Sweden clubroot update

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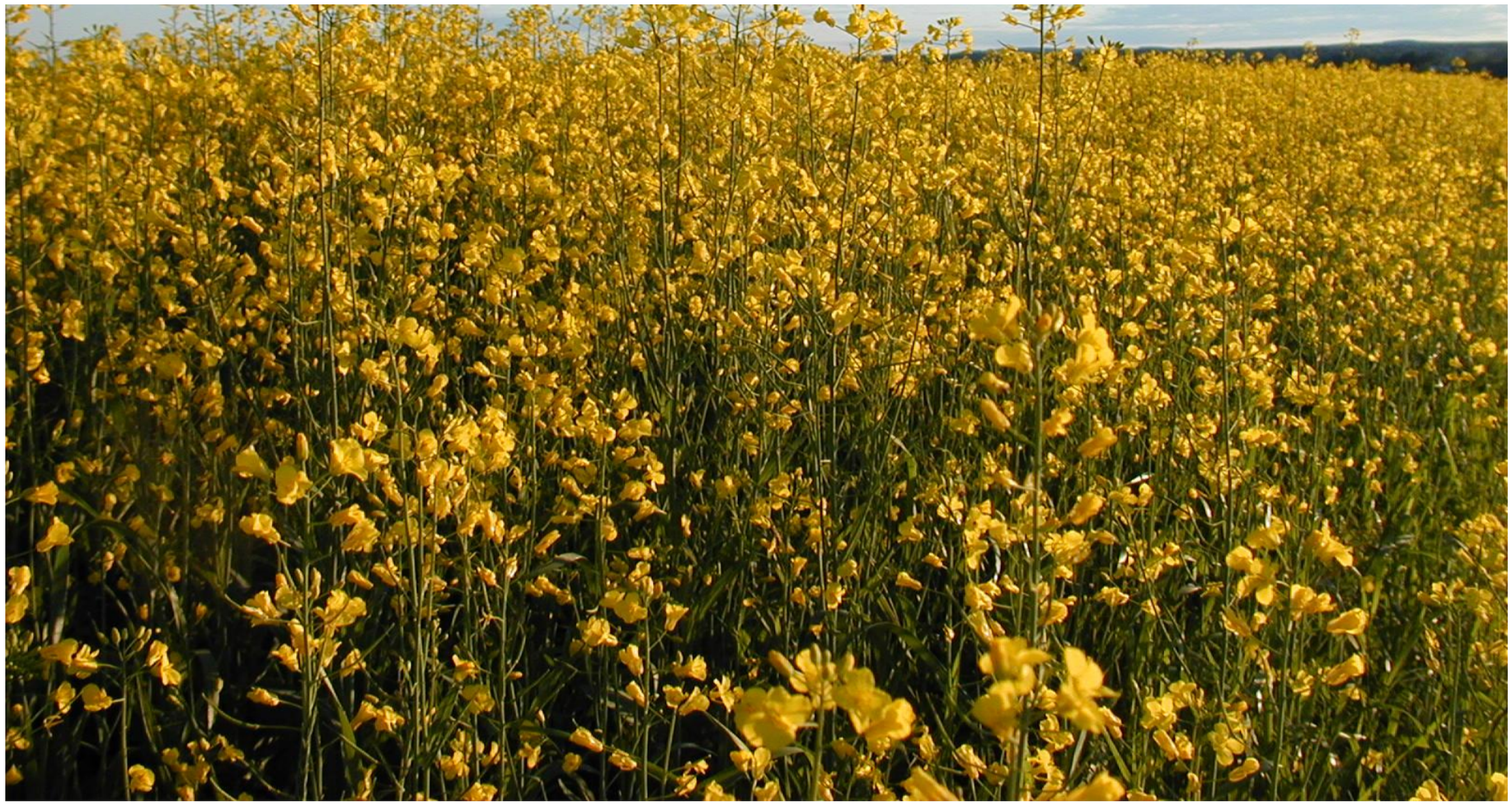
