Sustainable cultivation of pulses

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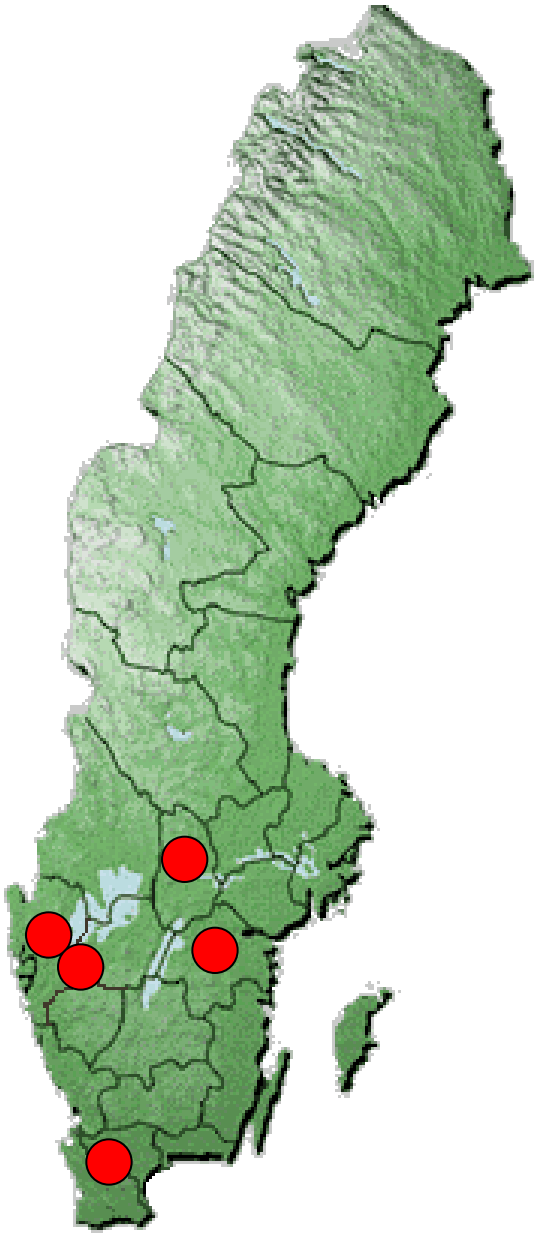
Outline

- Intercropping faba bean and oats and field pea and oats
- Soilborne diseases
- Chocolate spot disease in faba beans

What do we know about Faba beans?



