

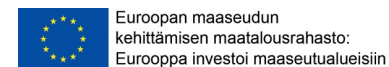
Biocontrol of diseases in organic onion and potato production

- Results of on-farm trials 2012-2014

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Production of onion and potato in Finland in 2014

	Ha	Organic, ha	Organic, %
Onion	1 149	40	3,5
Potato	21 990	483	2,2



Diseases causing problems in organic production



- *Fusarium* basal rot (*Fusarium spp.*) and grey mould (*Botrytis allii*) causes significant yield and quality problems in onion production



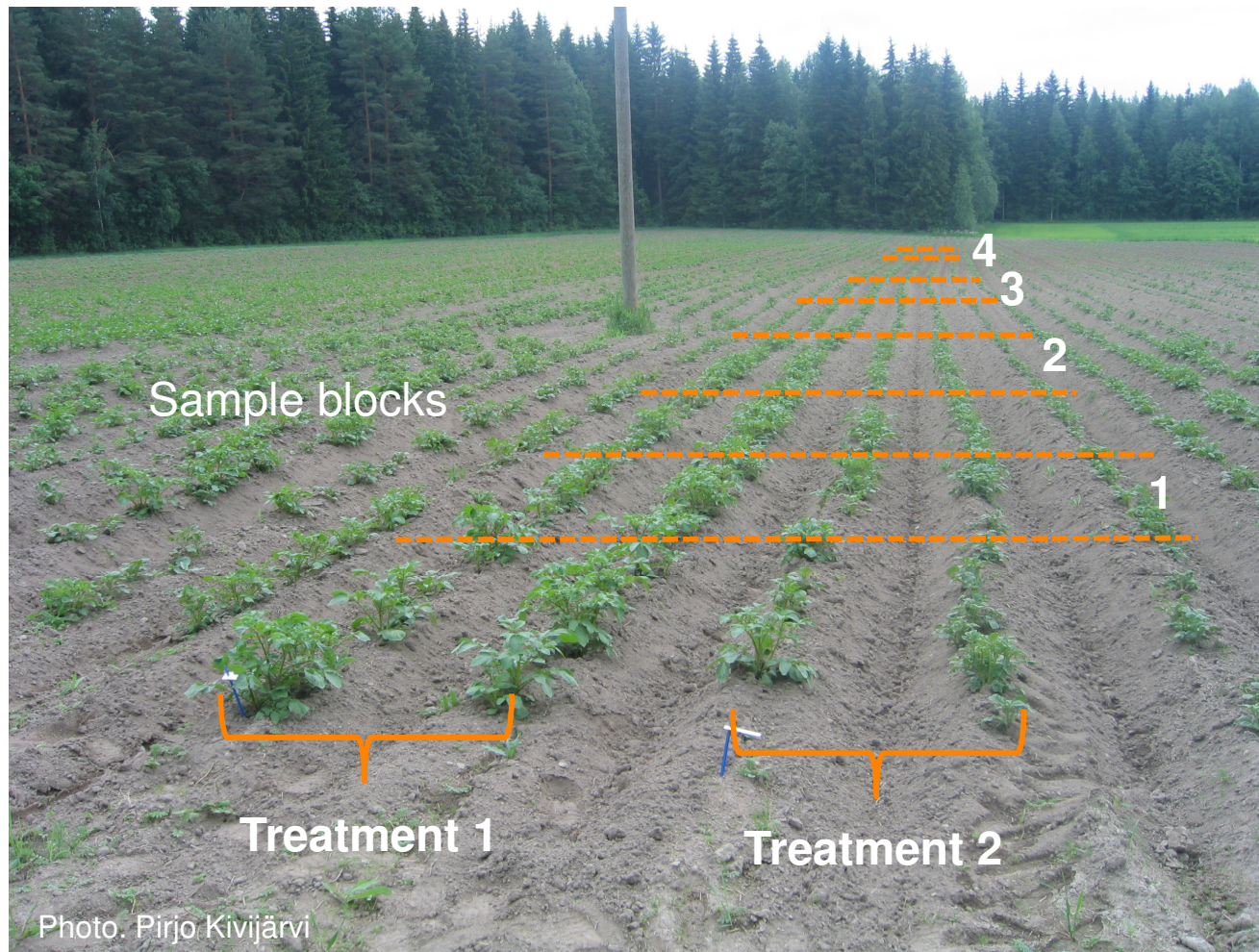
- Black scurf (*Rhizoctonia solani*) and potato blight (*Phytophthora infestans*) reduce the yield and quality of potatoes