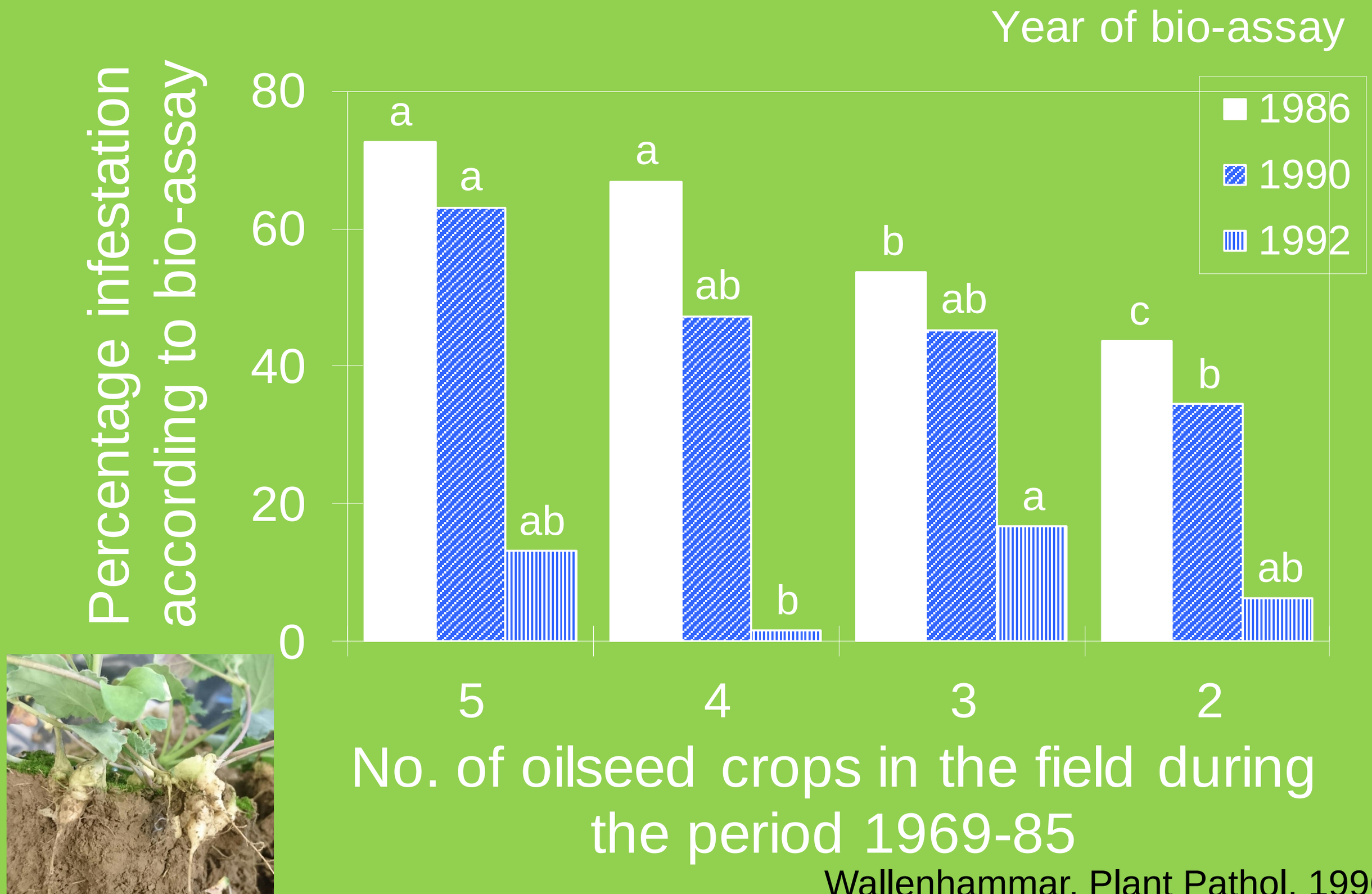
Clubroot Steering Committee, 30 April, 2020