Field experimental sites

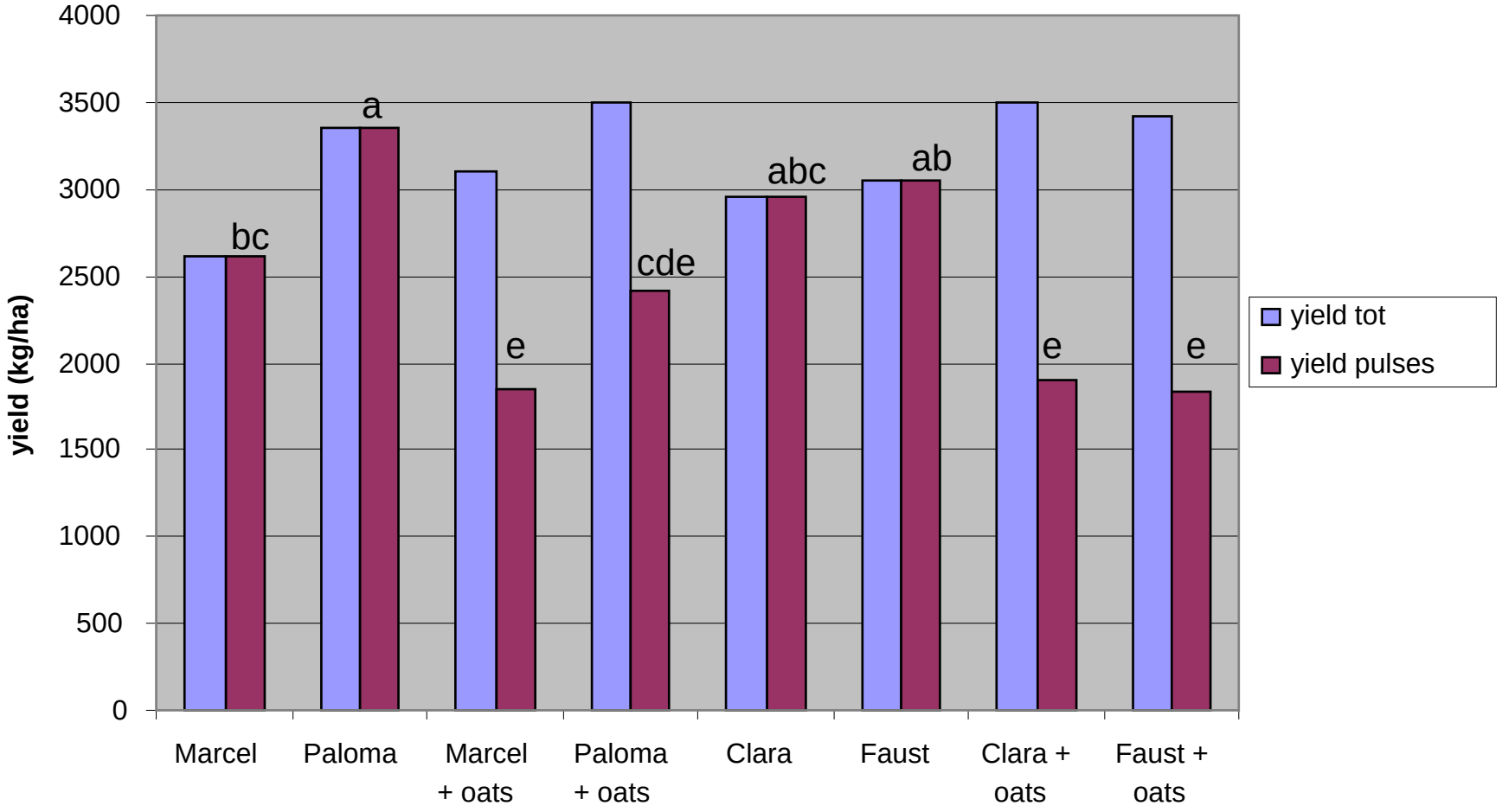
12 experiments 2008-2010

Oats; Belinda
Faba Bean; Marcel, Paloma
Field peas; Clara, Faust

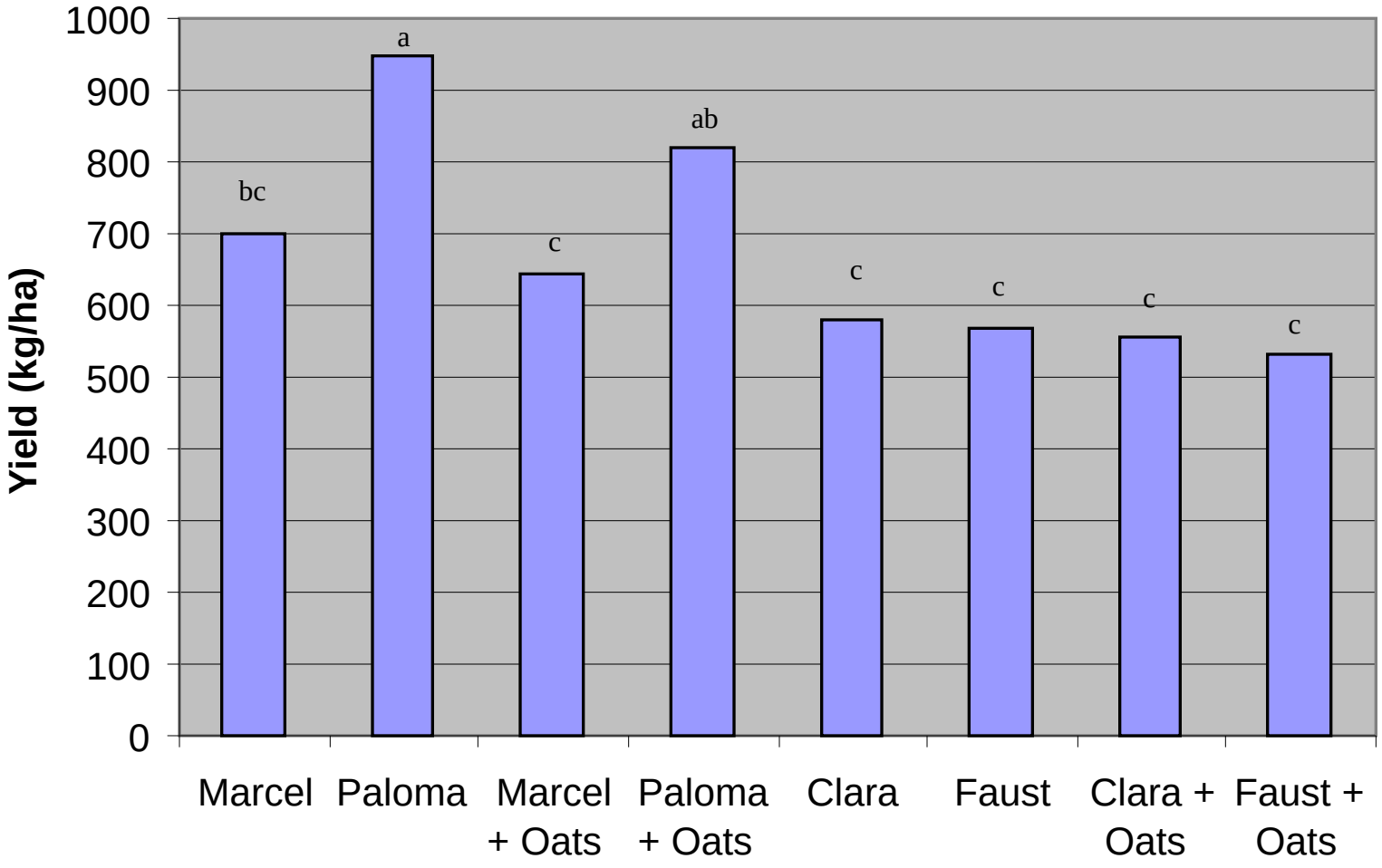
Intercropping
Oats (30 %), pulse crop (70 %)
Pulse crop in pure stand

