



Impact of organic N on corky root in organically cultivated greenhouse tomatoes

Anna Mårtensson¹ and Hanna Friberg²

¹Department of Soil and Environment

²Department of Forest Mycology and Pathology

Swedish University of Agricultural Sciences, Uppsala,
Sweden

Corky root rot

Wilting of affected plants,
brown corky swelling of the
root, suberisation

Major soil-borne disease in
Swedish organic tomato production



Organic tomato production

According to the Swedish organic regulations tomatoes have to be cultivated in soil – that is liquid cultures not allowed

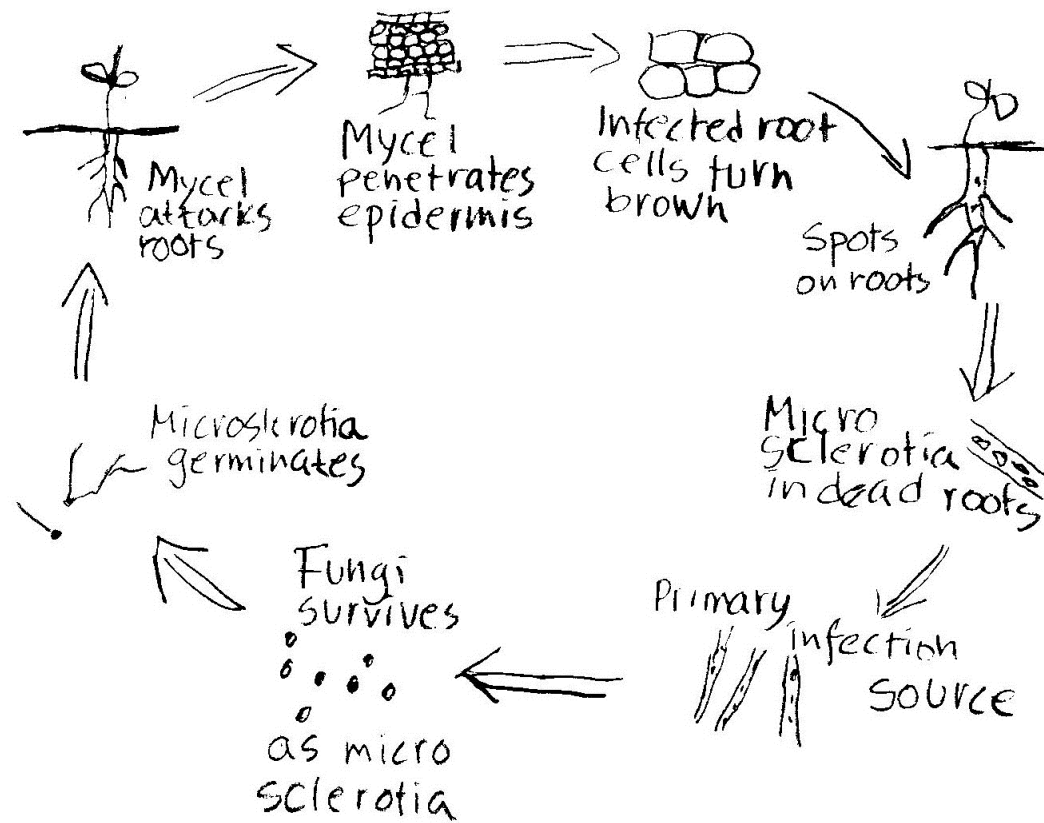


Why a problem in organic cultivation?

