
  - Disease severity seedling – risk factor (*Aphanomyces*)

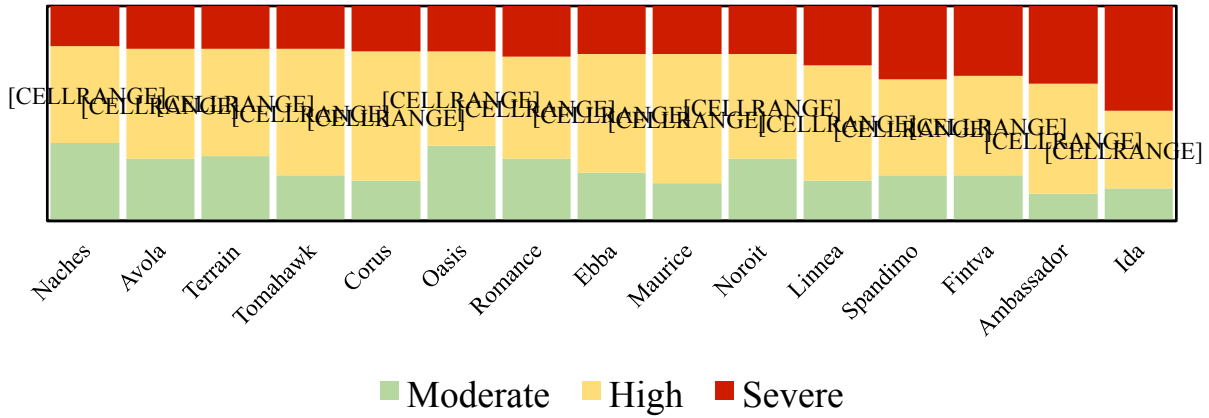


Variety trials 2019

Angus

Aphanomyces severity

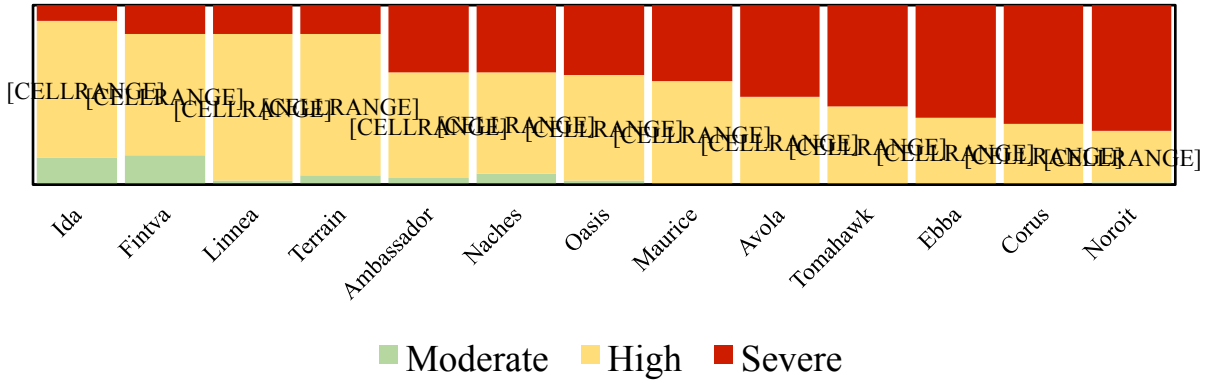
Severe infection

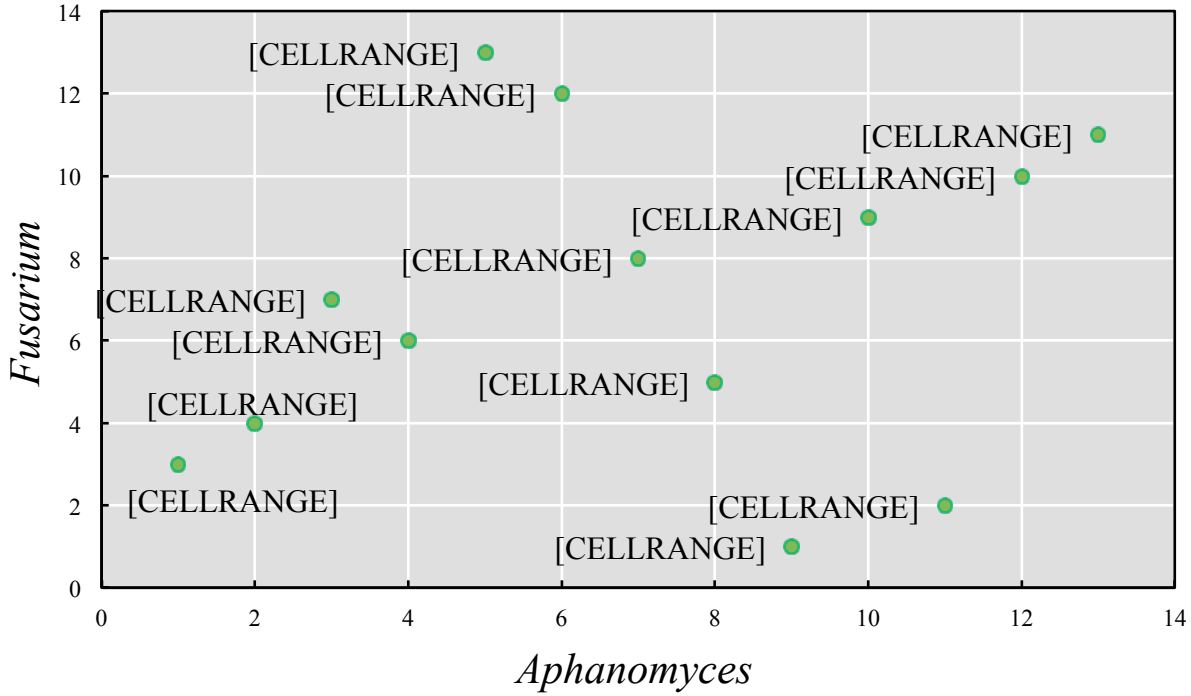


Lincolnshire

Fusarium severity

Strong infection





Calcium

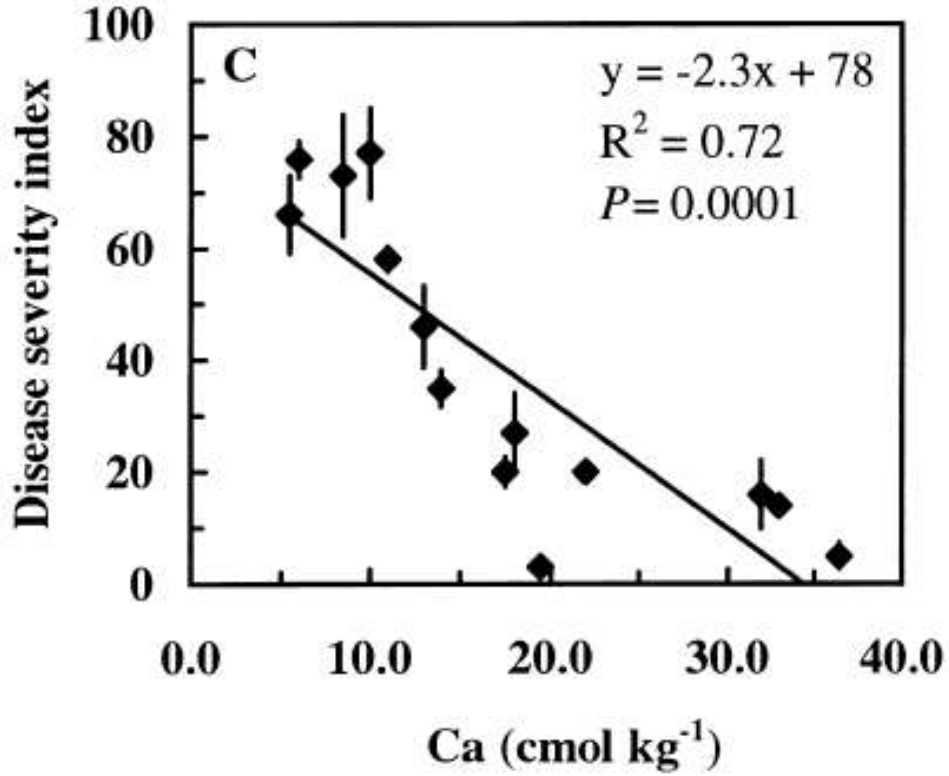


Table 2
Coefficients table from multiple regression analysis of relationship between soil parameters (independent) and disease severity (dependent variable) in 732 samples with confirmed *Aphanomyces* root rot prevalence

