Soil suppressiveness in in greenhouse horticulture

possible mechanisms and options for sustainable management

A.W.G. van der Wurff, M.A. van Slooten, R. Hamelink, S. Böhne, W. van Wensveen

Outline

- Definition
- Experimental field Topsoil (PPO-BBF) as reference
- Suppressive soils in greenhouses?
  - organic only?
  - pathogen specific?
  - biology or physical/chemical?
- Framework
- Soil Suppressiveness model

Greenhouse Horticulture future perspective

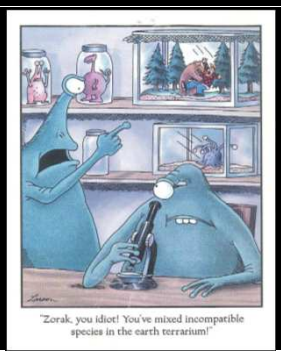
Pressure on crop protection agents

Energy savings

Pressure on crop protection agents

Legal admission

Underestimation of biology in biological agents



"Zorak, you idiot! You've mixed incompatible species in the earth terrarium!"

Is there a sustainable alternative?

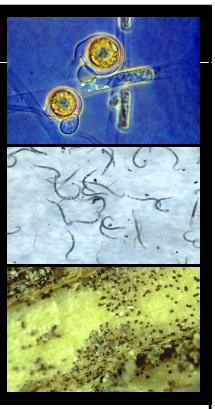
WAGENINGEN UR

Use the competence of the soil?

- Does bulk soil suppressiveness exist in greenhouses?
- Does it vary among different soil pathogens?
- Why does it vary?
- Can we use it?

WAGENINGEN UR

- The "inocula"
  - *Pythium aphanidermatum* (Oomycota)
  - *Meloidogyne incognita* (Nematoda)
  - *Verticillium dahliae* (Mycota)



WAGENINGEN UR

2009 - 2010

5640
bio-assays

WAGENINGEN UR

Experimental field Topsoil (PPO-BBF) as positive control

Organic Matter gradient:

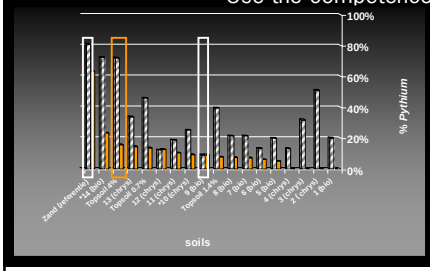
- 0.7%
- 1.4%
- 4.0%

(Lisse, 2005-2009)

Van Os GJ, van der Bent J & Conijn C (2009) Organische stof en ziektewering in de sierteelt. Gewasbescherming 40: 22.

WAGENINGEN UR

Use the competence of the soil?



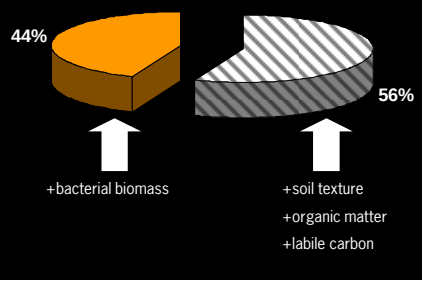
sterilized
non-sterilized

chrys=chrysanthemum
bio=organic fruit vegetables
Topsoil=experimental field BBF
Zand=sand as a reference

WAGENINGEN UR

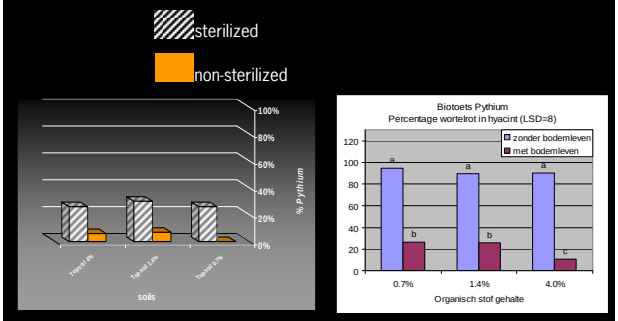
Pythium aphanidermatum

Proportions suppression in data set



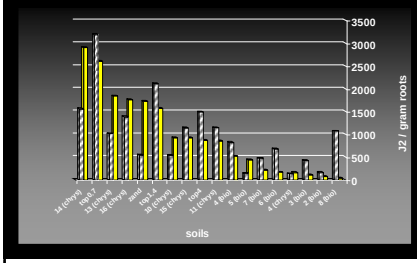
WAGENINGEN UR

Topsoil as a positive control



WAGENINGEN UR

Use the competence of the soil?



sterilized

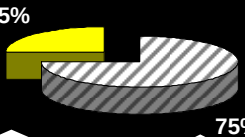
non-sterilized

chrys=chrysanthemum
bio=organic fruit vegetables
Topsoil=experimental field BBF
Zand=sand as a reference

WAGENINGEN UR

Meloidogyne incognita

Proportions suppression in data set



+chitinolytic bacteria
+soil dry matter
+frequency dividing cells
-fungal biomass

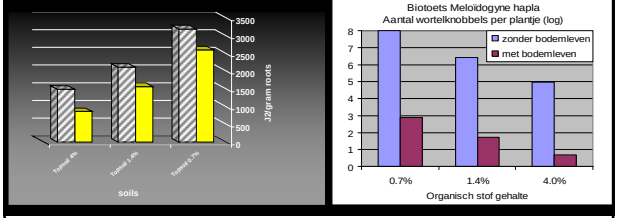
+calcium, sodium, ammonium *etcetera*
+EC
-pH