- The same substrate culture after culture
- Symptoms may occur after culturing in the same substrate for no more than 2 years
- After 5-6 years harvests can be reduced by 75%
- The sclerotia survives
- It colonizes the root system of hosts and persists for a long time in the soil
- Spread is facilitated by infected soil and handling of infected tools



Lifecycle of corky root rot



Applicable control measures



Solar radiation of the substrate



Soil steam sterilization



Grafting on resistant rootstocks



Cultivation measures such as biological control, fertilization

Our strategy

- 1) Fertilization
- 2) Biological control with preparates available on the Swedish market
- 3) Biofumigation
- 4) A combination of 1, 2, 3

1. Fertilization

We tested the hypothesis that a proper N fertilization regime decreases disease severity



Inorganic N-levels and forms

Nitrate:ammonium 1:3

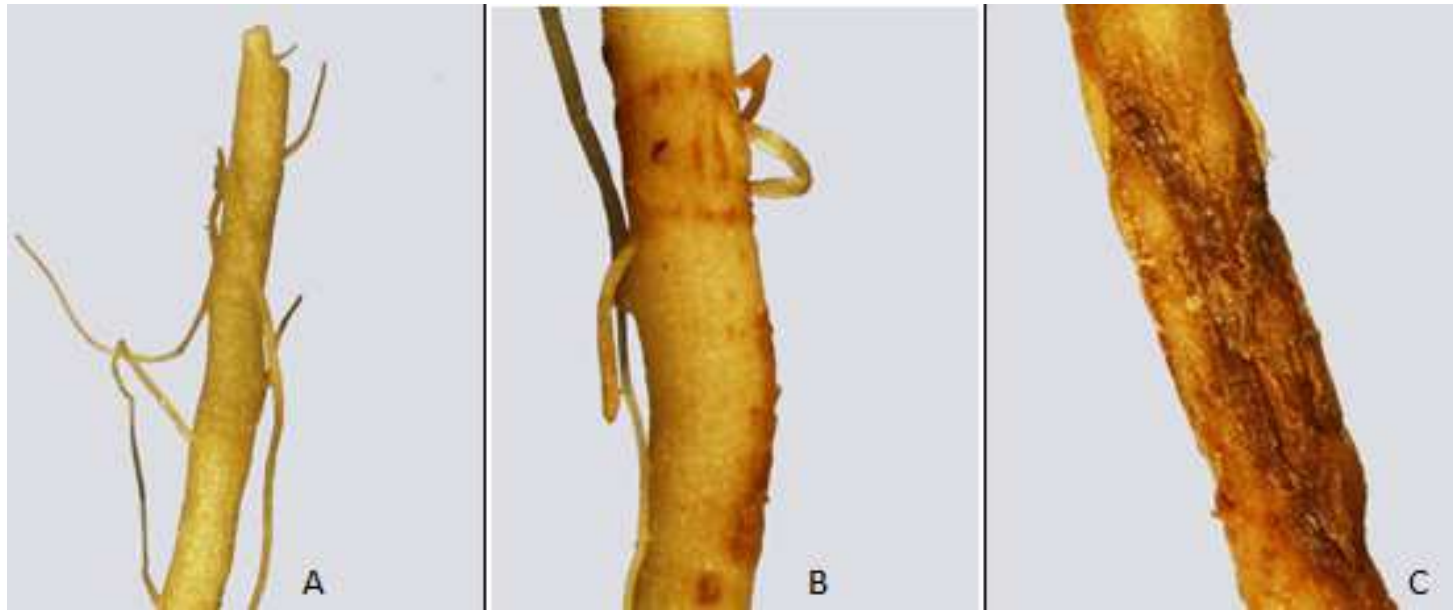
1:1

3:1

Two N-levels 0.5

(g N per plant and week) 0.7





Disease severity index, A=healthy, B=moderately infected, C=severely infected tomato root samples

Results

- Increased symptoms at increasing N levels and increased pH
- Most symptoms at high N-level in the form of nitrate-N (->high pH in the substrate)

Practical recommendations



Do not over fertilize with inorganic N, especially nitrate-N

Keep an eye on substrate pH, avoid too high pH

How to continue?

