

# The arable vegetation of Baltic organic cereal fields as shaped by crop management

M.A.J. Hofmeijer, B. Melander, J. Salonen, T. Verwijst, L. Zarina, B. Gerowitt



# Objectives

**Aim:** Better utilization of crop diversification strategies for weed management. To control weed densities and maintain diverse arable weed vegetation that is manageable in the long-term.

**Objective:** Investigate the role of crop diversification strategies on weed vegetation on farms.

- I. International utilization of crop diversity strategies
- II. What is the influence of crop diversity strategies on:
  - Weed density
  - Weed species numbers
  - Weed diversity
- III. Study the influence of crop diversity strategies on the weed community

# Method - Weed survey and explanatory variables

## Weed survey

Taking place at organic farms in spring sown cereals, BBCH stage 61-69

Transect of 100m<sup>2</sup>, 3 replications per field, 207 fields in 2015-2016

Estimation of weed species density

## Explanatory variables

Collection of field history data

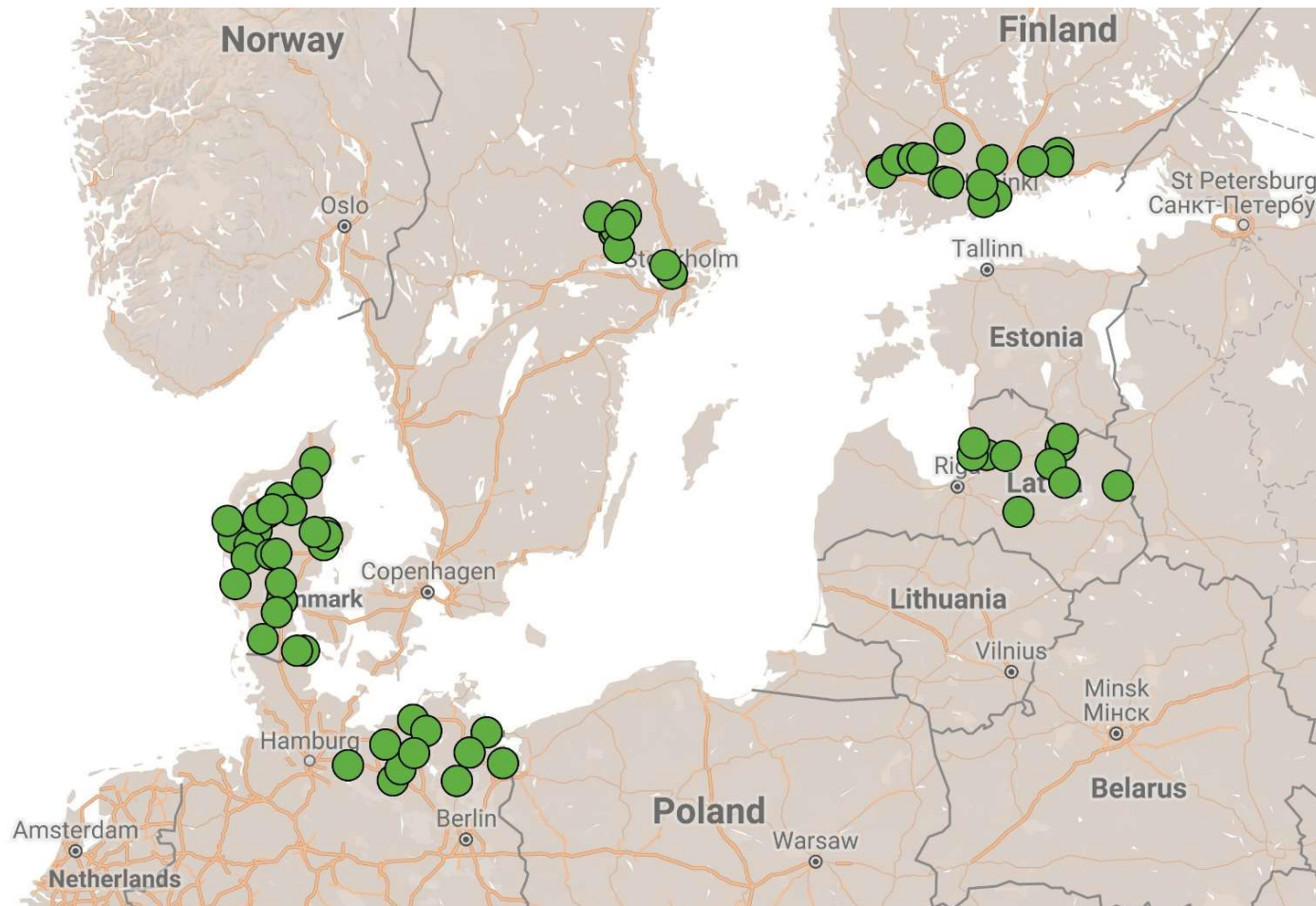
## Statistical analysis

Linear mixed models, multivariate analysis,  
canonical correspondence analysis (CCA)

Density Classes	100 m <sup>2</sup>	m <sup>2</sup>
I	0-20	<1
II	20-50	<1
III	50-100	0.5-1
IV	100-200	1-2
V	200-500	2-5
VI	500-1000	5-10
VII	1000-5000	10-50
VIII	5000-10000	50-100
IX	10000-50000	100-500



# Method - Site



## Definitions

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### Main crop: Cash crop

- This includes grass clover leys, that are cut

### Undersown crop: A cover crop sown at the same time as the main crop, but not harvested as a cash crop.

- In this study mostly grass clover, grass or clover solely, or vetch

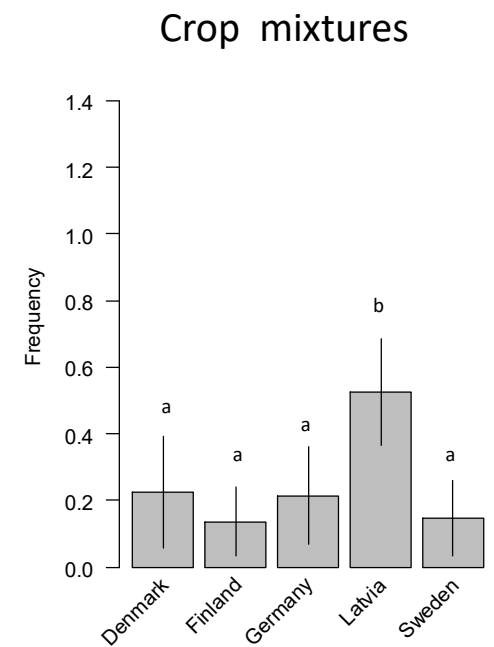
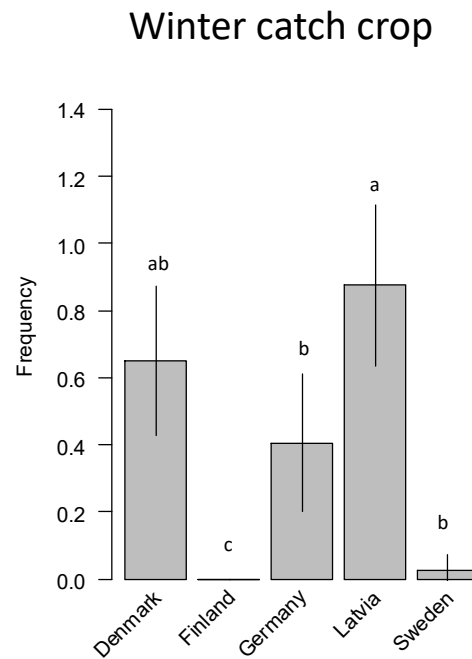
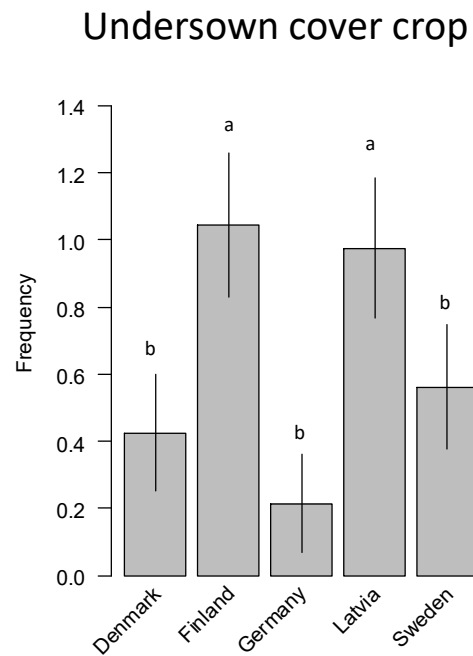
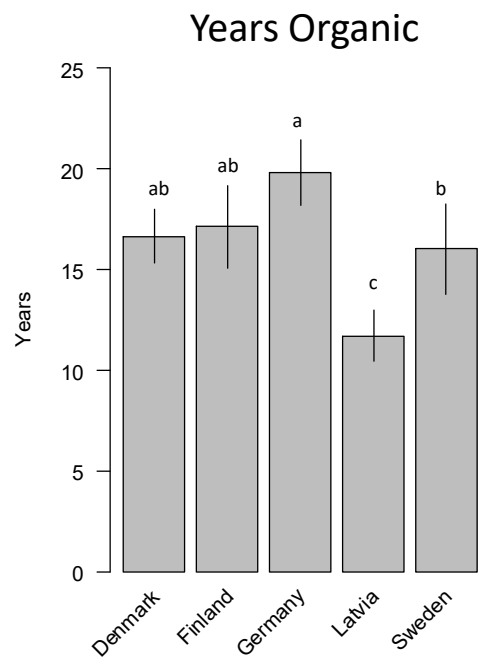
### Crop mixtures: Two crops sown together, both used as cash crops.