- The significant sources of infection of *Fusarium* and *Rhizoctonia solanii* are contaminated onion sets and seed potato

Farm trials in 2012-2014: biocontrol of Fusarium basal rot and black scurf

- Farm trials were in
 - South-Savo (onion)
 - North-Savo (onion and potato)
 - Häme (potato)
 - South-Karelia (onion)
- Trials were integrated into the onion or potato field so, that farmers were responsible for cultivation
- Project workers were responsible for measurements, observes, analyses, reports of the results

Potato field trial in Häme



Farm trials of onion

Treatments of onion sets

Farms	Treatment	Company	Solution	Concentration of solution
South-Savo and South-Karelia	Untreated sets (control)	-	-	-
	Watertreated sets	-	50 l water	-
	Prestop, <i>Gliocladium catenulatum</i> - fungi	Verdera Oy	50 l water + 250 g Prestop-powder	0,5 %
	Mycostop, <i>Streptomyces griseoviridis</i> - bacterium product	Verdera Oy	50 l water + 5 g Mycostop-powder	0,01 %
	FZB24, <i>Bacillus amyloliquefaciens</i> - bacterium product	Avagro Oy	50 l water + 100 ml FZB24-liquid	0,2 %



- Prestop- and Mycostop-powder were at first mixed into one liter of water for one hour
- Onion sets were kept in solution for 15 minutes in net bags

Results



- In South-Savo grey mould spoiled the yield in storage more than Fusarium, in South-Karelia the situation was opposite

Portion of different diseases of non-marketable yield after seven months storage

Farm	Treatment	Fusarium (%)	Grey mould (Botrytis allii) (%)	Fusarium and grey mould (%)*
South-Savo	Control	21,8	53,2	25,0
	Water treatment	34,1	34,1	31,8
	Mycostop	23,8	46,5	29,7
	Mycostop(drying 10 days)	26,7	50,0	23,3
	Prestop	31,3	40,2	28,5
	Prestop (drying 10 days)	24,3	54,0	21,7
	FZB24	34,5	27,7	37,8
South-Karelia	Control	38,5	39,6	21,9
	Water treatment	40,0	9,5	56,5
	Mycostop	22,6	4,3	73,1
	Mycostop(drying 9 days)	39,3	4,7	56,0
	Prestop	30,0	8,1	61,9
	Prestop (drying 9 days)	50,8	8,6	40,6
	FZB24	30,5	2,9	66,6

*Symptoms of both diseases

Farm trials of potato

Treatments of potato

Farms	Treatment	Company	Solution	Concentration of solution
North-Savo and Häme	Control (untreated)	-	-	-
	Prestop, <i>Gliocladium catenulatum</i> -fungi	Verdera Oy	50 l water + 250 g Prestop-powder	0,5 %
	Prestop (spraying), <i>Gliocladium catenulatum</i> -fungi	Verdera Oy	1 l solution/ 30 kg potatoes	0,5 %
	Rhizocell, rhizobacterium + yeast fungus	Verdera Oy	50 l water + 21 g Rhizocell-powder	0,2 %
	FZB24, <i>Bacillus amyloliquefaciens</i> -bacterium product	Avagro Oy	50 l water + 100 ml FZB24-liquid	0,2 %

- Prestop- and Rhizocell-powder were at first mixed into one liter of water for one hour to help powder solution
- Potatoes were kept in solution for 10 to 15 minutes
- In Prestop-spraying treatment potatoes were sprayed on the potato sorting table just before planting
- Rhizocell-treatment was sprayed to soil surface before the first potato ridging

Results

- Prestop-treatment decreased slightly black scurf infection of potatoe stems compared to control and other treatments both in North-Savo and South-Karelia