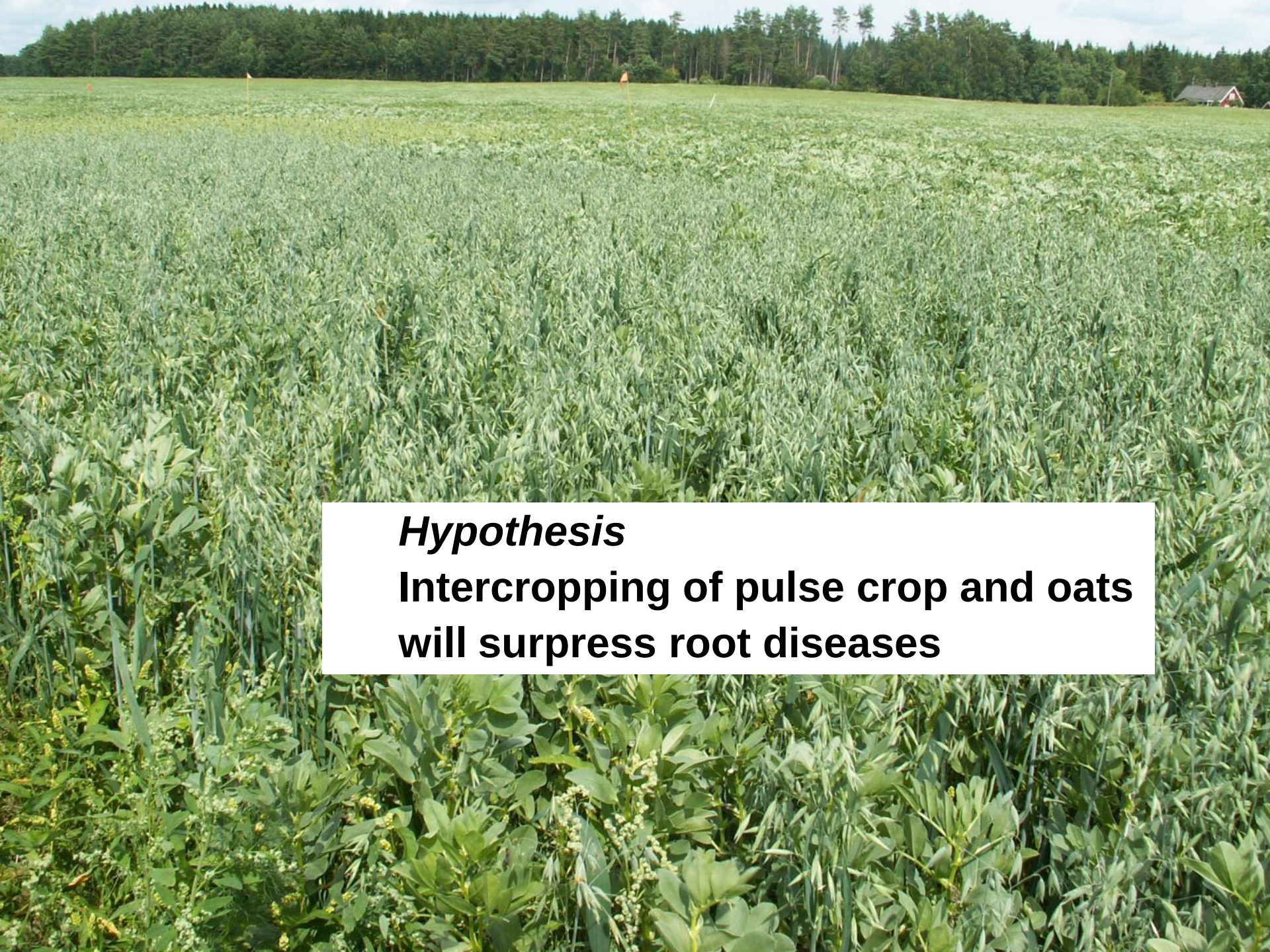
Total yield and yield of pulses

Faba bean: Marcel, Paloma Field pea: Clara, Faust



Protein yield





Hypothesis

Intercropping of pulse crop and oats will surpress root diseases

Soilborne diseases in peas

- ***Aphanomyces eutheiches***
  Sv. Ärtrotröta
  Eng. Aphanomyces root rot


Foto: Lars Persson

- ***Fusarium avenaceum***
  Sv. Rotröta
  Eng. Pea root rot


Foto: Jensen et al

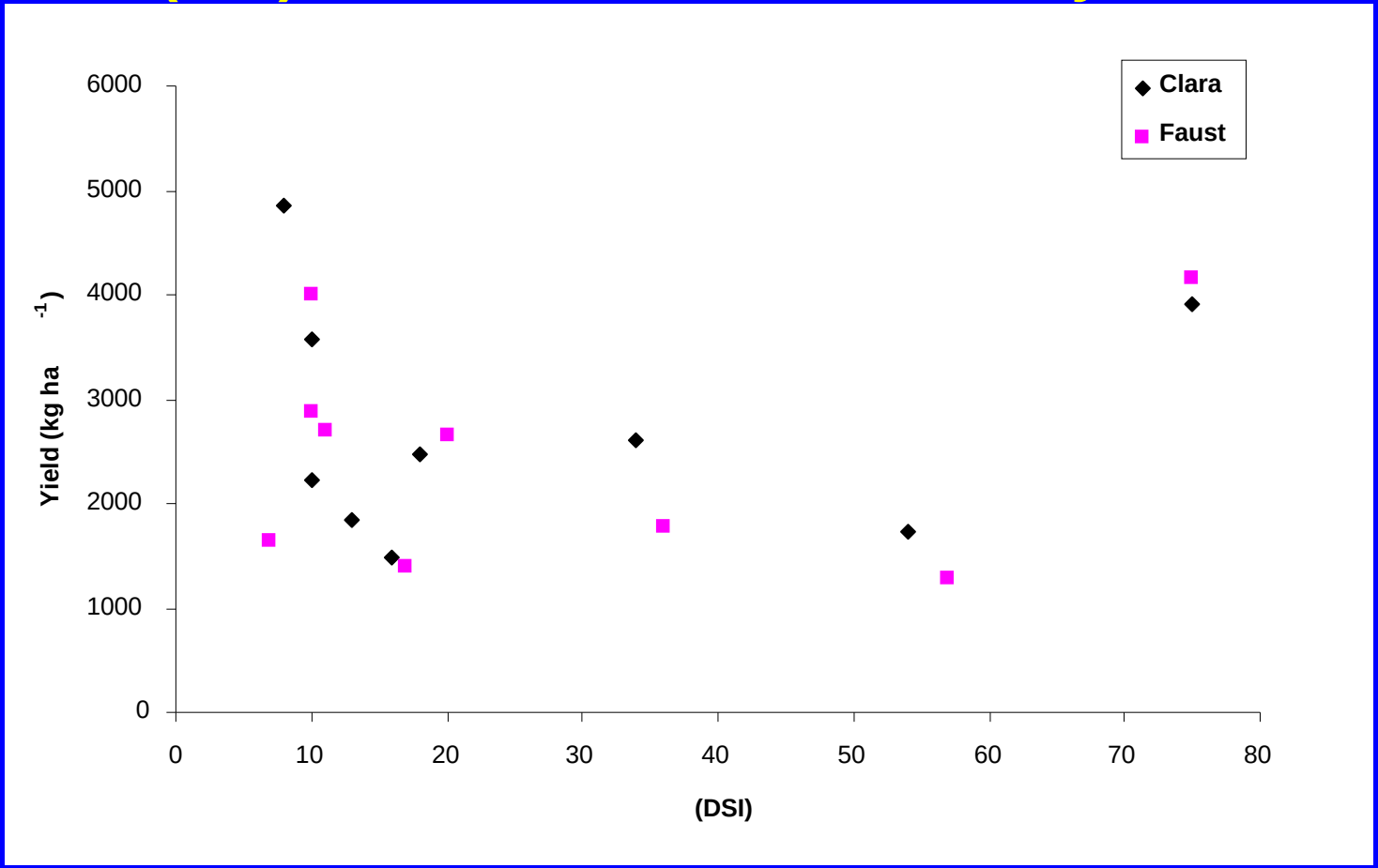
Metod

- Tio plants from each plot were dug up in early July
- Diseaseassessment in six classes (0-100)
- Disease severity index (DSI) calculated

Pea. Disease severity index (DSI) in roots of Clara and Faust in pure stand and intercropped with oats

Treatment	DSI
Cultivar	
Clara	29
Faust	30
p (cultivar)	*ns*[1]
Cultivation	
Pure stand	29,6
Intercropped	29,4
p (cultivation)	*ns*
Experimental site	
2008	
Örebro	9,7 efg[2]
Stjärnsund	7,6 fg
Dingle	35,3 c
Tanum	33,7 c
2009	
Örebro	13,1 def
Dingle	73,7 a
Lysekil	73,4 a
Vanås	57,1 b
2010	
Örebro	9,9 efg
Dingle	6,9 g
Borensberg	17,9 d
Grästorp	15,7 de
p (experimental site)	*<0,001*
CV	15