- In this study crop mixtures most often consisted of a cereal/legume mix

### Winter Catch Crop: Winter cover crop, that is present when no cash crop is present. Is not harvested as a cash crop.

- Grass Clover, but also mustard, oilseed rape and green cover mixtures

# Results I – Management implemented

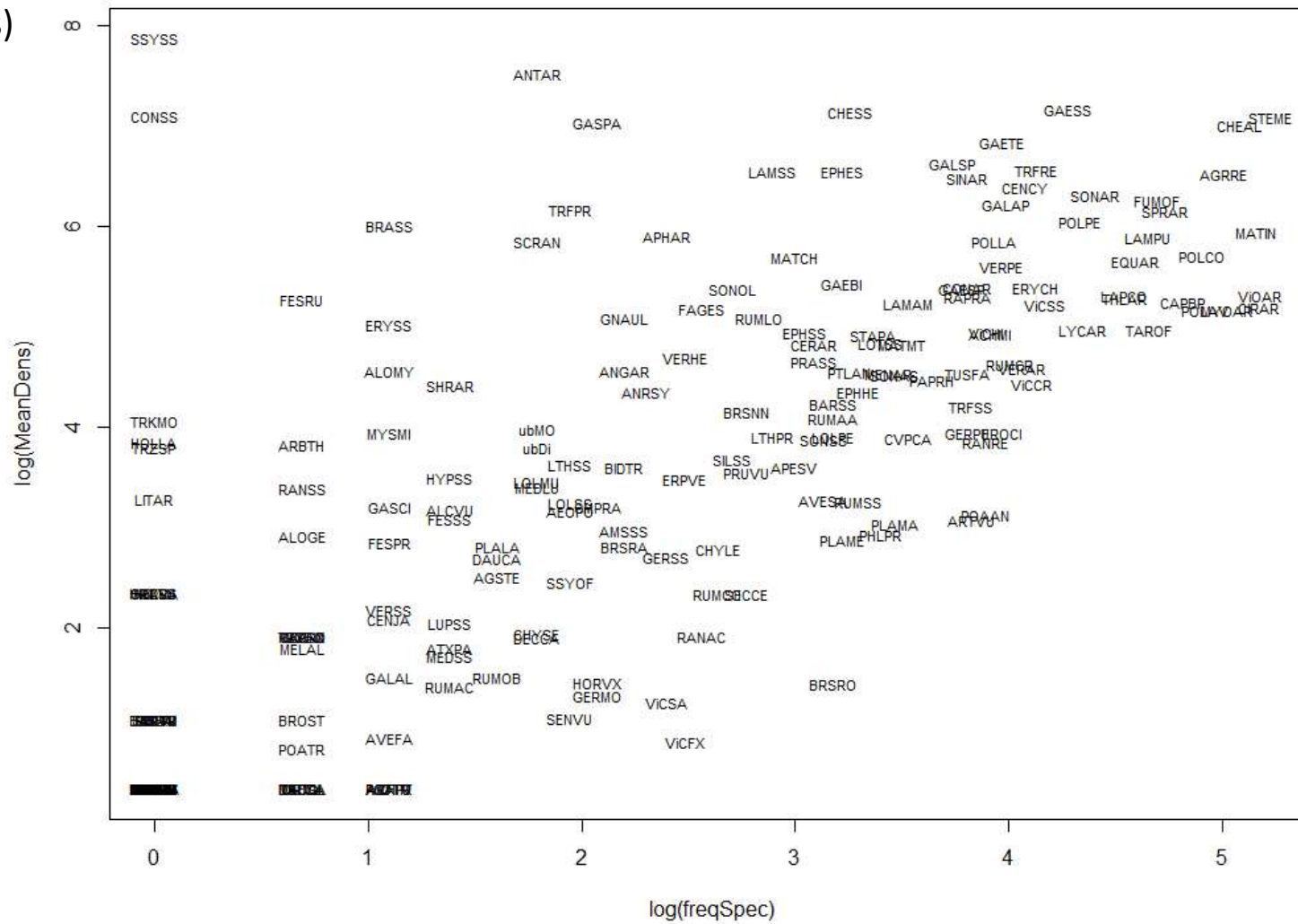


## Results – Management implemented

	Denmark	Finland	Germany	Latvia	Sweden
<b>Organic (years)</b>	<b>16,65</b>	<b>17,11</b>	<b>19,81</b>	<b>11,7</b>	<b>16,02</b>
stdev	4,2	6,78	5,31	4	7,22
<b>Undersow</b>	<b>0,43</b>	<b>1,05</b>	<b>0,21</b>	<b>0,98</b>	<b>0,56</b>
stdev	0,55	0,72	0,47	0,66	0,59
<b>Winter Catch Crop</b>	<b>0,65</b>	<b>0</b>	<b>0,41</b>	<b>0,88</b>	<b>0,02</b>
stdev	0,7	0	0,67	0,76	0,16