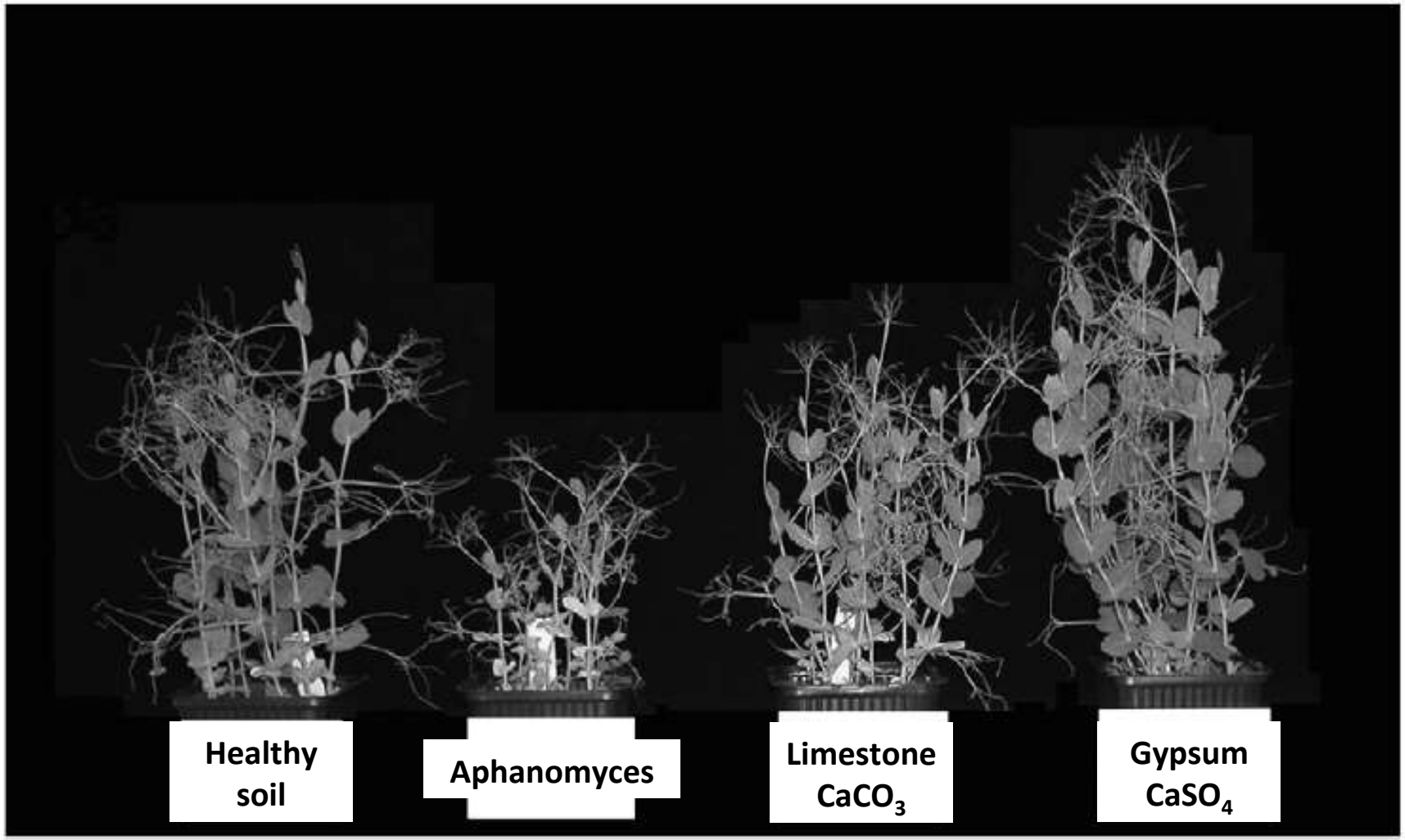
	Intercept	pH	P	Mg	K	Ca
Coefficient	3.67	4.43	0.048	−0.211	0.746	−0.028
P	0.775	0.027	0.629	0.458	0.0017	0.0023

Element concentrations as mg 100 g^{-1} soil. Adjusted $R^2 = 0.026$

Persson and Olsson (2000) Soil Biology & Biochemistry 32, 1141-1150

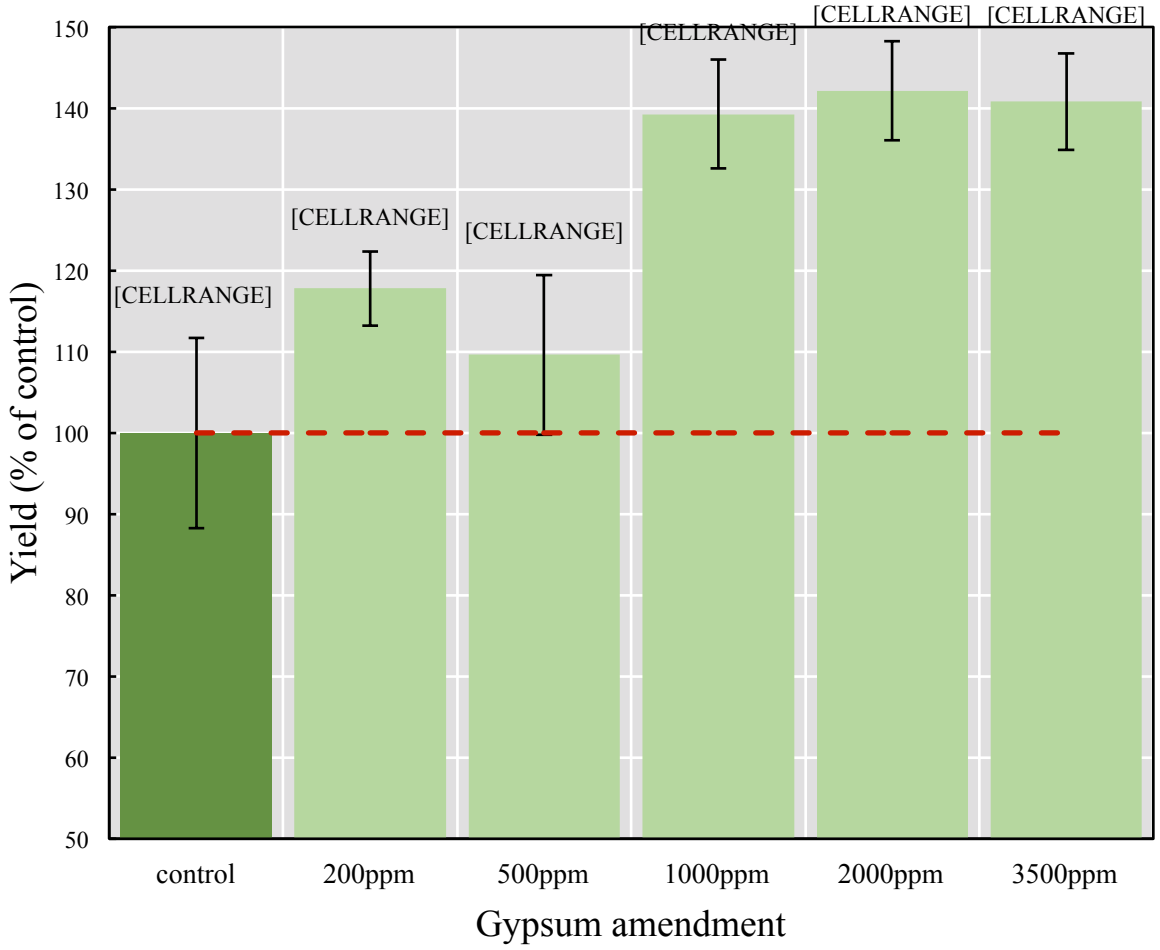
Heyman et al (2007) Soil Biology & Biochemistry 39, 2222-2229