WAGENINGEN UR

Topsoil as a positive control

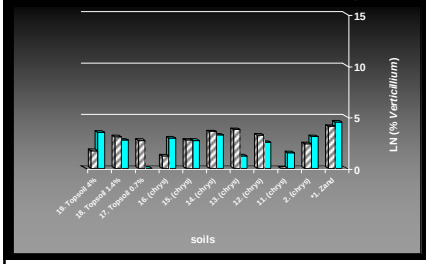
sterilized

non-sterilized



WAGENINGEN UR

Use the competence of the soil?



sterilized

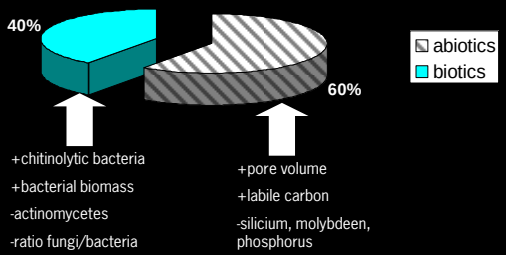
non-sterilized

chrys=chrysanthemum
bio=organic fruit vegetables
Topsoil=experimental field BBF
Zand=sand as a reference

WAGENINGEN UR

Verticillium dahliae

Proportions suppression in data set



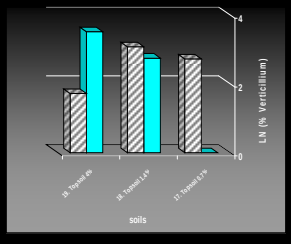
+chitinolytic bacteria
+bacterial biomass
-actinomycetes
-ratio fungi/bacteria

+pore volume
+labile carbon
-silicium, molybdeen, phosphorus

WAGENINGEN UR

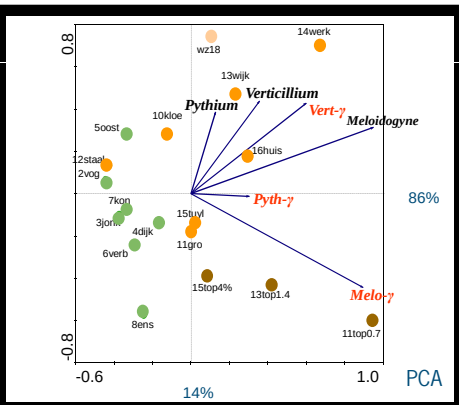
Topsoil as a positive control

sterilized
non-sterilized

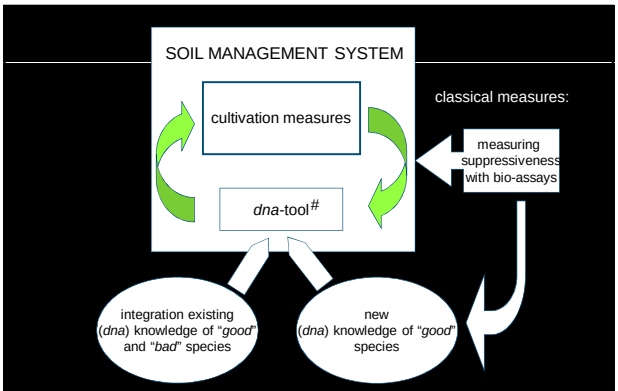


?

WAGENINGEN UR

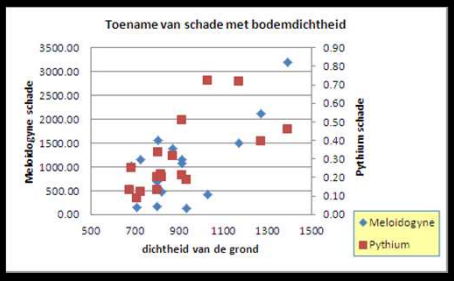


WAGENINGEN UR

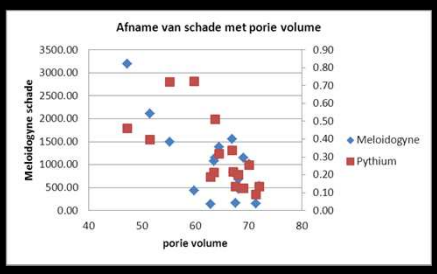


WAGENINGEN UR

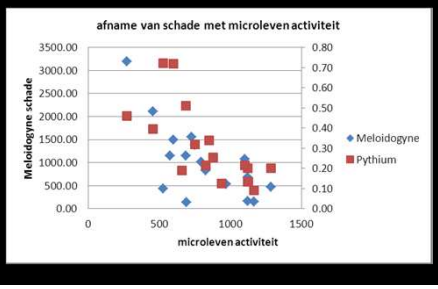
Overbeek, L.S. van; Schoen, C.D.; Bonants, P.J.M. (2010) Bodemindicatoren Gewasbescherming 41 (1). - p. 11.



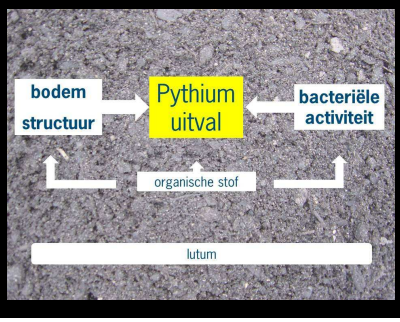
WAGENINGEN UR



WAGENINGEN UR



Soil suppressiveness model:



Thank you for your attention!

Do you have questions?

Wageningen UR Glastuinbouw
Innovation for and with greenhouse horticulture