<b>Crop Mixtures</b>	<b>0,23</b>	<b>0,14</b>	<b>0,22</b>	<b>0,53</b>	<b>0,15</b>
stdev	0,53	0,35	0,47	0,51	0,36
<b>Grass Clover</b>	<b>1,1</b>	<b>1,34</b>	<b>1,07</b>	<b>0,75</b>	<b>1,07</b>
stdev	1,11	1,14	1,18	0,81	0,85
<b>Cereals</b>	<b>2,9</b>	<b>2,5</b>	<b>3,02</b>	<b>3,5</b>	<b>2,7</b>
stdev	0,98	0,82	0,99	0,82	1,05
<b>Other Crops</b>	<b>0,98</b>	<b>1,16</b>	<b>0,64</b>	<b>0,75</b>	<b>1,2</b>
stdev	0,86	1,02	0,85	0,67	1,17
<b>SandPercentage</b>	<b>83,78</b>	<b>41,88</b>	<b>77</b>	<b>66,2</b>	<b>32,41</b>
stdev	9,89	19,99	11,87	14,6	4,63
<b>Yield (t/ha)</b>	<b>4,07</b>	<b>2,35</b>	<b>2,86</b>	<b>1,88</b>	<b>3,02</b>
stdev	0,81	0,76	0,95	0,71	0,99
<b>Harrowing (#)</b>	<b>0,75</b>	<b>0,23</b>	<b>0,71</b>	<b>0,6</b>	<b>0,88</b>
stdev	1,04	0,42	0,74	0,5	0,87

