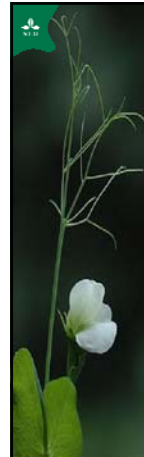


Impact of *Brassica* Cover Crops on the Management of Pea Crops and *Aphanomyces* Root Rot of Pea

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Background

Importance of pea:


- High protein content (21-25)%
- Can fix atmospheric nitrogen (150-200 kg)/ac
- Pea can grow as mixed or single crops
- Growing attention as organic pea for animal feed

Pea production:

- 25 million acres in the world
- In Sweden, 52000 tonnes pea was produced in 2009, which is 80% more than last year (source: www.scb.se)

Problems of pea production:


- Soil compaction
- Nutrients deficiency
- Aphanomyces* pea root rot (10-30) % total pea production losses)



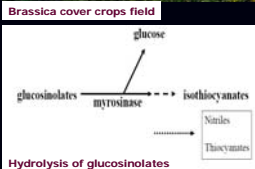
Brassica crops

Uses of *Brassica*:

- Vegetables, oilseed, condiment & forage crops
- Medicine
- Bio-remediation
- **Cover crops**
- **Bio-fumigation**

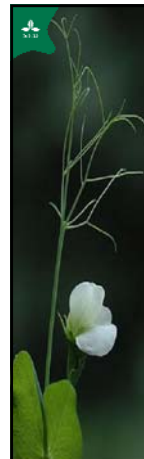


Brassica cover crops field



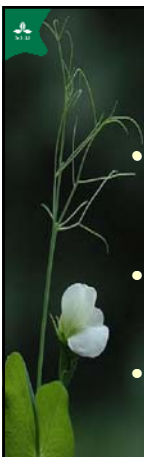
Hydrolysis of glucosinolates

The diagram shows the hydrolysis of glucosinolates. Glucosinolates are hydrolyzed by the enzyme myrosinase into glucose and isothiocyanates. Isothiocyanates can further break down into Nitriles and Thiocyanates.




Our interest

- *Brassica* biomass can **suppress** *A. euteiches* and *Aphanomyces* pea root rot.
- This biomass can **improve** soil quality
- Incorporated biomass have any effects on **establishment of rhizobia** on pea root nodules



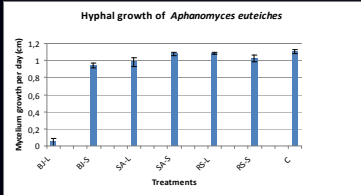
Impact of *Brassica* biomass on pea crops

- Effect of volatiles (ITCs) from hydrolyzed glucosinolates (GSLs) in *Brassica* biomass, on hyphal growth of *A. euteiches*
- Effect of incorporated *Brassica* biomass on the suppression of *Aphanomyces* pea root rot
- Also investigated the effects of *Brassica* biomass on pea seeds germination, pea plant growth and pea root nodulation

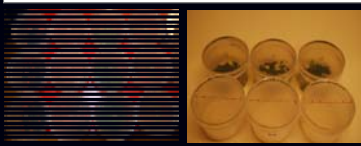


Effects of volatile substrates

Hyphal growth of *Aphanomyces euteiches*



Treatments	Hyphal growth per day (cm)
B-I	0.1
B-S	0.9
S-I	0.9
S-S	1.0
B-I	1.0
B-S	0.9
C	1.0



Glucosinolates in plant tissues

Brassica species	Root $\mu\text{mo l/g}$	Shoot $\mu\text{mo l/g}$	Types of glucosinolates
<i>Raphanus sativus</i>	4	1	4-methylsulphinyl-3-butenyl glucosinolate
<i>Brassica juncea</i>	6	6	Propenyl glucosinolate
<i>Sinapis alba</i>	2	1	4-hydroxybenzyl glucosinolate

Impact of *Brassica* biomass on pea root rot and germination in peat soil

DSI and Germination of pea in garden soil

Impact of *Brassica* biomass on pea root rot, germination & shoot growth in fresh field soil

DSI, germination and shoot weight of pea

Impact of *Brassica* biomass on pea shoot growth in fresh field soil (not inoculated)

DSI, germination and shoot weight of pea

Conclusions

- *Brassica* suppressed of hyphal growth
- *Brassica* also suppressed *Aphanomyces* root rot
- Green-manure from *Brassica* influence pea plant growth and pea root nodulation

Future planning

- Effective concentration of toxic substances on suppression of *A. euteiches* will be investigated
- Suitable sowing time of pea seeds in biomass incorporated soil for highest suppression will be investigated
- Soil physical, chemical and biological properties will be determined after incorporation *Brassica* biomass



Thank You