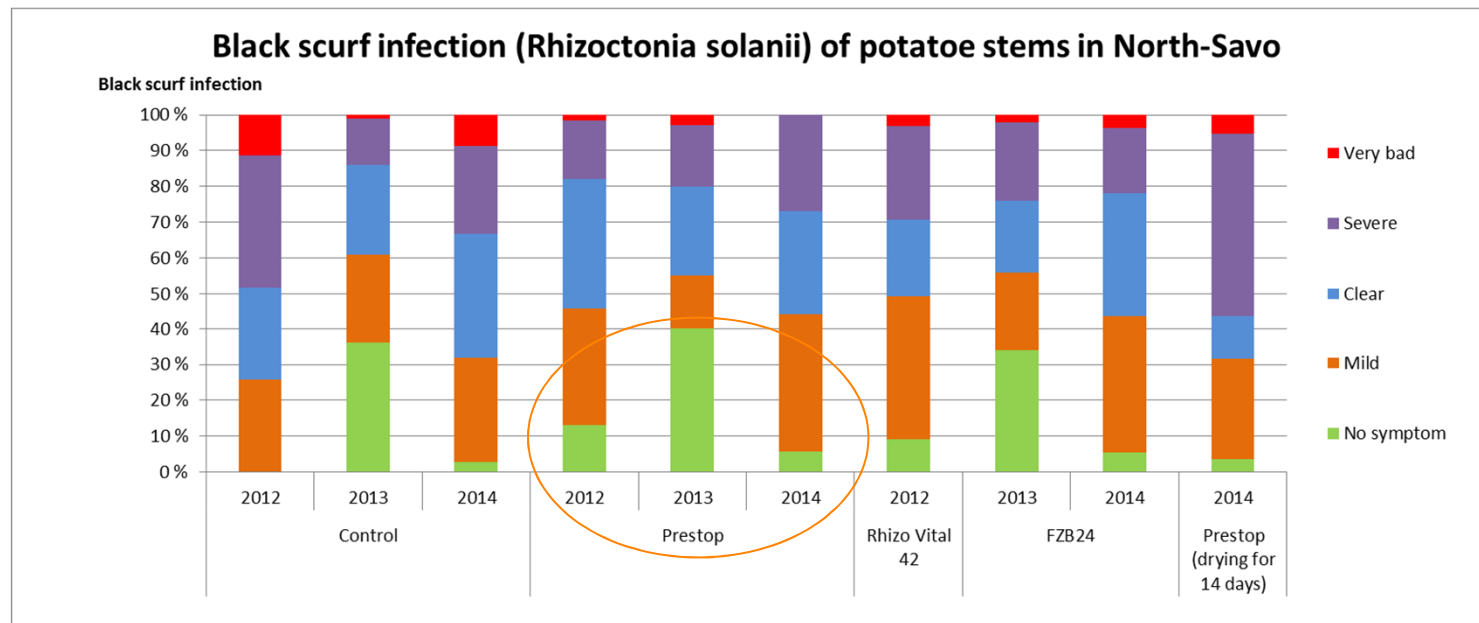


Photo:
<http://www.potatodiseases.org/rhizoctonia.html>

Conclusion

- The results varied each year and between farms -> conclusion was difficult
- Biocontrol agents failed to control examined diseases
- The effectiveness was modest due to the use of highly infected onion sets (*Fusarium spp.*) and seed potatoes (*Rhizoctonia solani*)
- Dipping treatment with no drying period prior planting is not recommend
- The use of healthy potato seed is necessary in organic potato production
- Alternative and profitable production methods has to study in order to replace onion sets in organic onion production

What next?



- Field trials of onion seedlings
- Trials on experimental farms in Mikkeli (organic) and Piikkiö (Luke)
- Also trials on organic farms
- Questions:
 - Variety selection?
 - Cultivation techniques: planting, weed control (mulches, mechanical, thermal by flaming)?
 - What is the yield level, yield quality and storage ability?
 - Is it profitable to use onion seedlings instead of onion sets?



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Onion seedling trials on farms



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What next?



- Variety trials by using sets from different origin in Luke Mikkeli and Piikkiö
- Sets of chemically non-treated and treated sets (Setton)
- Prestop -treatment (concentration 0,5 %) to the soil surface immediately after planting
- Questions:
 - What is the yield level, yield quality and storage ability of different varieties and differently treated sets?





Thank you!