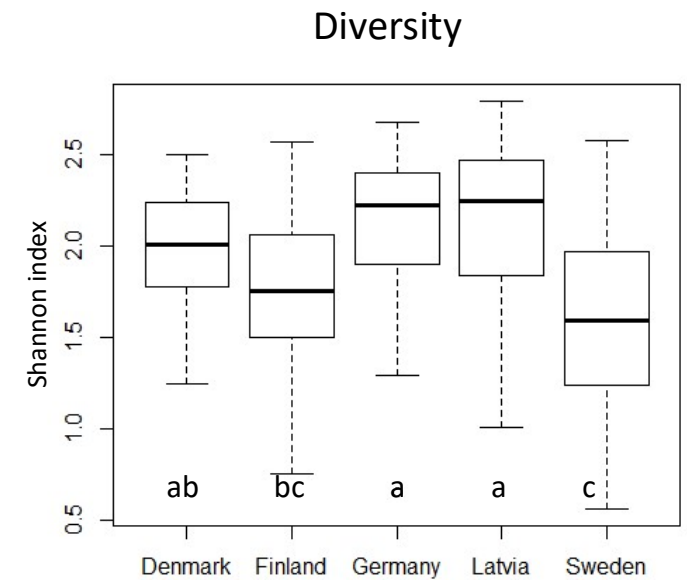
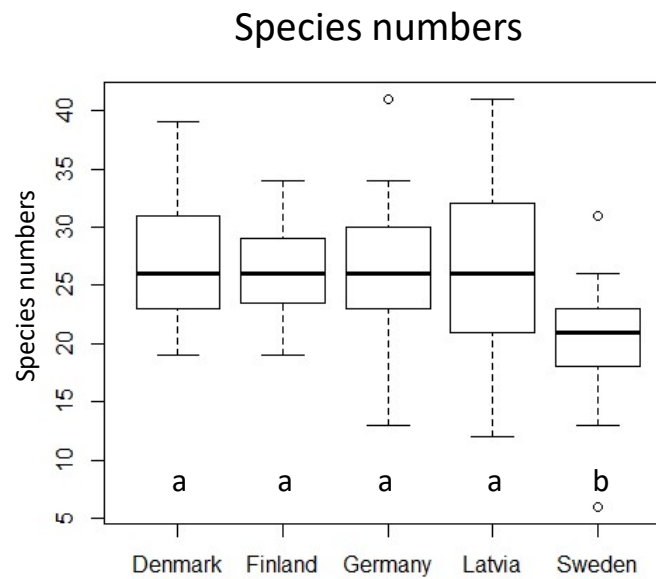
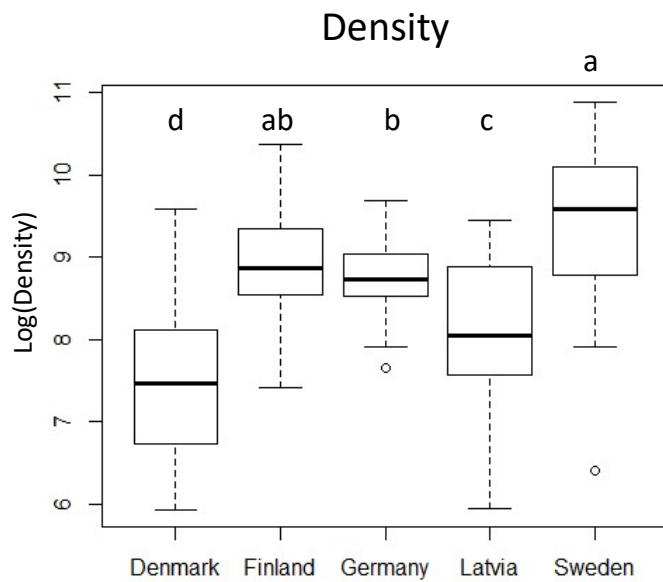
# Results - Weed occurrence

(197 species)





