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WINTER COVER CROPS DECREASE WEEDINESS IN ORGANIC CROPPING SYSTEMS

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Background and objectives

Drilling winter cover crops after the main crop harvest can improve soil characteristics and prevent leaching.

Growing cover crops:

- Prevent water and winter erosion;
- Improve chemical, biological and physical soil properties;
- Suppress weeds.





Aim of the study

The aim of the study was to investigate the influence of different winter cover crops and their combination with composted cattle manure on weeds in three organic farming systems during the period of 2014–2016.

Description of the experiment

- Site: **Estonia**, Eerika experimental field (58°22'N, 26°40'E) near Tartu.

(The property of the Department of Field Crop and Grassland Husbandry of the Estonian University of Life Sciences)

- 3 systems in total were compared:
Org 0 (as control), Org I and Org II

- Soil: sandy loam
Albic Stagnic Luvisol



Experimental design

Organic systems		
Org 0 (control)	Org I (green manure as winter cover crops)	Org II (green manure + composted cattle manure)
Winter wheat	Winter oilseed turnip + winter rye (2013)	10 t ha ⁻¹
Pea	Winter oilseed turnip	
Potato	Winter rye	20 t ha ⁻¹
Barley us. red clover		10 t ha ⁻¹
Red clover	Red clover	

Weed density and biomass (2014-2016)

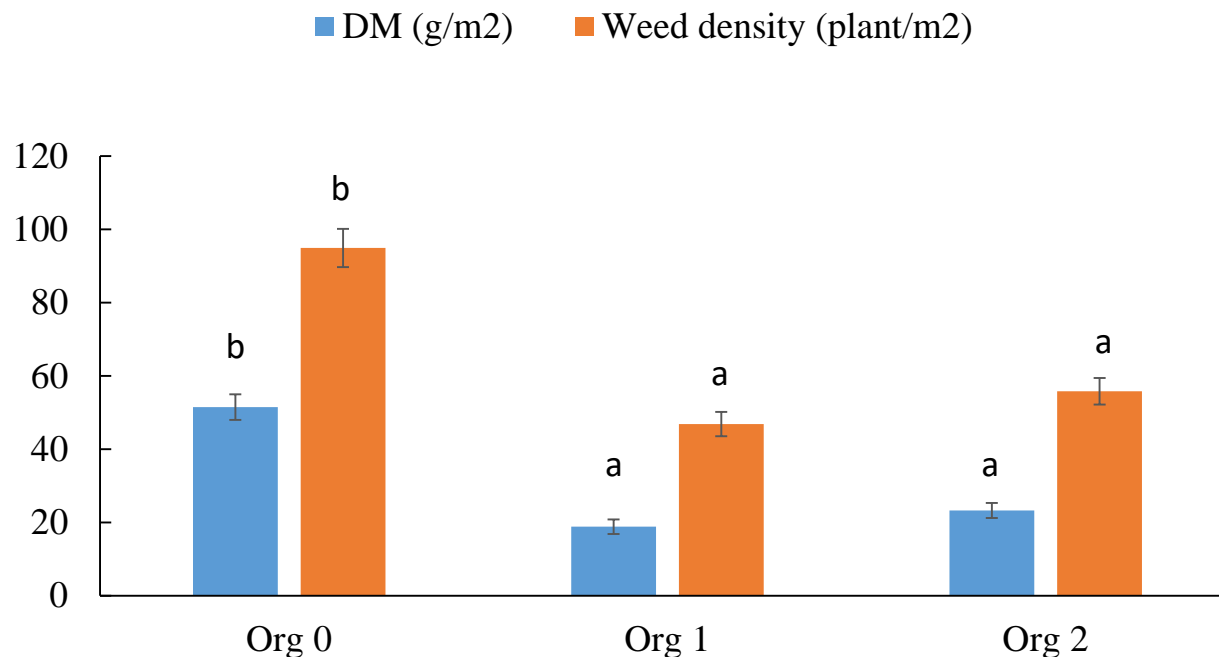
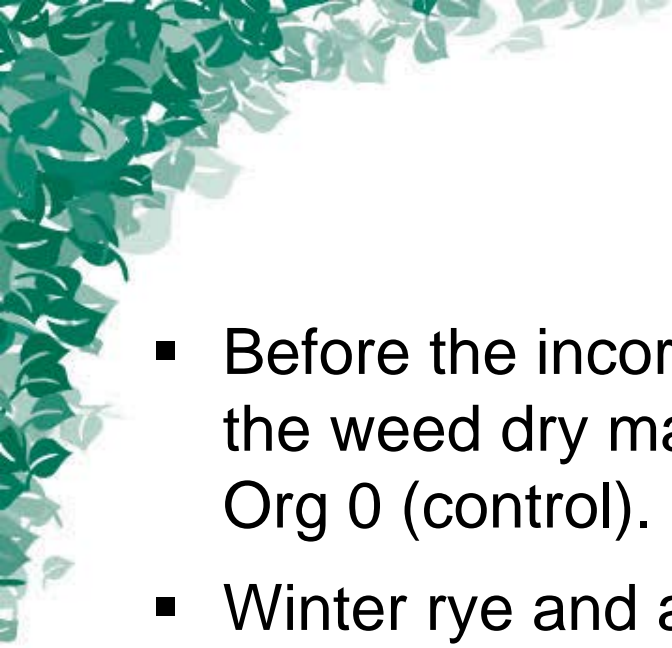


Figure 1. Weed dry biomass (g m⁻²) and density in green manures as winter cover crops (CC) before incorporation to soil in organic cropping systems in 2014-2016. (Org 0 – without CC, Org I – with CC; Org II – with CC and composted cattle manure).