There was a time…….



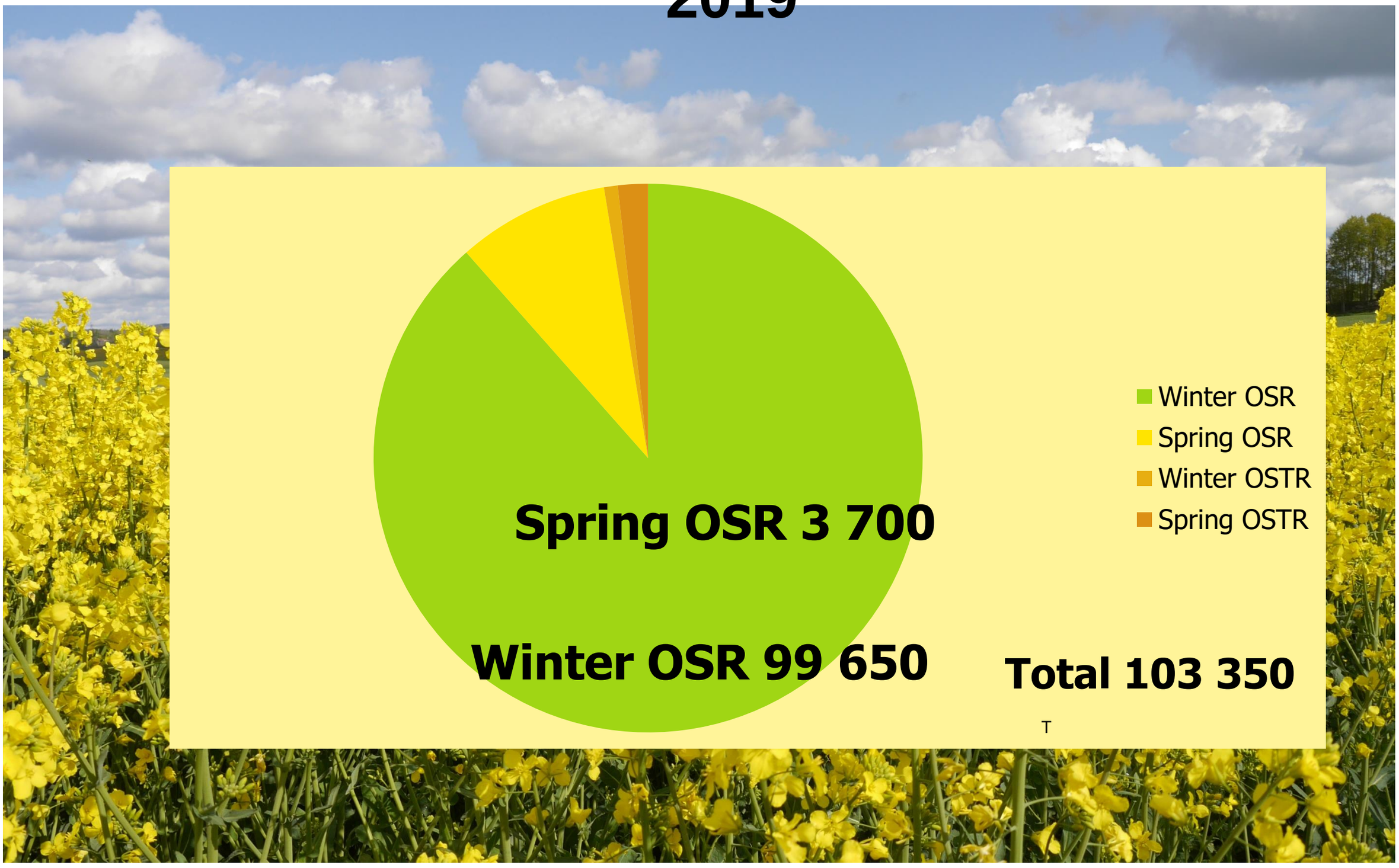
Spring oilseed rape and spring oilseed turnip rape
Were seeded in May, often every 4th year

Relationship between percentage of diseased plants in the bioassay and OSR cropping intensity (1969-1985)



Wallenhammar, Plant Pathol, 1996

Rapeseed acreage (hectares) in Sweden 2019



Crop rotation

Long-term fertility experiments-ongoing

OSR every 6 year started in 1968

OSR every 4 year started in 1957

P. brassicae in soil after 13 rotations of spring oil seed rape 2007

4 year rotation of SOSR

	Experimental site	*P. brassicae* DNA fg/ g soil
M1	Fjädringslöv	**<5**
M2	Orupsgården	635
M4	Örja	137
M5	S:a Ugglarp	340
M6	Ekebo	1430

Jonsson et al., 2016. European Journ of Plant Pathology

P. brassicae in soil after 7 rotations of spring oil seed rape 2007

6-year rotation of SOSR!