# Results II - Weed Density, Species numbers, Diversity



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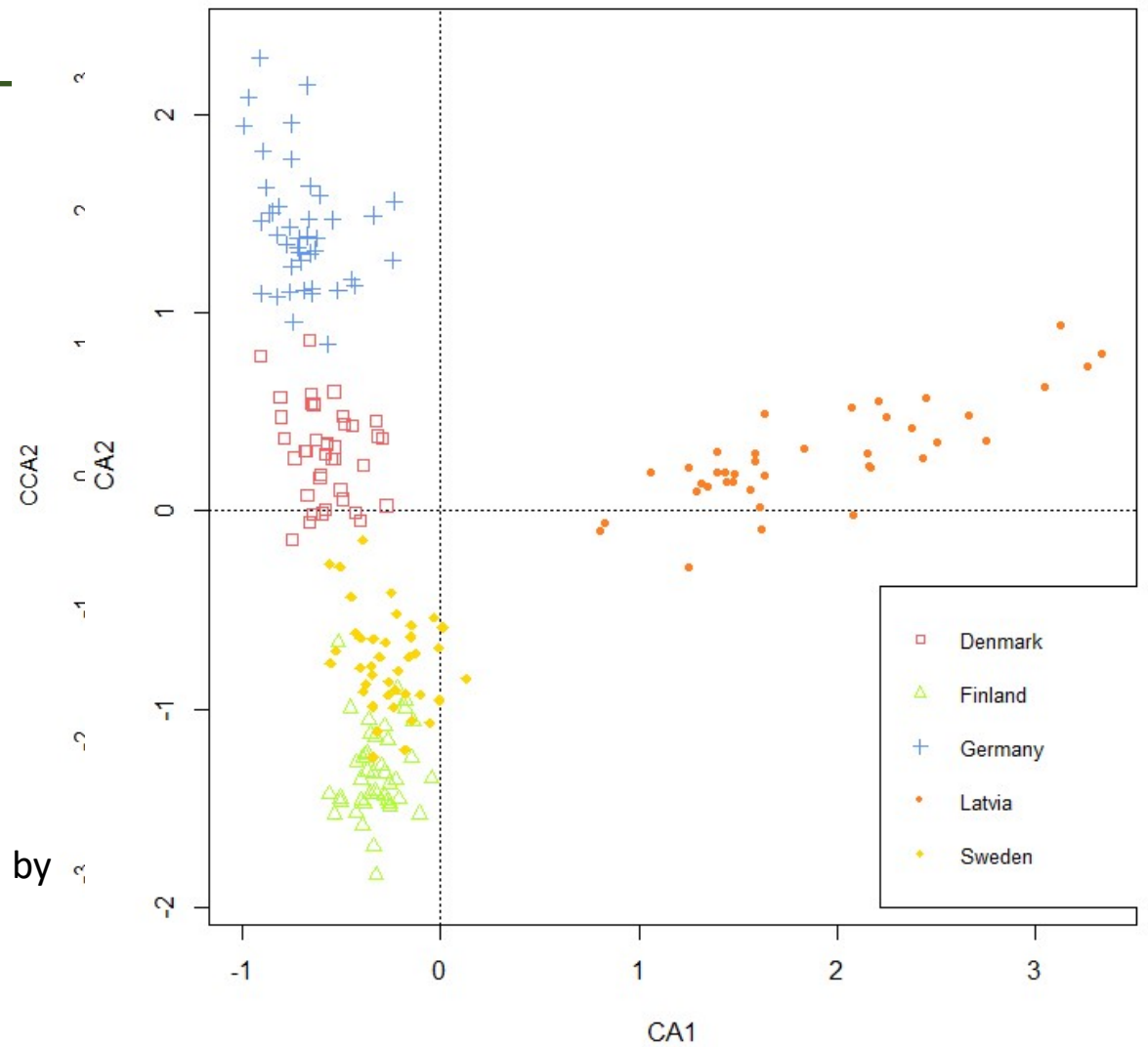
Mixed Model anova				
Explanatory Variables	(log)			Unit
	Weed Densities	Species Numbers	Shannon Index	
Farm	Information removed, these are unpublished data and will be produced in an article in the future.			
Survey Year				2015, 2016
Country				Denmark', 'Finland', 'Germany', 'Latvia', 'Sweden'
Years Organic				Years under Organic Management
Management				
Crop Present				25 classes
Yield				tons/ha
Harrowing				number of
Crop Diversity				
Undersow				frequency in 5 years
Crop Mixtures	frequency in 5 years			
Winter Catch Crop	frequency in 5 years			
Grass Clover	frequency in 5 years			
Cereals	frequency in 5 years			
Other Crop	frequency in 5 years			