Different letters indicate significant differences (Tukey HSD test ($P < 0.05$)).

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- Before the incorporation of winter cover crops into soil, the weed dry mass was statistically highest in system Org 0 (control).
 - Winter rye and a mixture of winter rye and winter turnip rape were better suppressors of weediness compared to winter turnip rape.
 - Before the incorporation of the cover crop, the dominant weed species was *Matricaria inodora* in all systems.
 - The number of weed species was higher in Org 0 and lower in winter rye as cover crop in systems Org I and II.

Weed biomass (2014-2016)

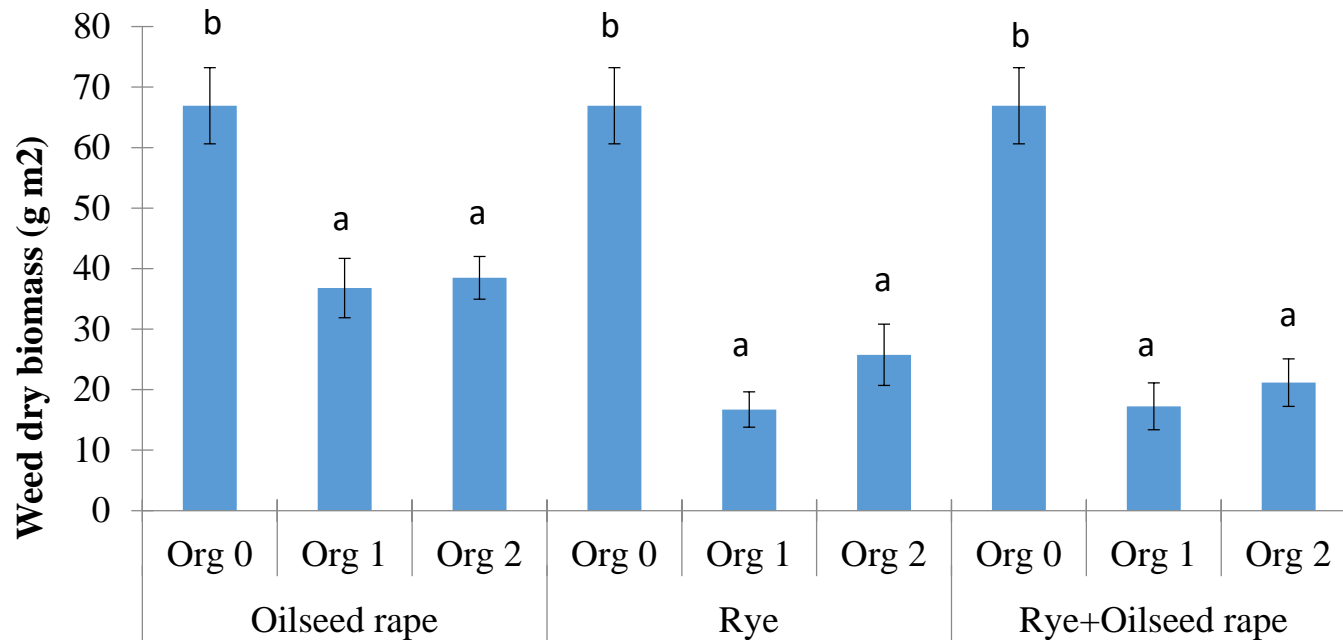
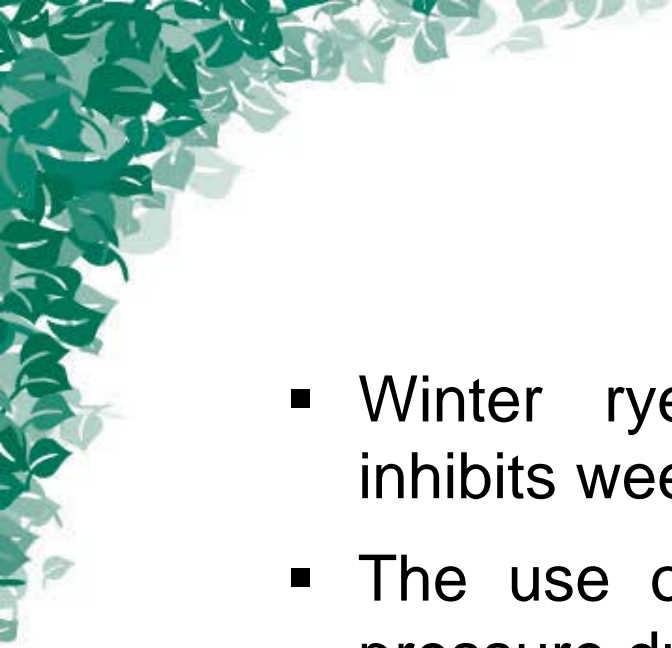


Figure 2. Weed dry biomass (g m⁻²) in green manures as winter cover crops (CC) before incorporation to soil in organic cropping systems in 2014-2016. (Org 0 – without CC, Org I – with CC; Org II – with CC and composted cattle manure).

Different letters indicate significant differences (Tukey HSD test ($P < 0.05$)).

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- Winter rye exhibits allelopathy and thus inhibits weeds by releasing natural toxins.
 - The use of cover crops reduced the weed pressure during the cover crop cycle.
 - The effect of cover crops was not significantly obvious in the subsequent cash crop – the significant differences between systems appeared only in 2015.

Conclusions

- ✓ The introduction of winter cover crops to a five-year crop rotation (Org I system) and in combination with cattle manure (Org II system) depressed weediness in comparison with the control system (without cover crops, system Org 0).
- ✓ Winter cover crops have a suppressing effect on weeds.
- ✓ From the cover crops used the winter rye was the best weed suppressor.



THANK YOU!



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