Inorganic N not allowed in organic cultivations

Our hypothesis that a
proper N fertilization regime decreases disease severity
not completely confirmed or rejected, maybe a pH effect



Organic N- and pH-levels

pH	Organic N added (g · N plant ⁻¹)
5.8	2.5, 5.0, 7,5
6.5	2.5, 5.0, 7,5
7.5 (MgCO ₃)	2.5, 5.0, 7,5
7.5 (CaCO ₃)	2.5, 5.0, 7,5



Results

N

- Disease severity tends to increase at higher N-levels (not statistically significant)

pH

- Increased pH reduced yields, no difference depending on type of liming (MgCO_3 or CaCO_3)
- Disease severity tends to increase at higher pH –levels (not statistically significant)

- Our hypothesis that a proper N fertilization regime decreases disease severity is confirmed
- pH is of importance,
pH above 7 should be avoided




Practical recommendations

Fertilization with organic N at high levels does not affect disease severity and it increases yields – Keep on fertilizing!

High pH of the soil substrate (above 7) is not recommended, may increase disease severity

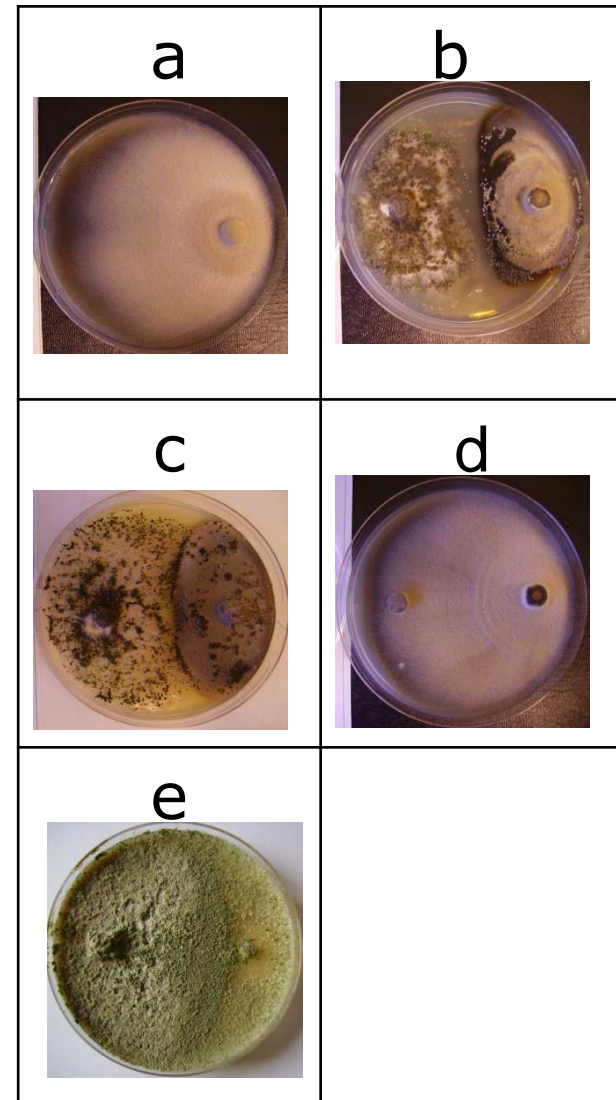


Our strategy

- 1) Fertilization 
- 2) Biological control with preparates available on the Swedish market
- 3) Biofumigation
- 4) A combination of 1, 2, 3

- a) Corky root rot alone
- b) Prestop (*Gliocladium catulenum*)
- c) Gliomix (*Gliocladium* spp)
- d) Mycostop (*Streptomyces viridis*)
- e) Binab (*Trichoderma harzianum* + *T. Polysporum*)

e best, d poor



Results



- All treatments improved root development, more uninfected roots occurred and yields increased
- No differences between manufacturer's practises and the studied 10 times higher applications

Practical recommendations

Use of commercial biological control agents reduces disease severity – no need to overdose



Our strategy

- 1) Fertilization 
- 2) Biological control with preparates available on the Swedish market 
- 3) Biofumigation **on going**
- 4) A combination of 1, 2, 3 **in planning stage**

3. Biofumigation

Substances which "sanitize" the soil and hampers development/growth of the fungi

Could be originating from various Brassica



Thanks for your attention, questions now
or later are welcome



Hanna Friberg (SLU)



Anna Mårtensson (SLU)
anna.martensson@slu.se



Birgitta Rämert (SLU)



Elisabeth Ögren (Regional advisory consultant)