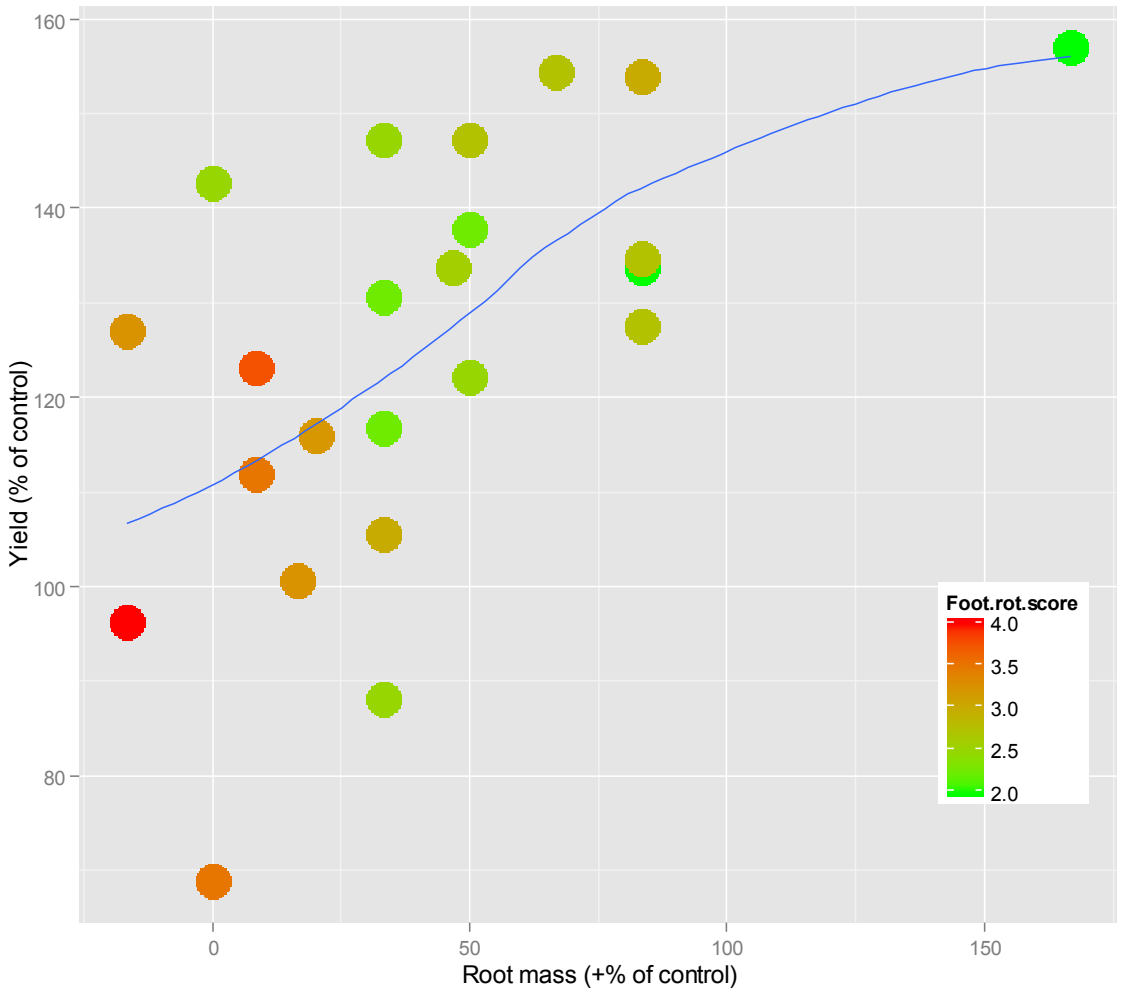
Gypsum



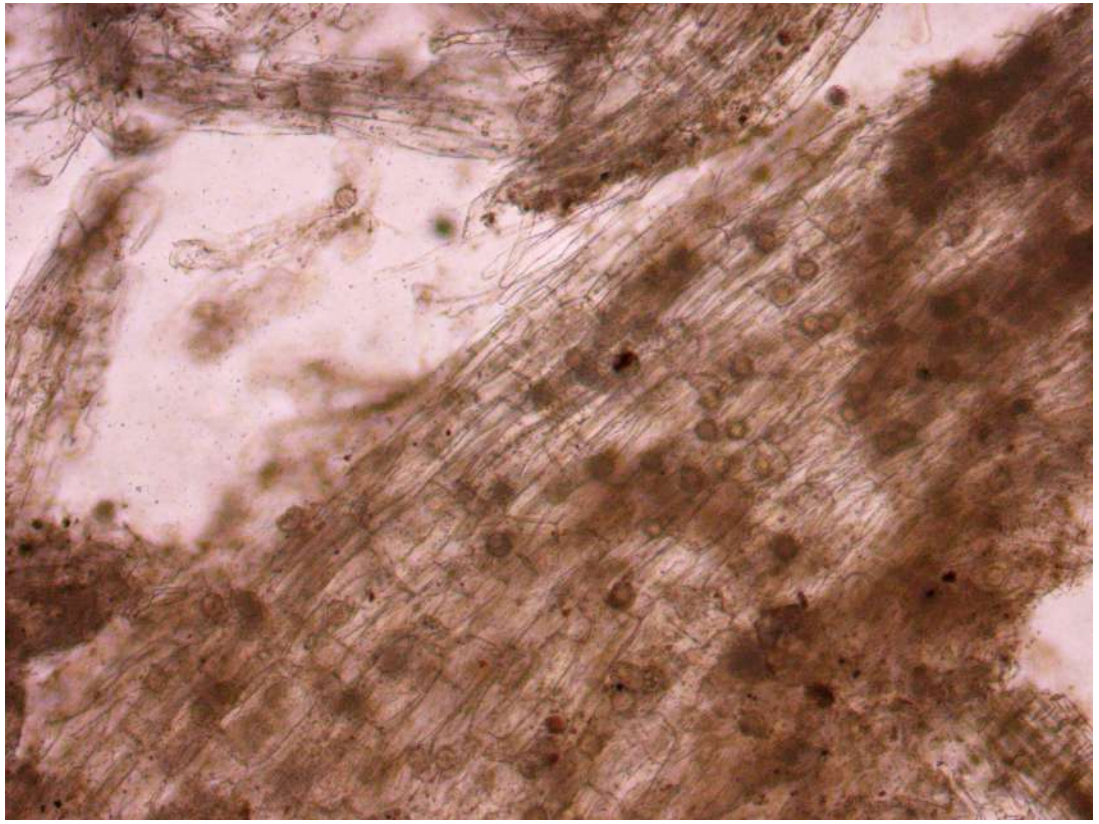
Heyman et al (2007) Soil Biology & Biochemistry 39, 2222-2229