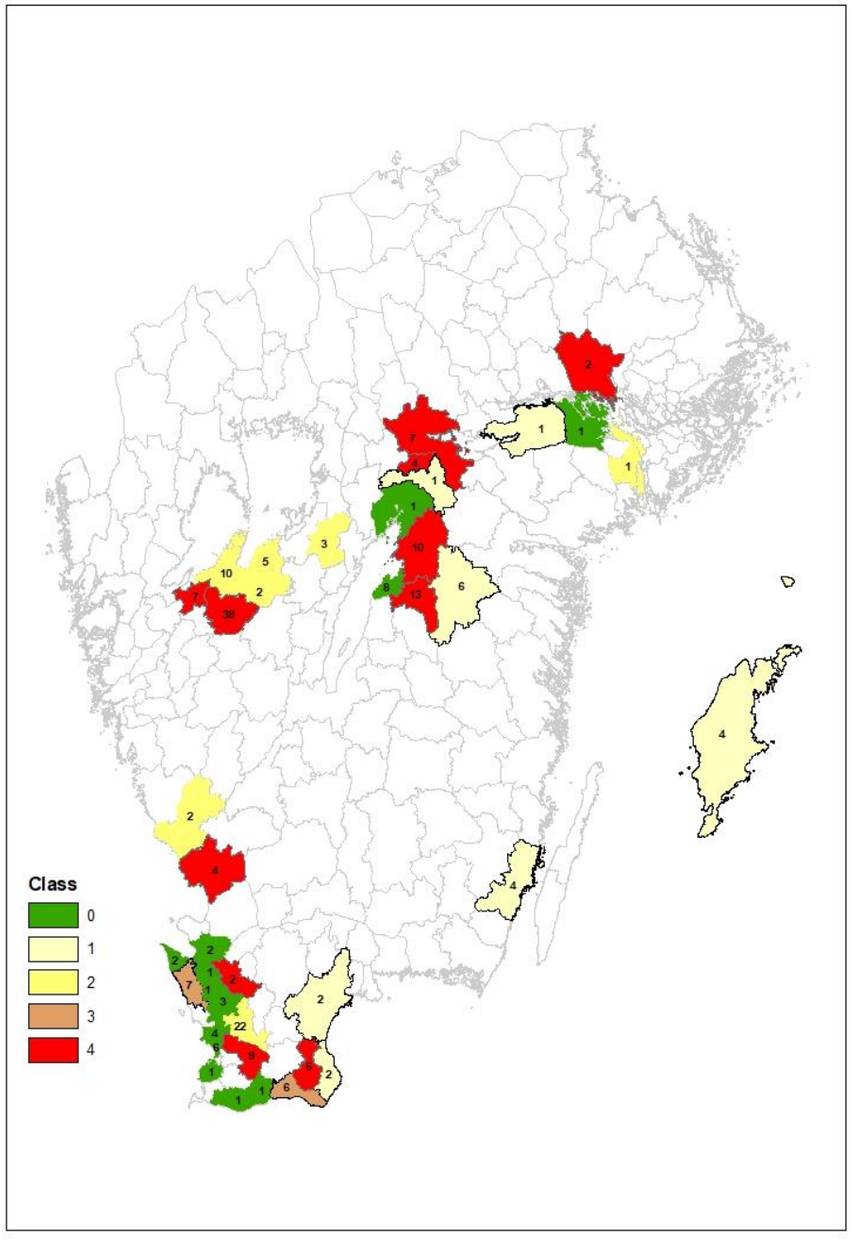
Experimental site		*P. brassicae* DNA fg/g soil
R94	Bjertorp	251
E9	Klostergården	n.d
E10	Högåsa	n.d
C-7	Kungsängen	n.d
C-8	Fors	n.d

Soil fertility experiments – pH value

		1957	2007
Fjädringslövs	M1	7.9	7.0
Orupsgården	M2	6,6	6.1
Örja	M4	7.8	6.6
S:a Ugglarp	M5	6.7	6.0
Ekebo	M6	6.8	6.1
Bjertorp	R94	6.5	6.1

Recent outbreaks

Visualisation of 212 soil samples from 40 communities classified according to number of gene copies per g of soil 2009-2018.