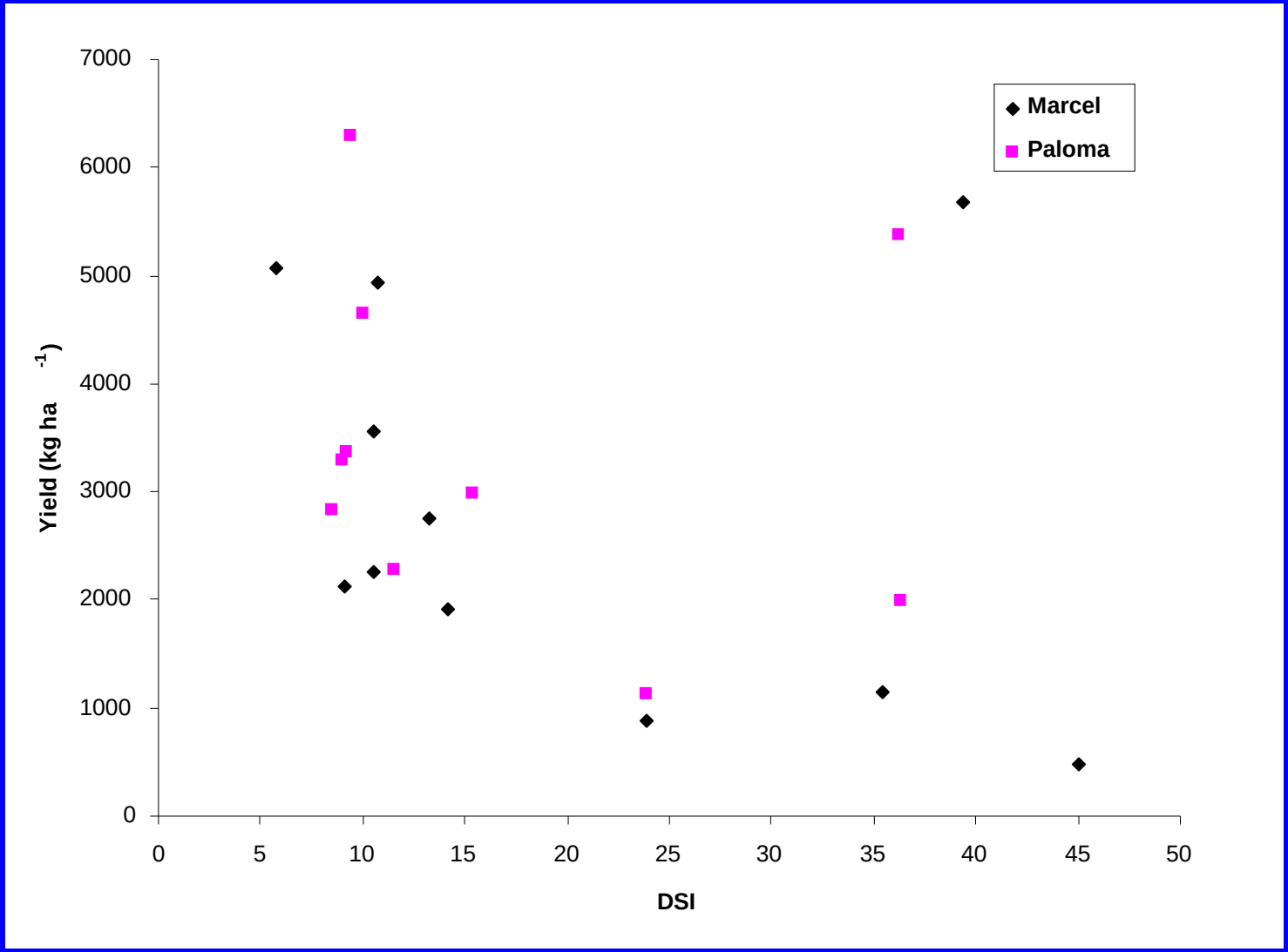
Pea in pure stand. Relationship between means of yield and disease severity index (DSI) of root discoloration in July.

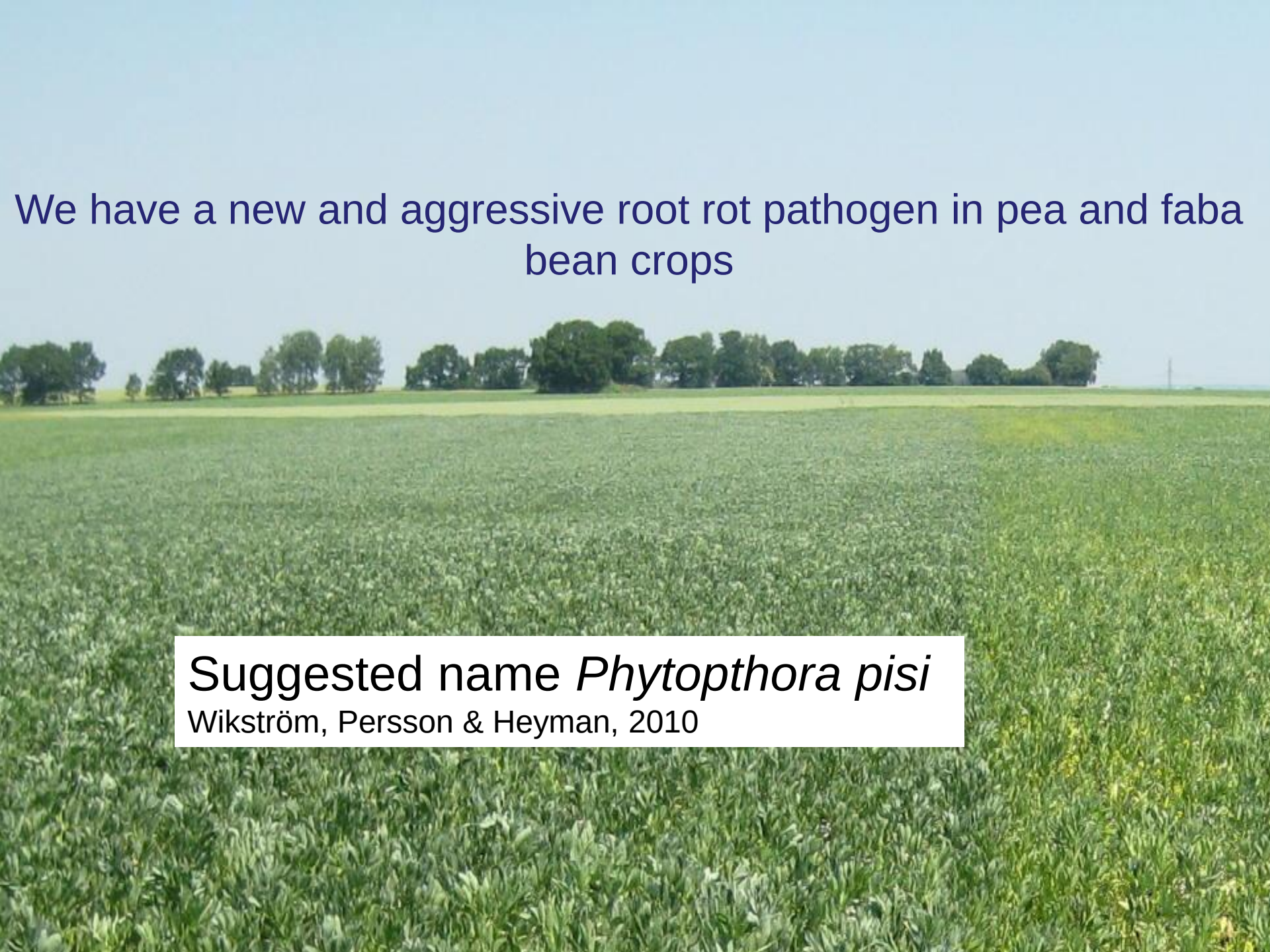


Faba bean. Diesase severity index (DSI) in roots of cultivars Marcel and Paloma in pure stand and intercropped with oats

Treatment		DSI	
Cultivar			
	Marcel	20,9	a[1]
	Paloma	19,7	b
p (cultivar)		*0,014*	
Cultivation			
	Pure stand	20,5	
	Intercropped	20,0	
p (cultivation)		ns[2]	
Experimental site			
2008			
	Örebro	44,4	a
	Stjärnsund	30,7	bc
	Dingle	34,0	b
	Tanum	36,9	ab
2009			
	Örebro	13,7	de
	Dingle	10,8	e
	Lysekil	10,1	e
	Vanås	14,7	de
2010			
	Örebro	9,1	e
	Dingle	8,2	e
	Borensberg	9,6	e
	Grästorp	21,4	cd
p (experimental site)		<0,00 1	
CV		15	

Faba bean in pure stand. Relationship between means of yield and disease severity index (DSI) of root discoloration in July.