\*P<0.05  
 \*\*P<0.01  
 \*\*\*P<0,001

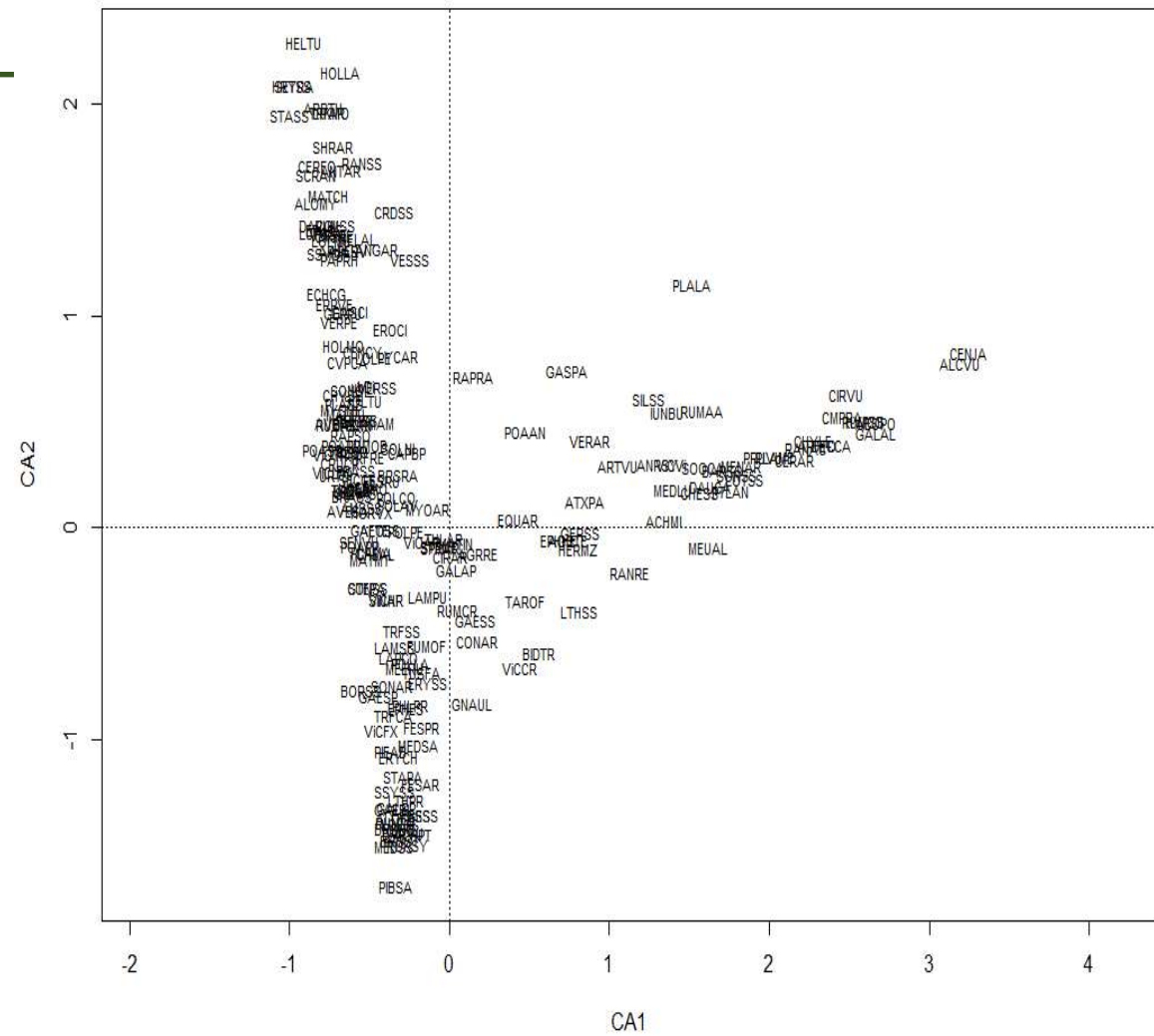
## Results III – Weed community

- Geographical dispersal

Ordination plot (CCA) displaying all sites effected by 8 management variables.



# Results III – Weed community



Ordination plot (pCCA) displaying the 94 most frequent species as effected by 8 management variables.

- I. Crop diversity strategies are use in low intensities (based on the information provided) and depend on local socio-economic and environmental conditions.
- II. Winter cover crops affect weed species numbers and diversity positively.  
Densities were not affected by the implementation of crop diversity strategies.
- III. The data show that the crop diversity strategies have a subtle influence on the weed community, where winter catch crops affect annuals and perennials differently.

Thank you for your attention!



Thanks to all participating farmers, partners and Core Organic