Gypsum – Glasshouse trial

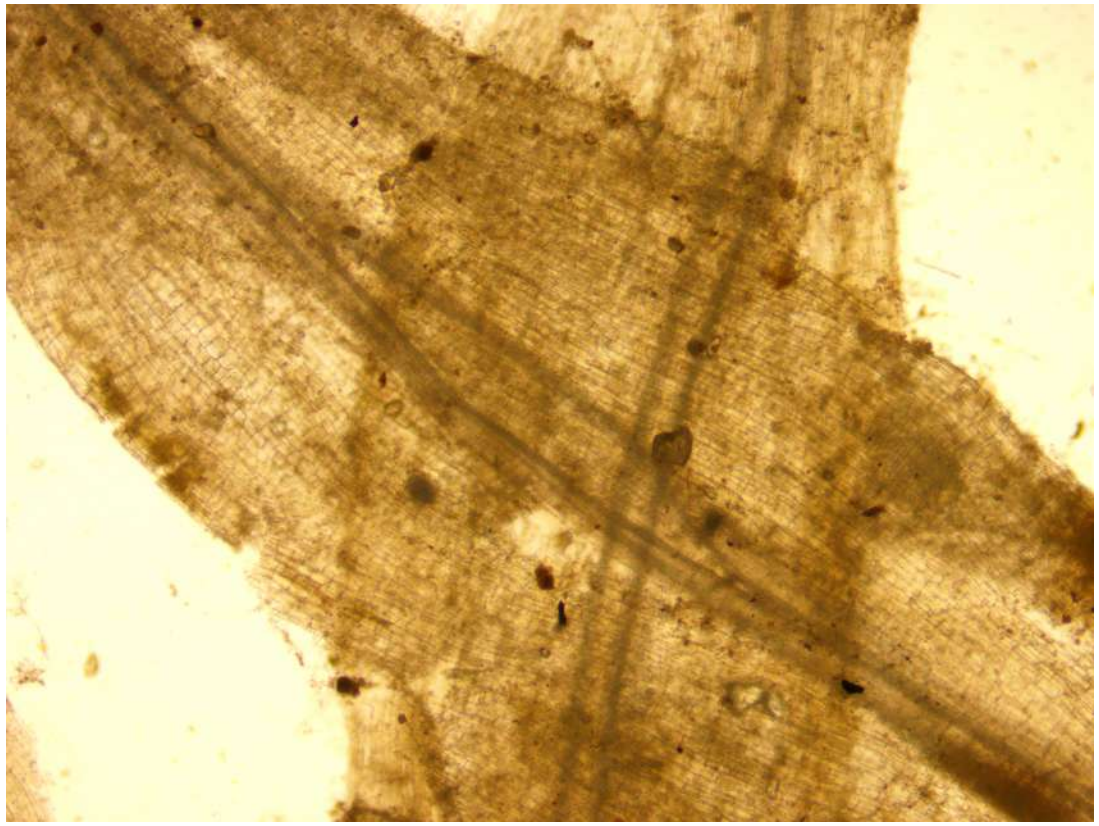




Gypsum – Glasshouse trial

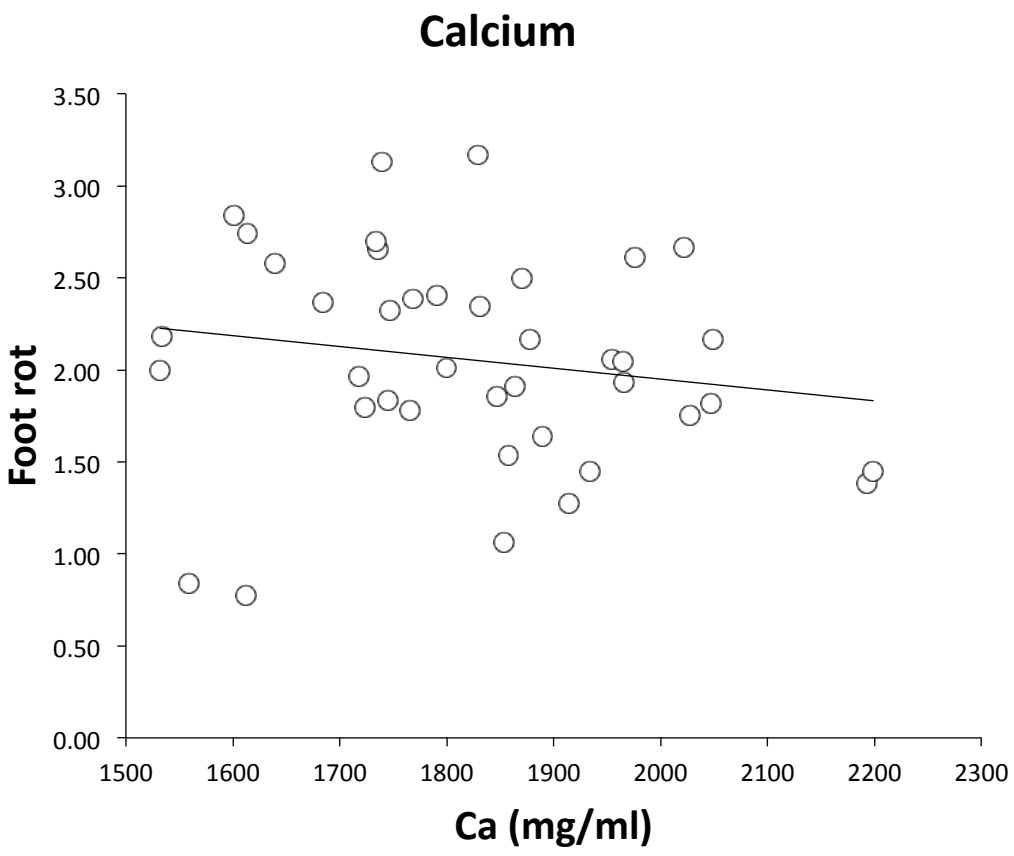


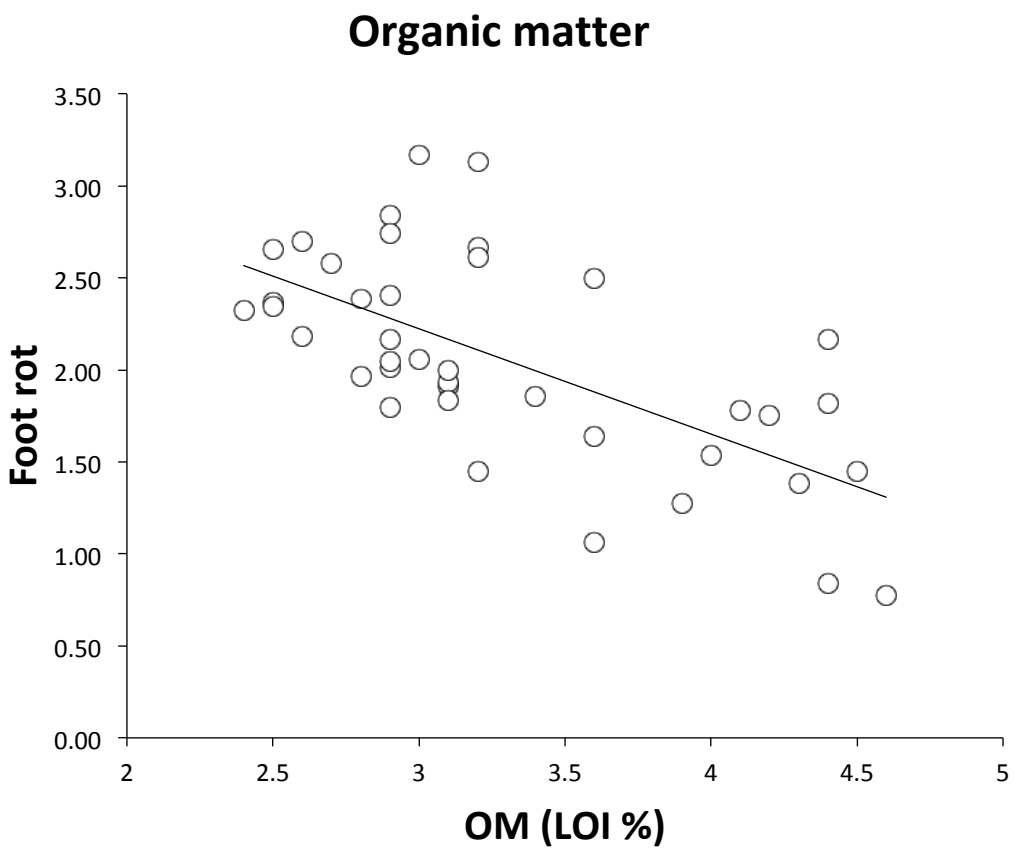
Control



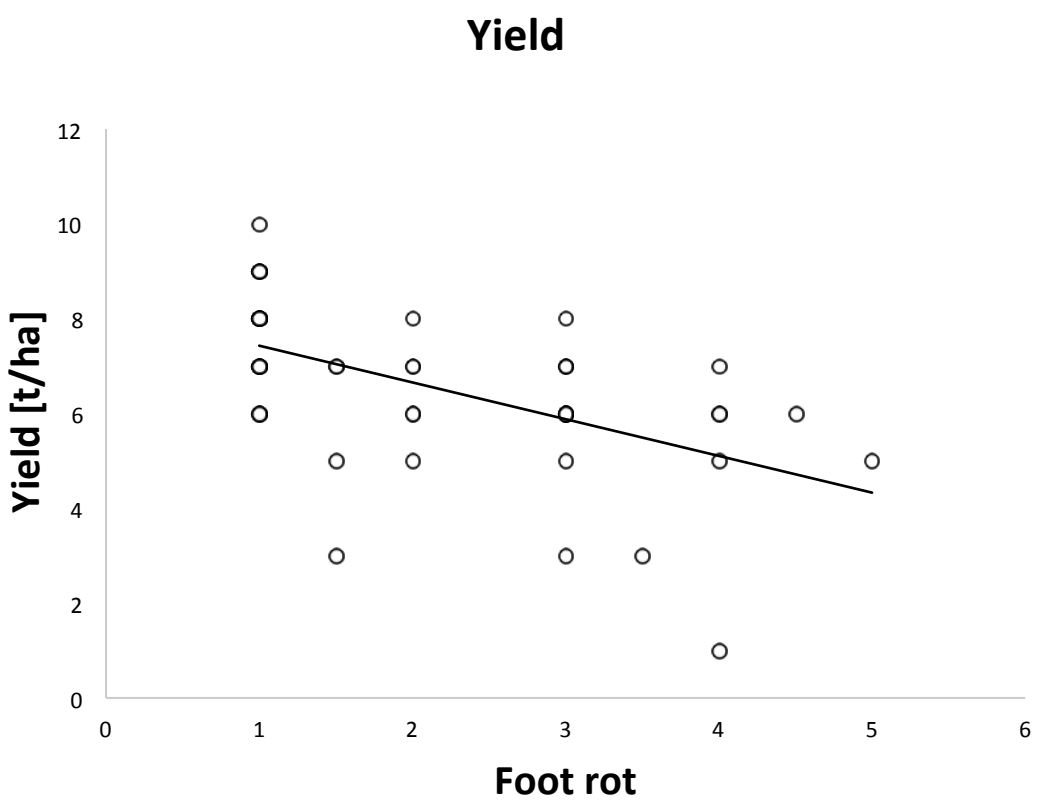
2000ppm

Fusarium in fields 2018





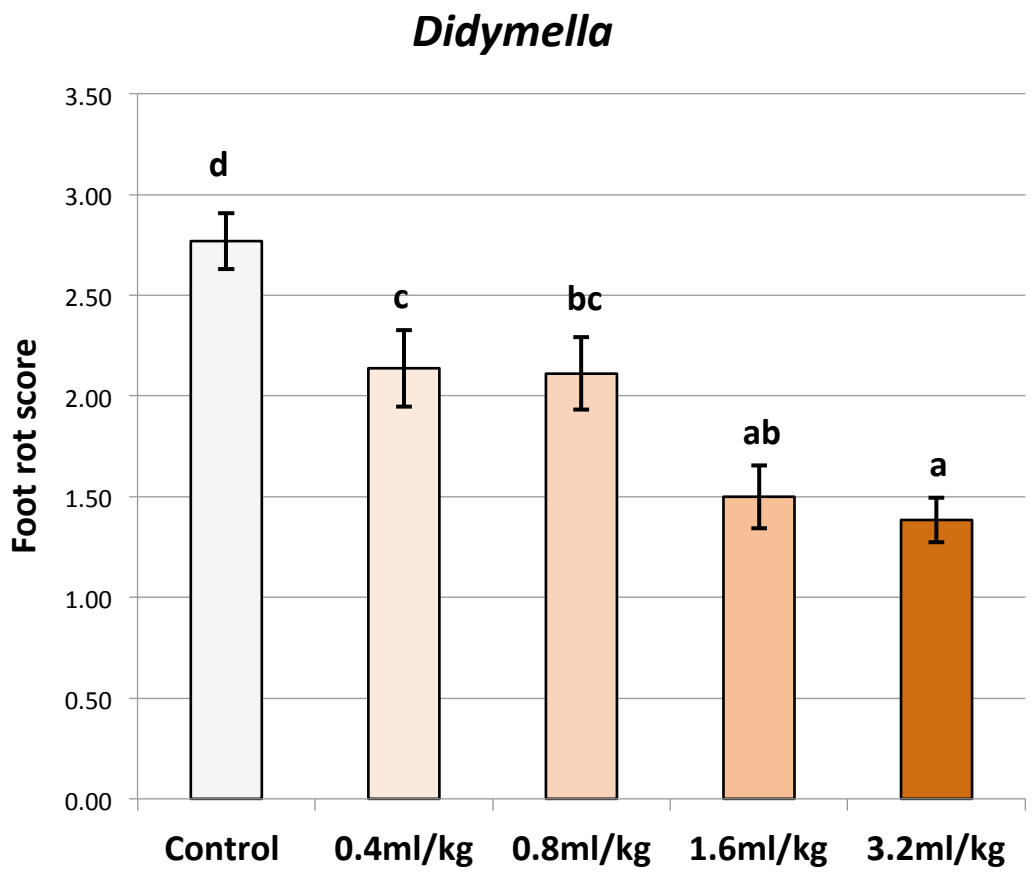