Number of samples in each community

Cederberg, 2018 https://stud.epsilon.slu.se/13215/1/cederberg_g_180322.pdf

Resistant cultivars

Resistance breeding in Sweden

- **1999** SOTR cv SW Pegasus approved,
  WOR cv. SW Tosca and SOTR cv. SW Rebus.

- **2013** and onwards European clubroot resistant WOR cultivars are tested in field trials in contaminated soils (SFO). 10 cultivars are currently tested 2020.

- **2014** CR WOR introduced on the Swedish market

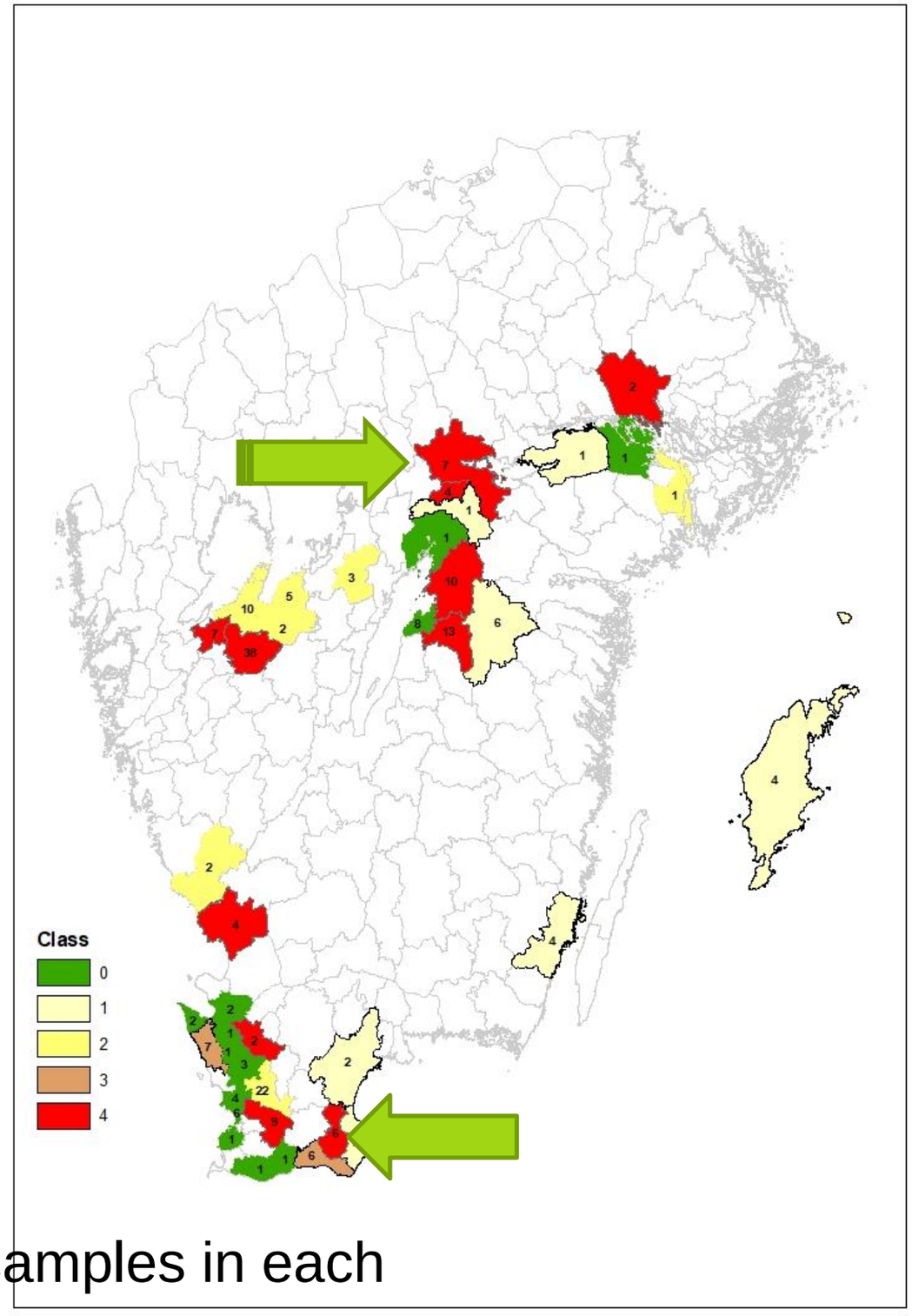
Ongoing project

Integrated management of clubroot in WOSR 2017-2019

Strategy for growing WOSR in infested fields

- ✓Characterisation of reisistant cultivars
- ✓New gudelines for interpreting soil assays

Visualisation of 212 soil samples from 40 communities classified according to number of gene copies per g of soil.