We have a new and aggressive root rot pathogen in pea and faba bean crops

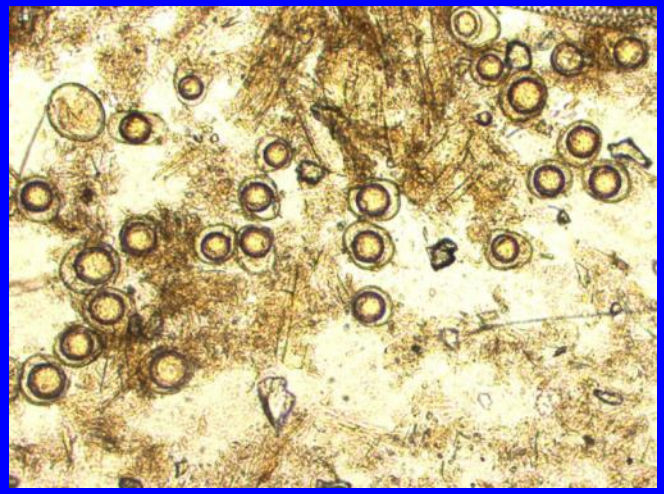
Suggested name *Phytopthora pisi*

Wikström, Persson & Heyman, 2010

Faba beans infected by *Phytopthora pisi*

Source:Wikstr

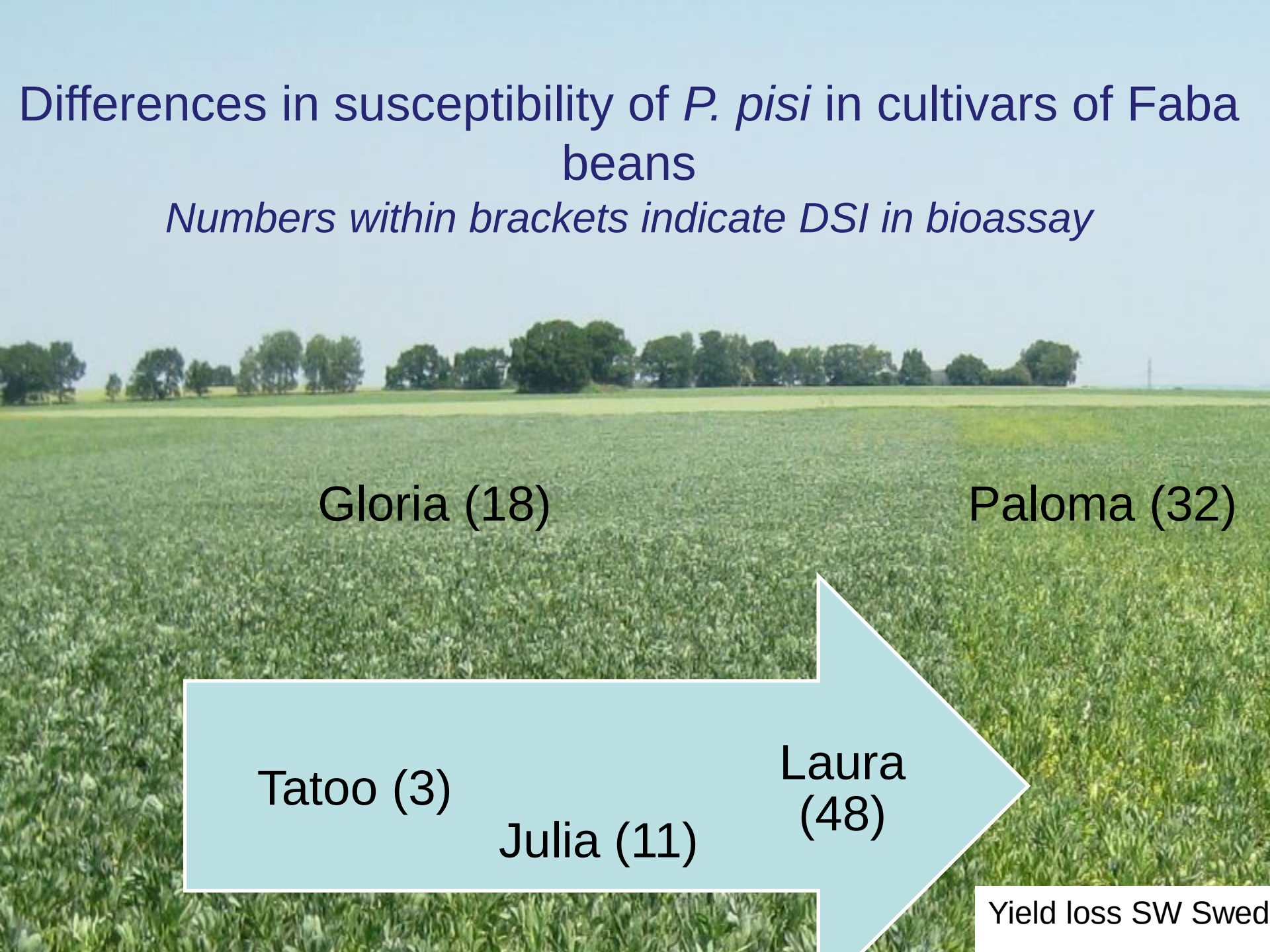
Phytopthora pisi resting spores in pea roots