Foot rot in fields 2019

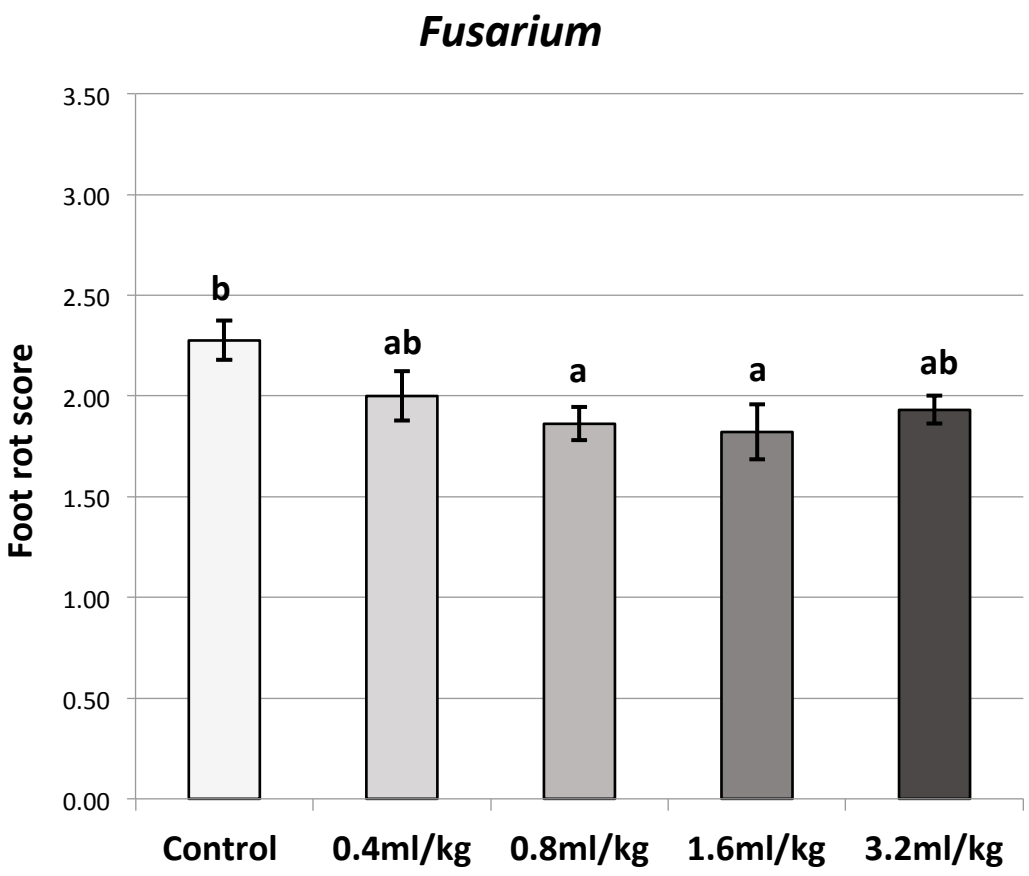


- Foot rot severity in the field explained by (45%)
  - Abundance of *Fusarium* spores
  - Abundance of *Didymella* spores
  - Magnesium in soil (clay related?)
  - Reduced by higher amounts of organic matter