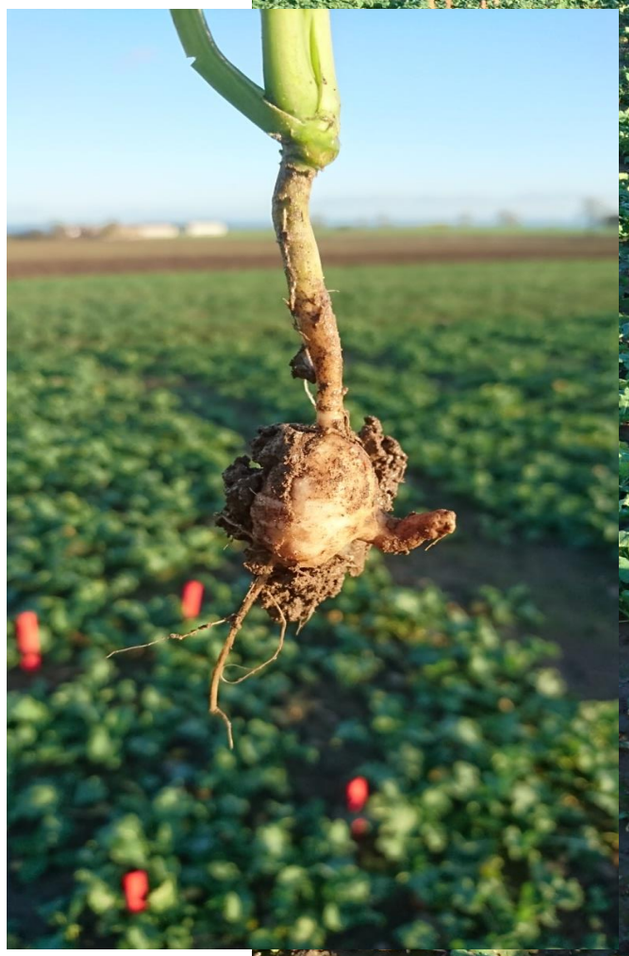


Number of samples in each community

Cederberg, G. 2018

Results

Unpublished



Simris 6 November 2017

Soil inolulum determined by qPCR number of gene copies per g of soil

Field site	Average of 16 plots	Range	
Östansjö	3 000	0-9 500	
Byrsta, Kumla	56 000	2000-167 000	
Simris	420 00	13 000-1 400 000	
Bollerup	1 200 000	170 000- 3 000 000	

Disease severity index (DSI) and percentage infected plants. Number of target copies per g of soil on average; at Bollerup **1 200 000** and at Simris **420 000**. Seeding date **26** and **25** August 2017.

Treatment and site	DSI		Disease incidence (%)	
Susceptible Bollerup	55.4	b	62.5	b
Resistant 1	8.0	c	11.0	cd
Resistant 2	7.8	c	9.2	cd
Resitant 3	2.4	c	4.0	cd
Susceptible Simris	52.1	b	67.5	b
Resistant 1	11.9	c	15.6	cd
Resistant 2	8.5	c	10.8	cd
Resistant 3	5.3	c	6.0	cd
p	*<0.001*		*<0.001*	

2018 ????

2018 -2019

Number of gene copies per gram of soil

Bollerup 24 000- 71 000
Simris 120 000 - 1 500 000

Disease assessments: November 2018 and July 2019

Only traces of disease!

Harvest 2019

Growing WOSR every 4 th year leads to problems also with other diseases

Verticillium longisporum

Black leg?

Leptosphaeria biglobosa L.Maculans

2 december 2019

Information on resistance to other important diseses is needed for CR cultivars!

Checking response of resistant cultivars

Susceptible cultivar- unpleasant surprise!

Thank you for your attention!

18 april 2020, Nerikes Allehanda