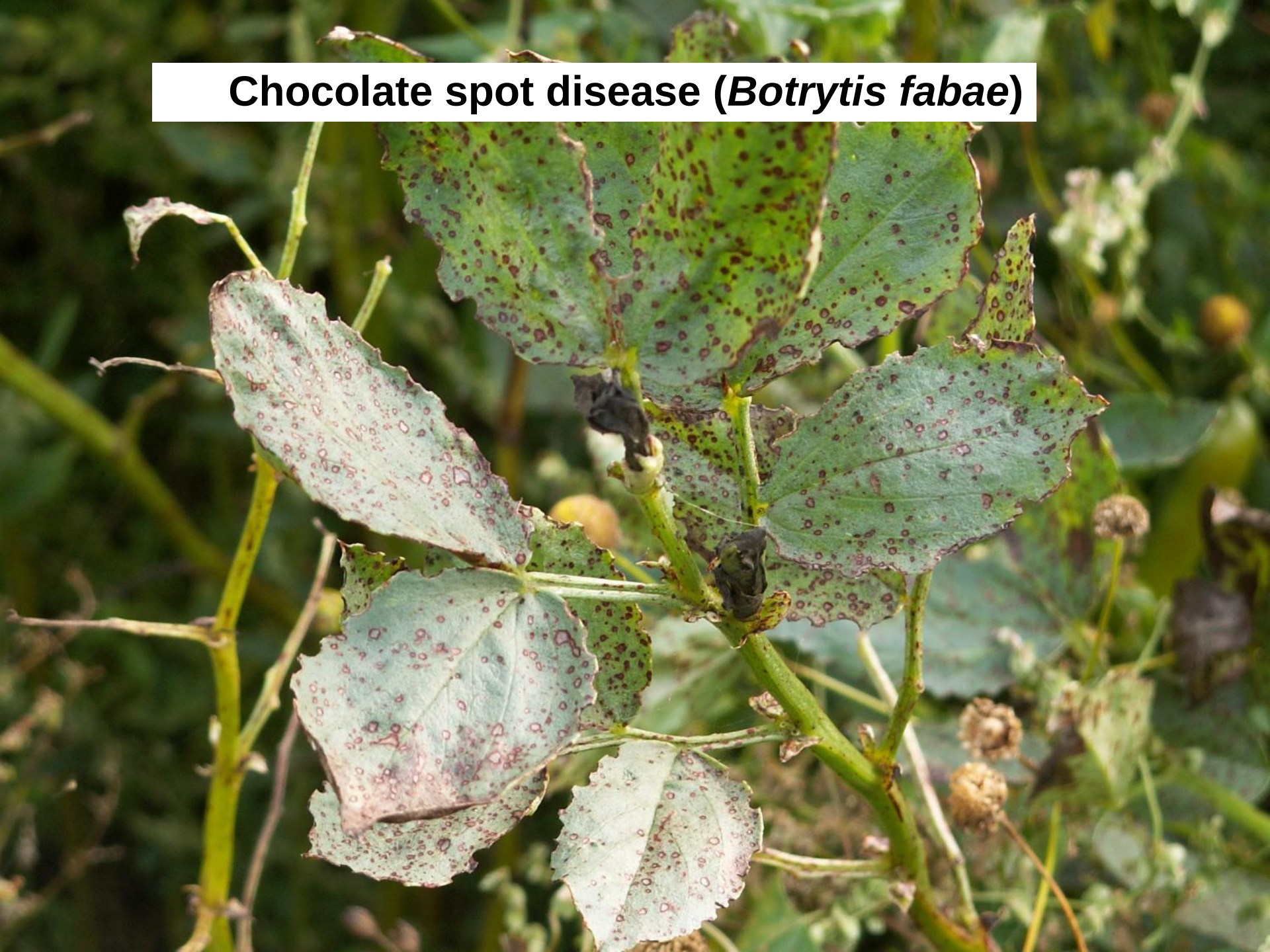
Källa: Wikström et al.

Differences in susceptibility of *P. pisi* in cultivars of Faba beans

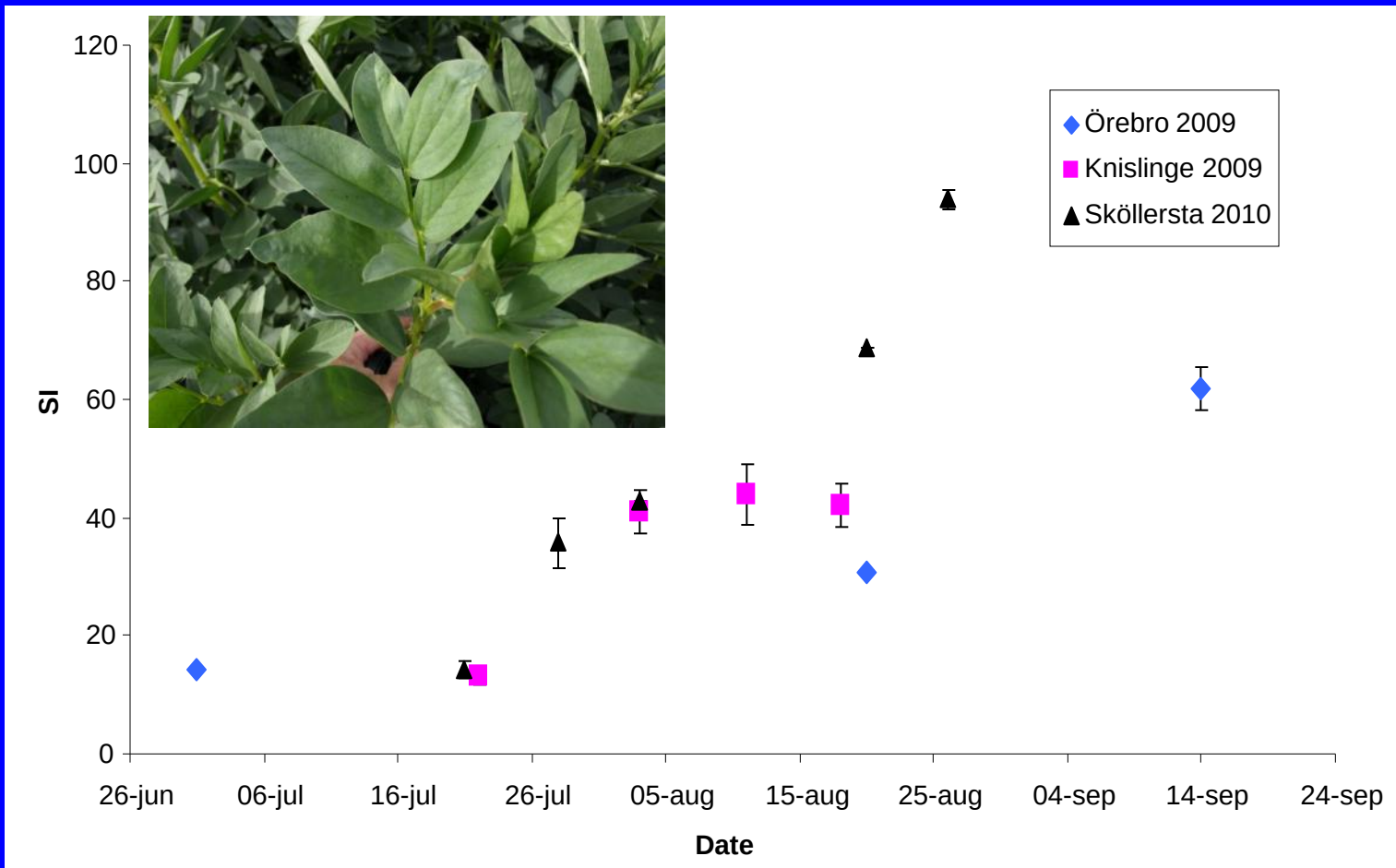
Numbers within brackets indicate DSI in bioassay



Chocolate spot disease (*Botrytis fabae*)