Alternative seed treatments - glasshouse

Product I (2018) – pot tests

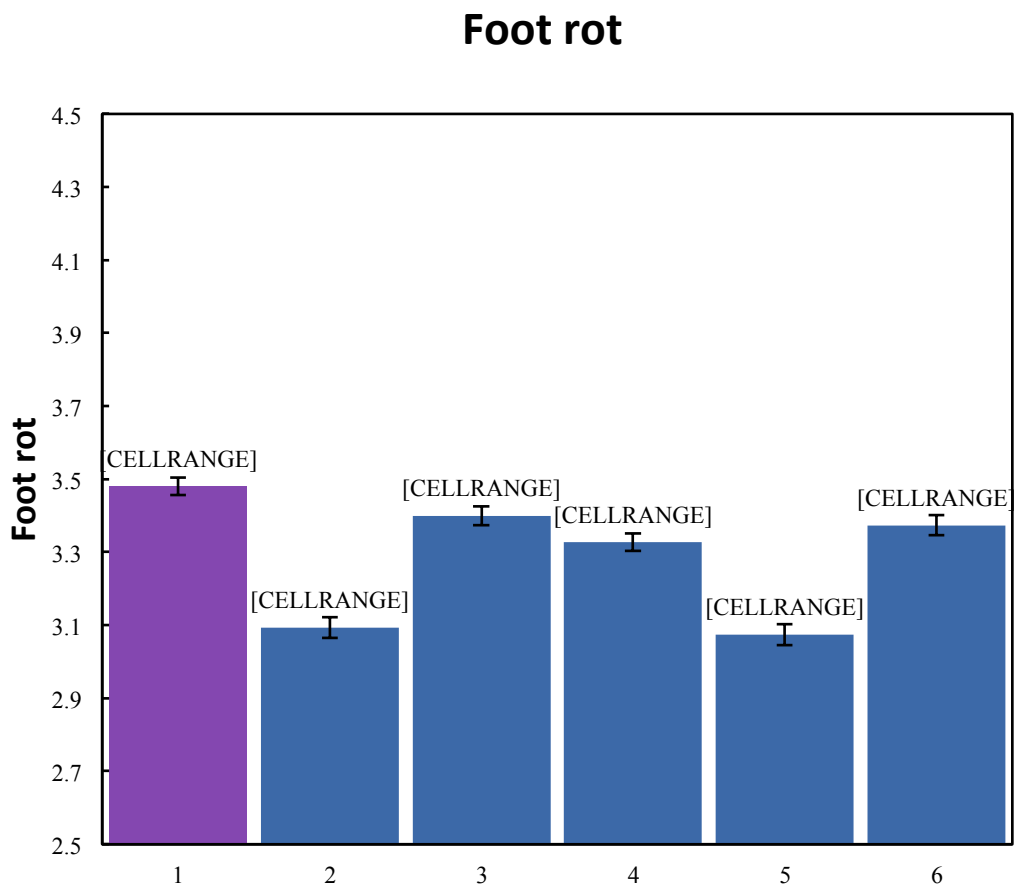


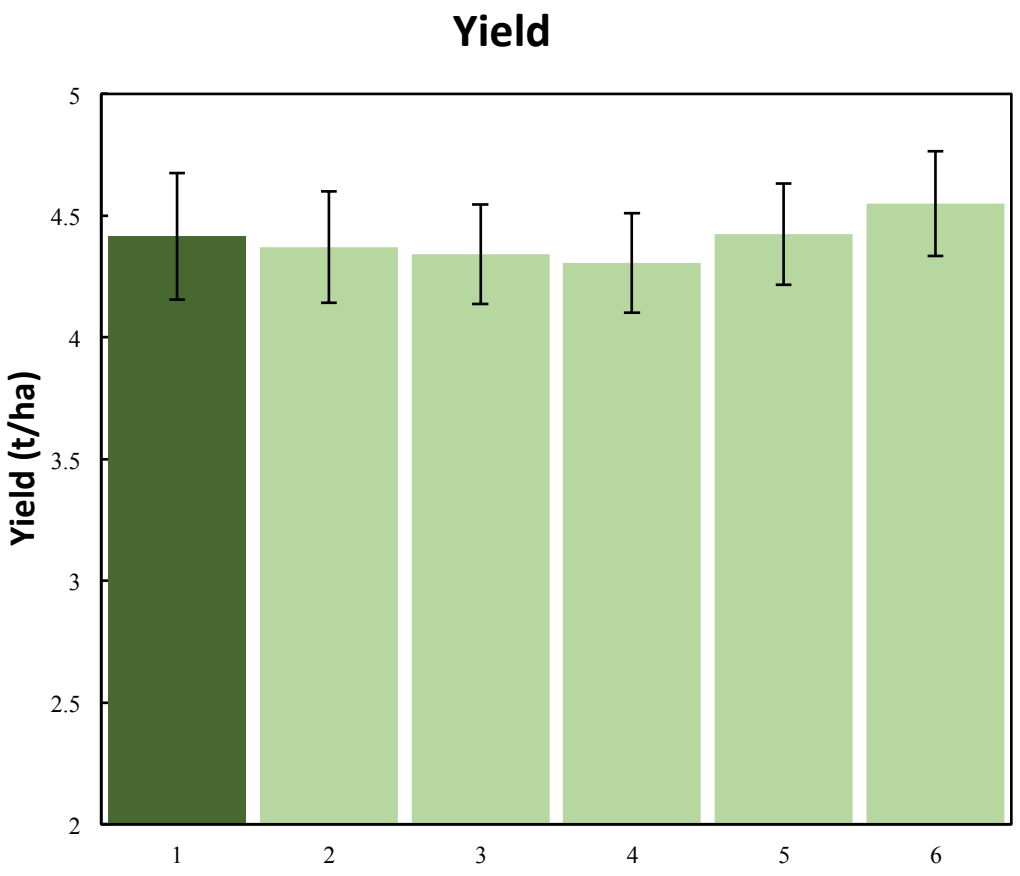


No effect on *Aphanomyces*

Alternative seed treatments - field

Product I (2019) – combining peas



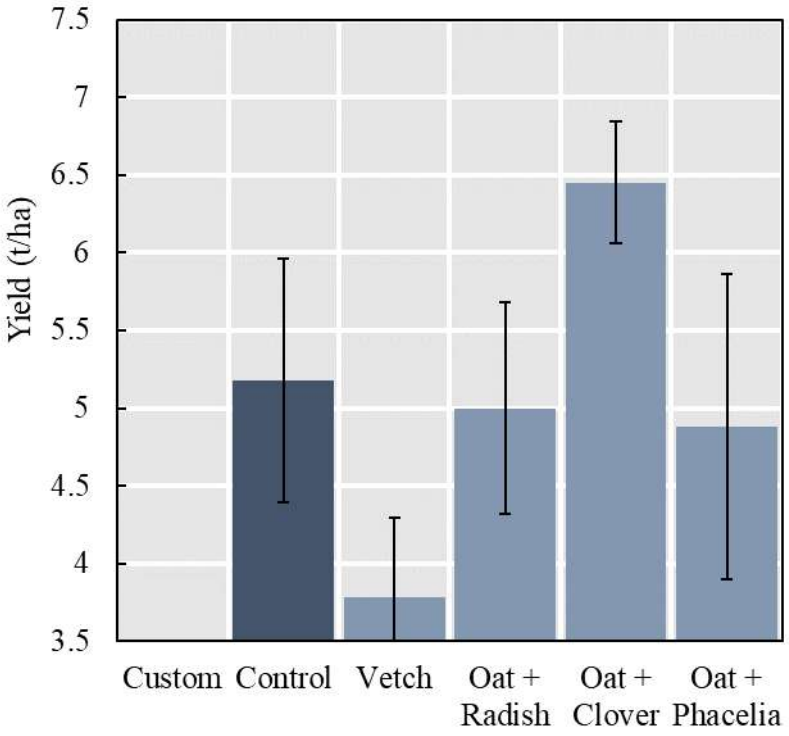


Four products, four field trials performed, results not consistent.

