

# Clover fatigue - a reason for precaution in organic farming?

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# Old problem - new challenge I

- Clover fatigue - a generic term for growth problems in clover
- Known from the 18th century
- Different plant pathogens: nematodes, fungi
- Resistance breeding → 1940-50

# Old problem - new challenge II

- Legumes, i.e. clover - the N-engine in organic farming
- Increased certified organic areas - more areas with clover
- More specialized organic farming systems
- Climate change - expanding growing season, higher temperature



*Photo: Ilevina Sturite, Bioforsk*

# Clover fatigue can give clover yield failure

- Grass/clover ley sown in both plots
- Left: Clover is missing in the new ley, after 8 previous years with clover
- Right: The same amount of clover sown, after grass as a pre-crop



*Photo: Karen Søgaard, Aarhus University*

# Preliminary study 2012 - I

## Background

- Some organic dairy farmers in Norway have observed lower proportions of clover in the ley
- Plant pathogenic nematodes found in samples taken on two organic farms in 2011

## Aims

- Provide knowledge about the situation in Norway
- Status in other countries - how do they cope with the problem?



## Clover cystnematodes

*Photo: Bonsak Hammeraas, Bioforsk*



## Stemnematodes

*Photo: Gudmund Taksdal, Bioforsk*

## Preliminary study 2012 - II

- Cooperation with the Norwegian Agriculture Extension Service
- Samples taken on 6 certified organic farms in different parts of Norway
- Analyses of nematodes done by Bioforsk Plant Health and Plant Protection Division
- Literature study
- Contact with researchers and advisers in different countries



## Numbers of different nematode groups in samples of 250 ml soil from 6 Norwegian organic farms 2012

Farm no.	Stunt nematodes	Spiral nematodes	Root lesion nematodes	Ring nematodes	Pin nematodes	Needle nematodes	Stubby root nematodes	Cyst nematodes
1	0	1320	0	0	0	0	0	0
1	4	106	6	0	0	0	2	0
2	0	265	144	0	0	0	0	0
2	0	124	213	0	0	0	0	4
3	0	3	29	0	30	0	8	8 cysts
3	0	57	5	1	12	0	2	0
3	0	4	0	1	0	0	0	1 cysts
3	0	35	0	0	0	0	14	1 cysts
4	13	0	130	0	10	10	15	1 cysts
4	93	0	42	0	0	6	0	0
4	35	0	33	0	0	8	0	-
4	97	0	8	0	0	3	0	-
5	12	262	50	0	58	0	1	16 cysts
5	56	5	118	0	6	0	0	0
6	11	420	27	0	73	0	7	0
6	17	9	20	0	0	0	100	0

# Results

- 8 different types of nematodes were found
- 6 different types of nematodes on one of the farms
- Root lesion nematodes found on all farms
- 1 320 spiral nematodes/250 ml soil is a very high number
- Stem nematodes, common earlier, were not found
- Not always correlation between nematodes found and clover damage

October 2011:



July 2012



# What's going on in other countries?

- Denmark: Plant pathogenic nematodes recognised as a problem, crop rotation with at least 1 clover free year recommended
- Sweden: Focus on root rot as a major problem for durability of red clover leys
- The Netherlands: Plant pathogenic nematodes recognised as a problem, crop rotation recommended  
List of host plants for different nematodes
- Germany: Research on nematodes on organic farms and use of biofumigation
- Finland, Baltic countries??

# Not straight forward.....

- Not always correlation between damage in clover and occurrence of pathogenic nematodes
- Nematode population changes during the growing season
- Longevity of dormant spores can be many years
- Complex problem - different pathogenes together, possible interactions
- Economic damage threshold not possible/useful?
- Identifying groups and species important for designing good crop rotations and other measures

# Possible preventive actions

- Identifying groups and species of nematodes
- Crop rotation
- Weed control
- Good agronomic practice: ploughing, drainage, healthy soil
- Clean equipment - washing/desinfection
- Plant breeding
  
- Natural enemies?

# Biofumigation

- Use of certain plants with high level of glucosinolates: Mustard, oil raddish
- Decomposed plant material incorporated in the soil
- Active phytochemicals: Isothiocyanates



*Photo: Mette F. Graneng, NLR Sør-Trøndelag*



## Further action needed

- Continued mapping
- Promotion of crop rotation as an important preventive measure
- Better knowledge of natural enemies
- Stronger focus on nematology
- Better exchange of knowledge between countries
- Testing out biofumigation
- Resistance breeding in legumes

## Report and contact information

The report from the project (in Norwegian):  
«Kløvertretthet - et problem i økologisk engdyrking?»  
download from:

[www.agropub.no/](http://www.agropub.no/)

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*Thank you for your attention!*