Faba bean. Development of disease severity index (DSI) of leaf spots

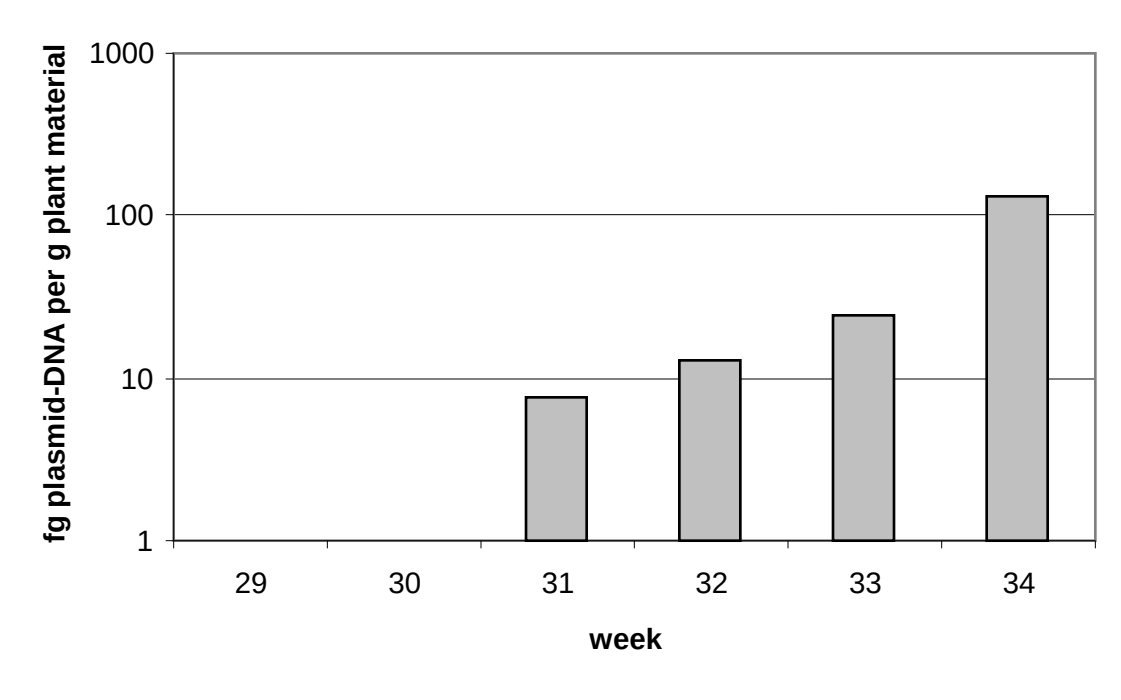


Faba bean. Disease severity index (DSI) of leaf spots in Marcel and Paloma culitvated in pure stand and intercropped with oats.

Treatment	DSI
Cultivar	
Marcel	77,9
Paloma	75,0
p (cultivar)	*ns*
Cultivation	
Pure stand	78,3
Intercropped	74,6
p (cultivation)	*ns*
Experimetal site	
Sköllersta 2010	89,7 [a]
Örebro 2009	63,2 [b]
p (experimental site)	*0,0048*
exp. site x cultivar	
Sköllersta 2010 Marcel	96,8 [a]
Sköllersta 2010 Paloma	82,7 [b]
Örebro 2009 Marcel	59,1 [c]
Örebro 2009 Paloma	67,3 [bc]
p (exp. site x cultivar)	*0,00018*
CV	10,9

Development of a real-time qPCR-metod for detection and quantification of *B. fabae*

Leaf samples from a field at Skänninge 2010 analysed with qPCR for DNA of *B. fabae*



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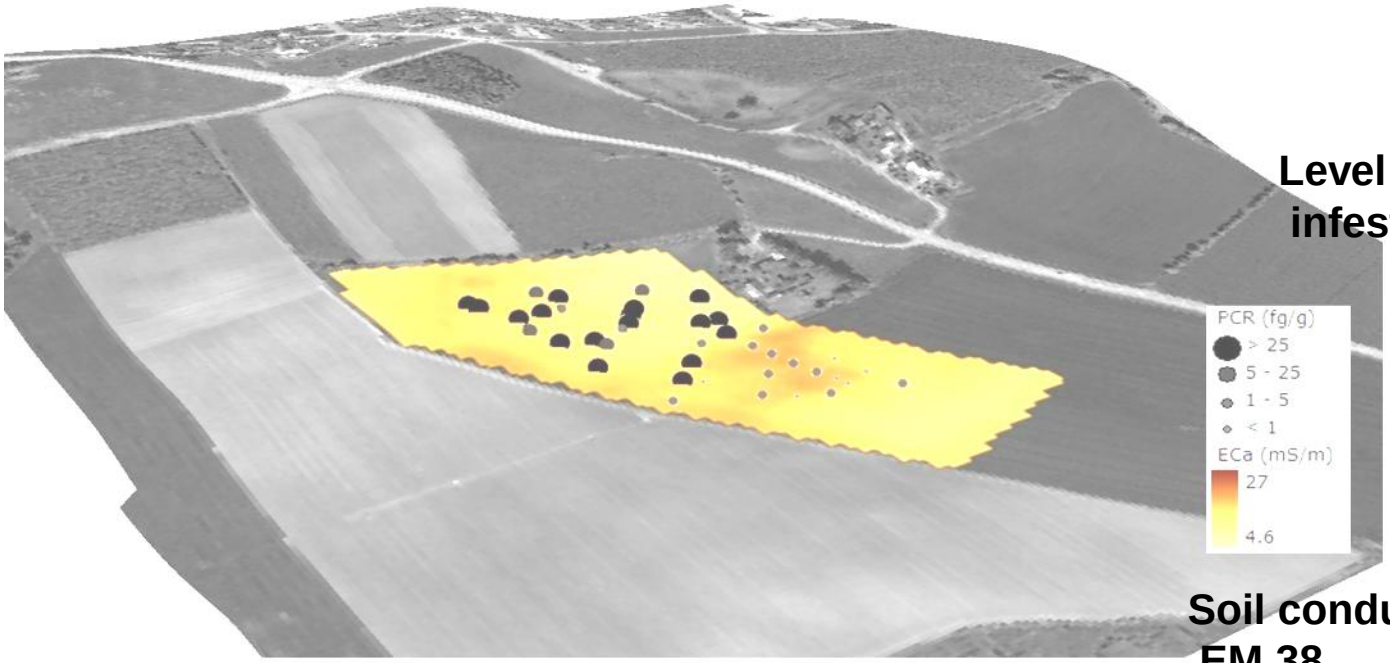
BioSoM

Biological Soil Mapping of Pathogens

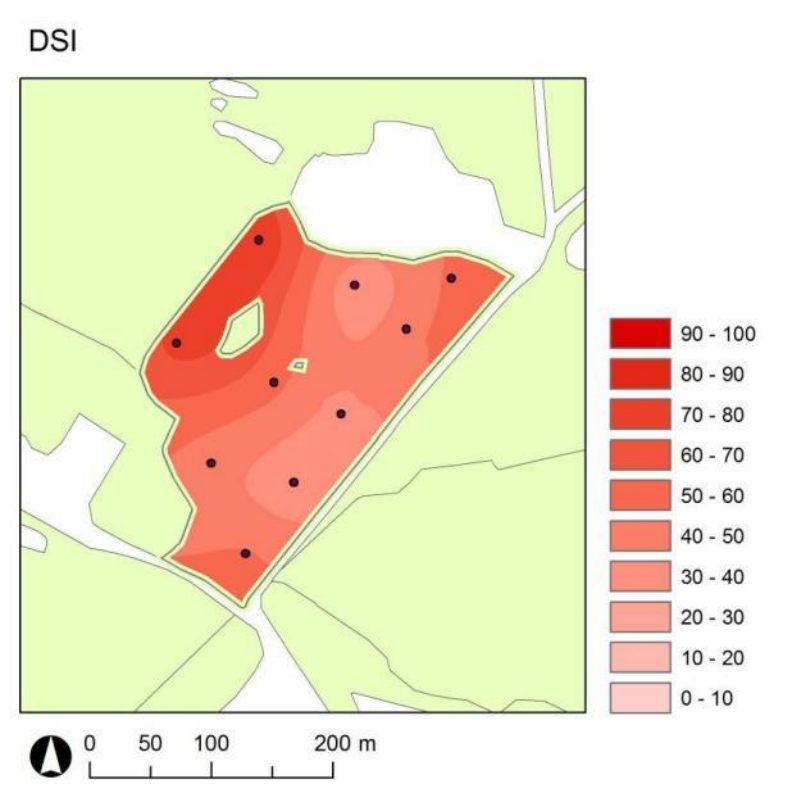
Multidisciplinary Thematic Research Program 2009-2014
The Faculty of Natural Resources and Agricultural Sciences, SLU and eleven stakeholders