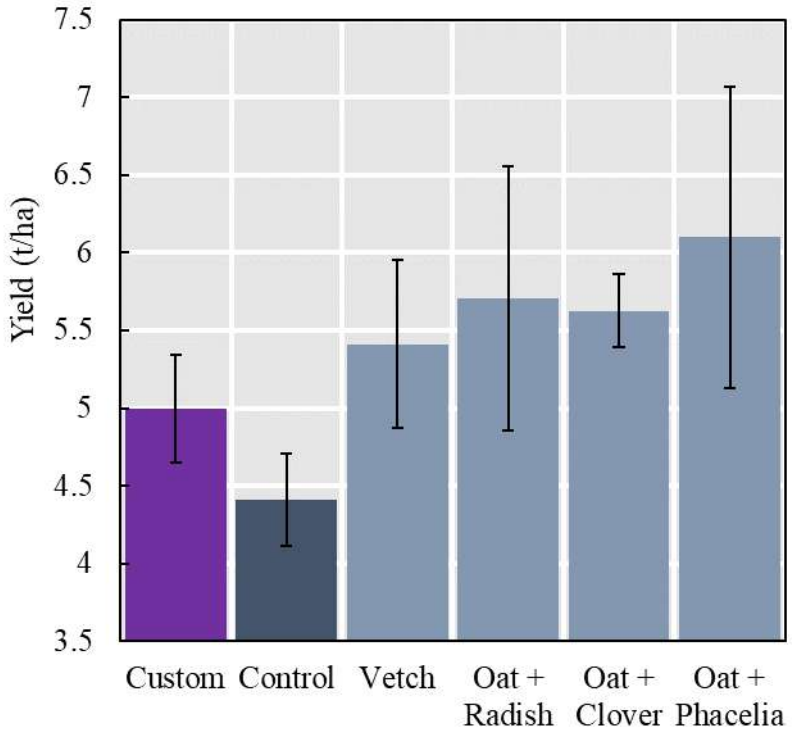
Cover crops

- Black oats in combination with
  - Oil radish
  - Phacelia
  - Berseem clover
- Winter vetch