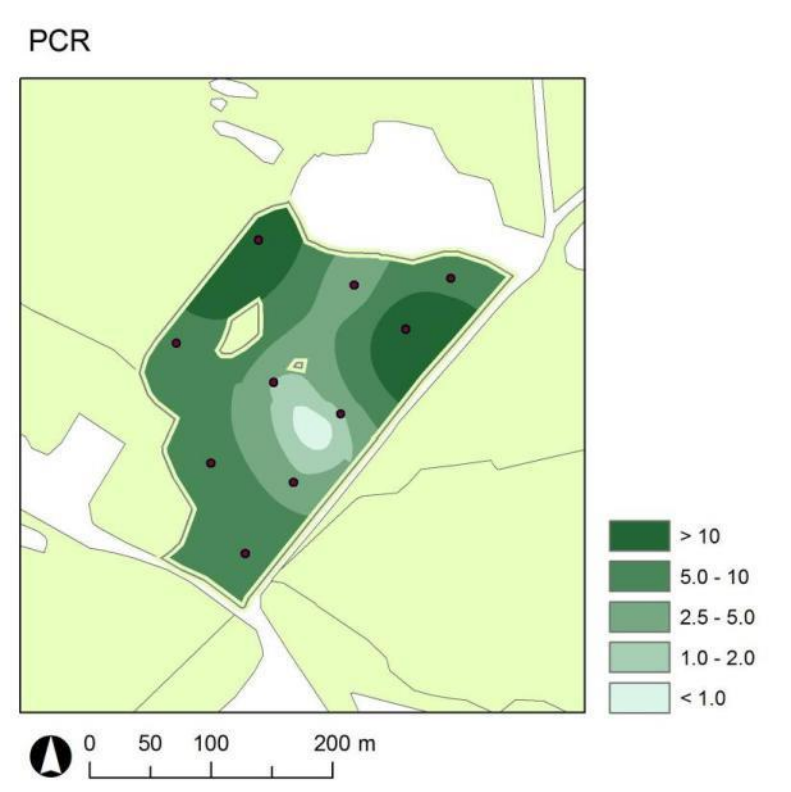


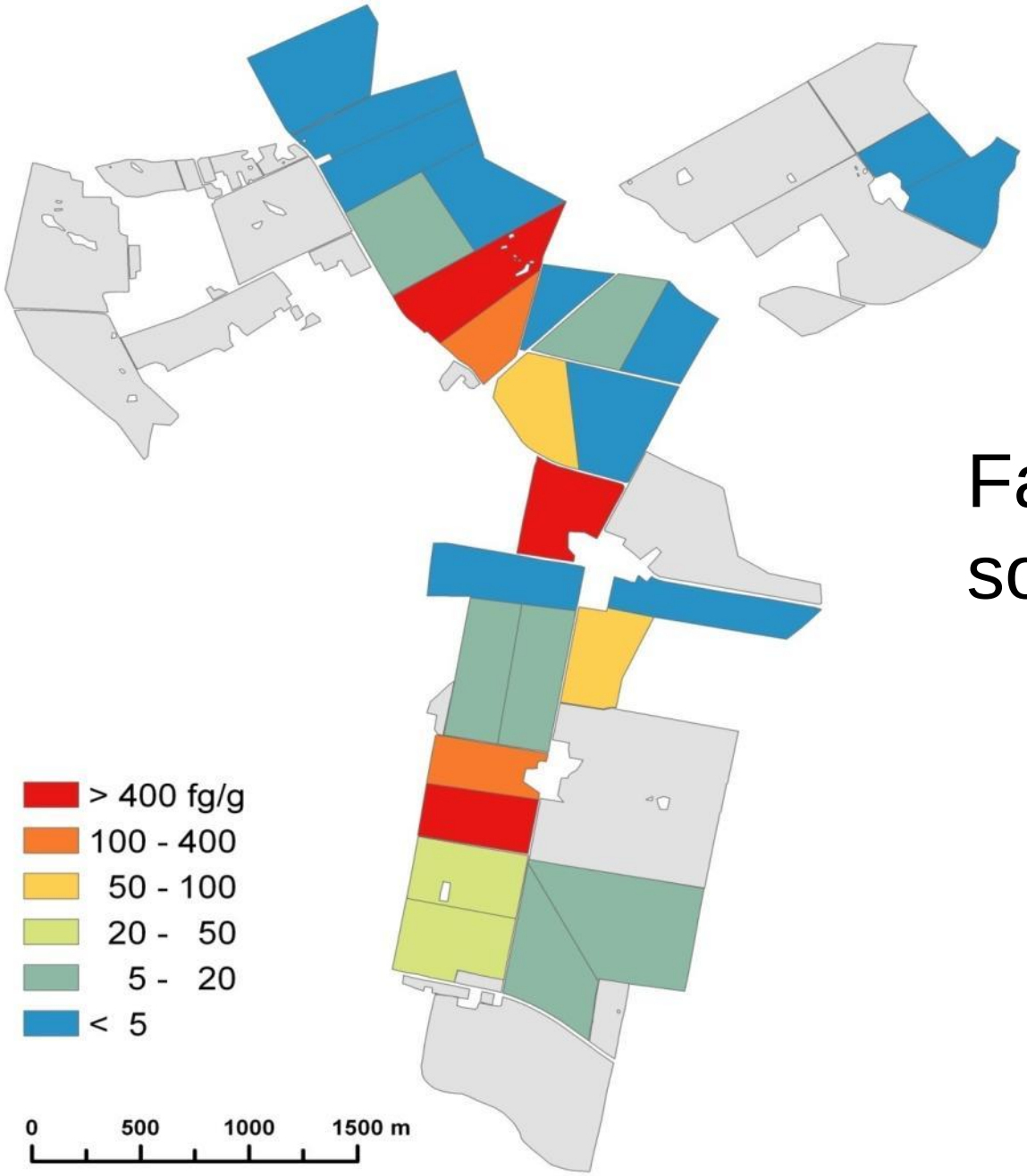
Level of *P. brassicae* infestation

Soil conductivity EM 38

Within-field variation of *A. euteiches*







Farm fields soil test

Thank you for your attention!

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