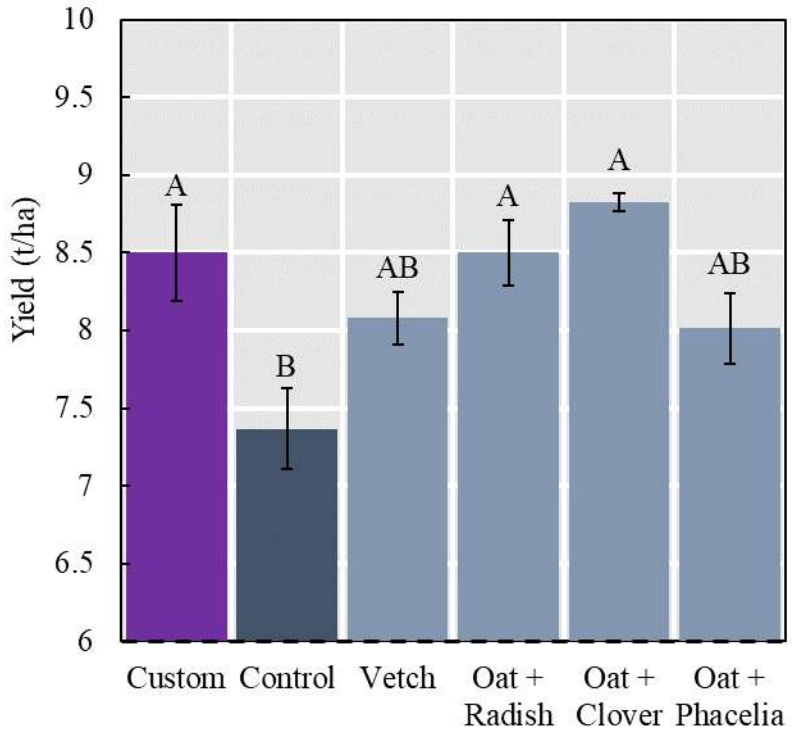
Pea yields 2019



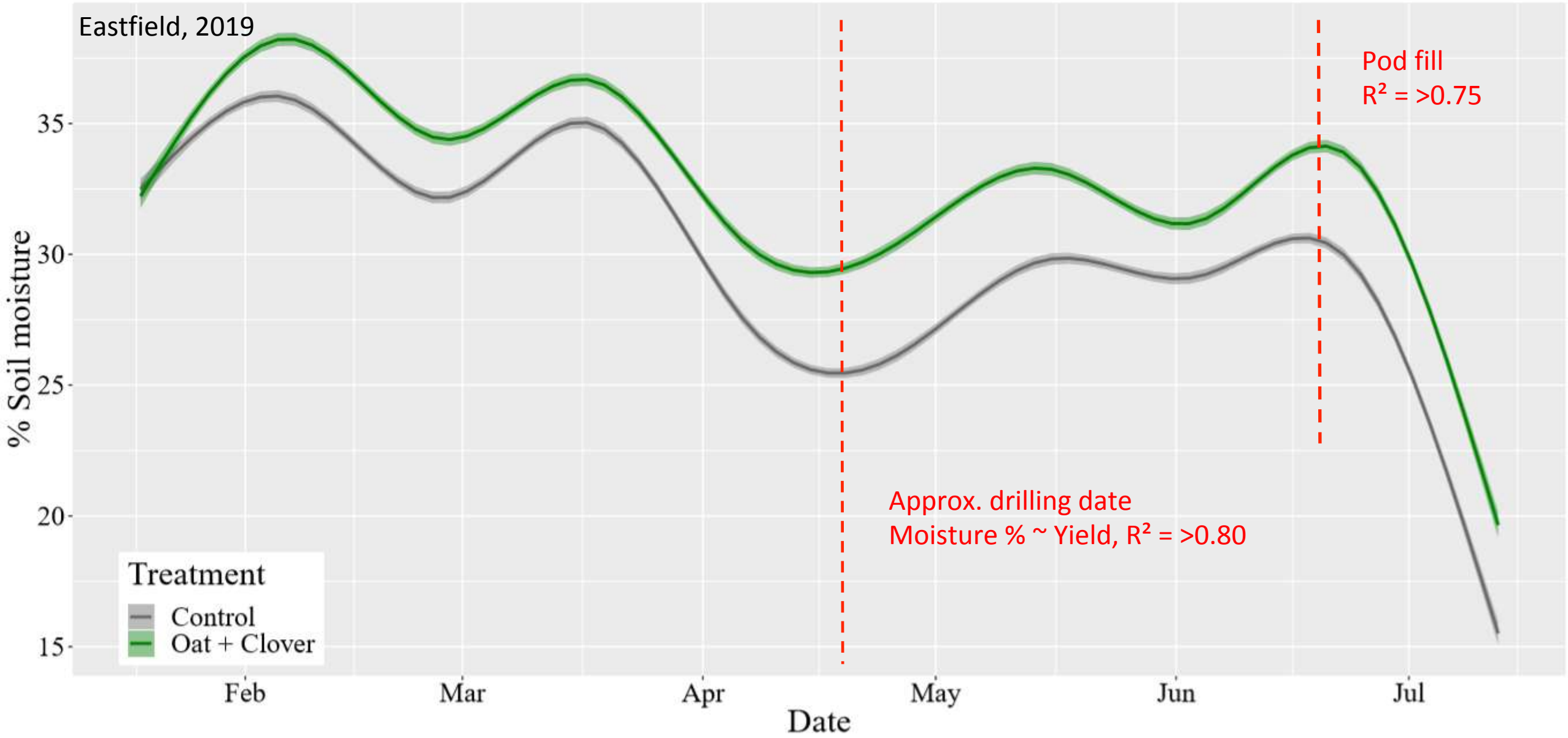
Vicarage, power harrow, 2019



Vicarage, plough, 2019



Eastfield, 2019

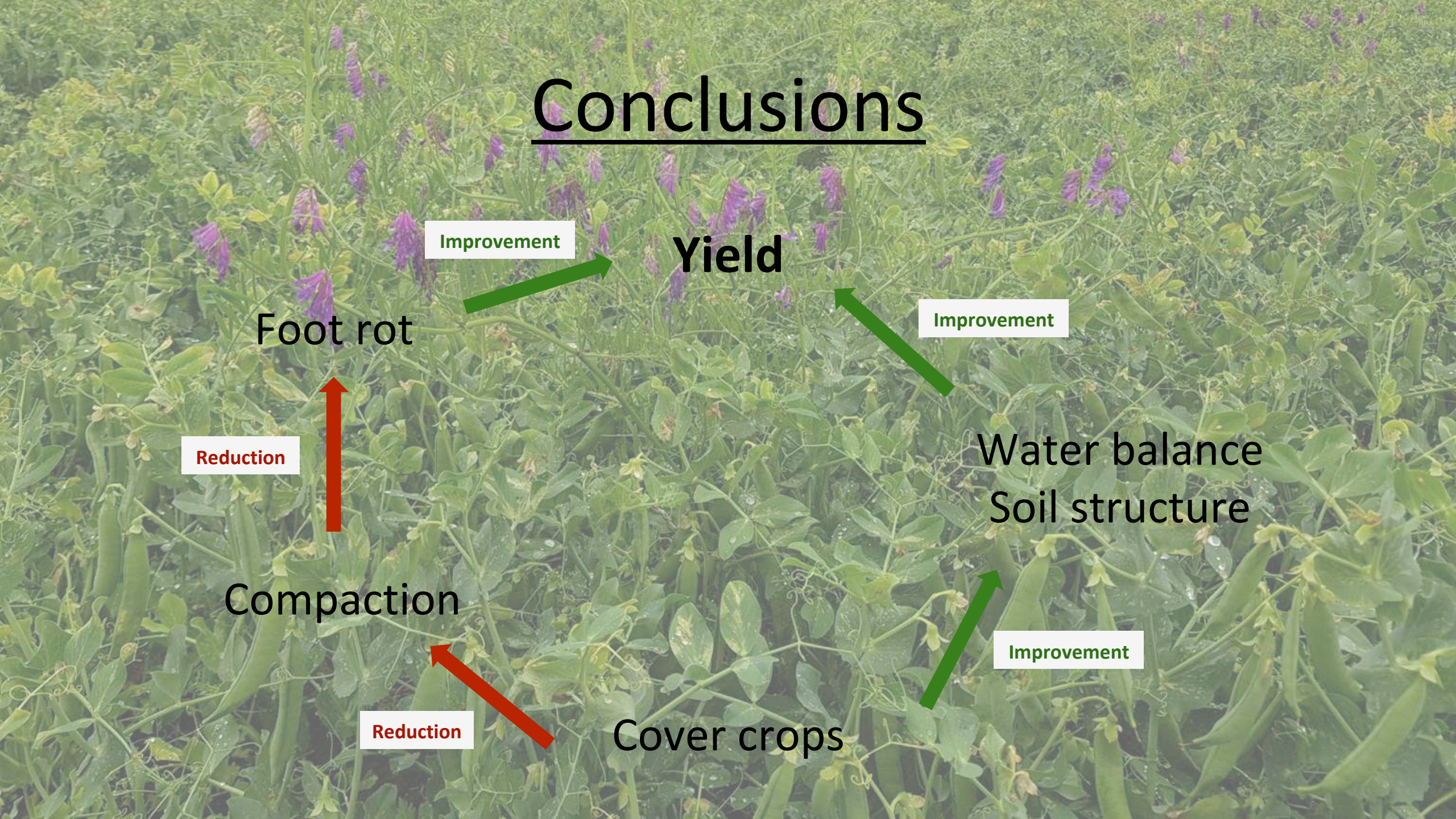


Increased moisture retention at drilling and during pod fill improved yield.

Soil structure

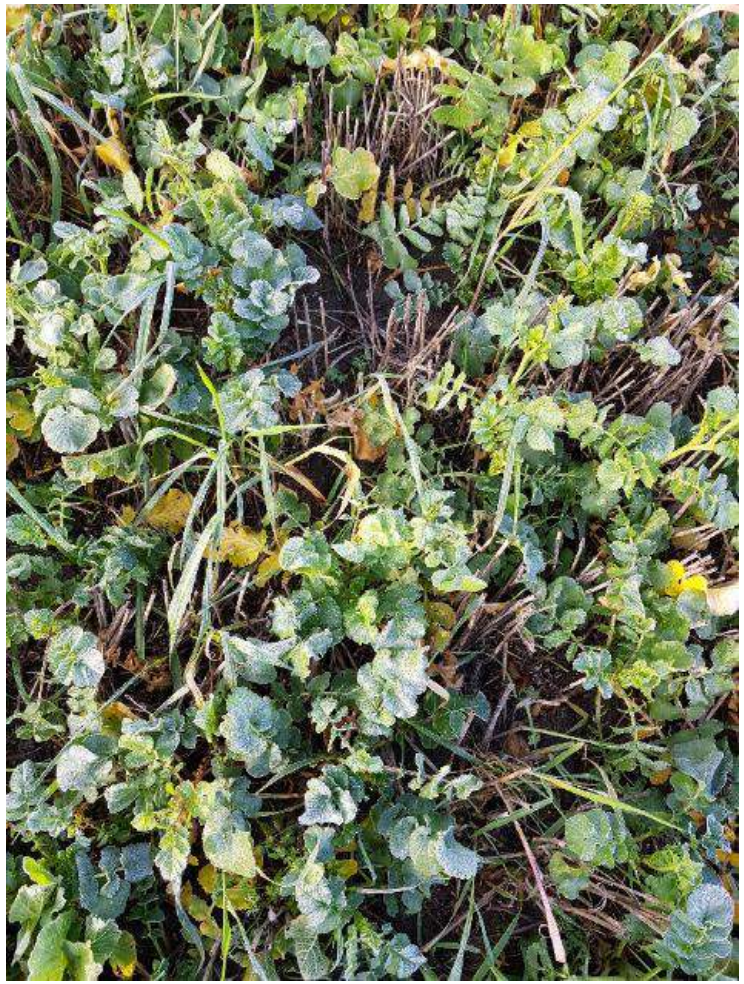
Good structure vital for correct root development and thus resilience to stress and disease.

Conclusions



Recommendation

- Oat based cover crop mixtures - good partners are phacelia, potentially clover or vetch (no negative impact on foot rot observed)
- Sow clover carefully – does not like to be buried
- Best avoid using oil radish prior to peas – seems to increase foot rot risk



Recommendation

- Drill cover crops early, ideally mid-August (mid-September at the very latest)
- Destroy cover crops about 6 weeks prior to drilling peas (from around the end of January)
- Shallow cultivations prior to peas seem sufficient – no contamination issues and preserves positive effects on soil structure

Thank you

- Green Pea Company
- Holbeach Marsh Co-operative
- Bruce Farms

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- Technical reports on the cover crop work can be found at https://www.pgro.org/r-d-news/