

# PRODIVA project

## Crop diversification and weeds

  
CORE organic

[www.coreorganic.org](http://www.coreorganic.org)

### Manipulating plant species diversity with cover crops.....recent research efforts in Finland

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PRODIVA project 2015-2018

# PRODIVA project details

- ❖ **Work packages:**
- ❖ **WP0: Project coordination**  
*Bo Melander (DK)*
- ❖ **WP1: Weed dynamics in crop rotations with cover crops**  
*Jukka Salonen (FI)*
- ❖ **WP2: Crop mixtures for weed suppression**  
*Anneli Lundkvist (SE)*
- ❖ **WP3: Variety mixtures for weed suppression**  
*Bo Melander (DK)*
- ❖ **WP4: Crop diversification and weeds on farms**  
*Bärbel Gerowitt (DE)*
- ❖ **WP5: Dissemination**  
*Bärbel Gerowitt (DE)*

<http://coreorganicplus.org/research-projects/prodiva/>

# PRODIVA project HYPOTHESES

## Improved weed management with....(WP 1)

- ❖ Selected competitive **cover crop species**
- ❖ Improved **cover crop establishment**

*More project info:*

*<http://coreorganicplus.org/research-projects/prodiva/>*

# Cover/catch crops in field experiments in FI 2015&16

- ▶ TRFPR Red clover (*Trifolium pratense* L.)
- ▶ TRFRE White clover (*Trifolium repens* L.), 2 cultivars
- ▶ TRFHY Alsike clover (*Trifolium hybridum*)
- ▶ TRFRM Persian clover (*Trifolium resupinatum* var. *majus*)
- ▶ TRFSU Subterranean clover (*Trifolium subterraneum* L.)
- ▶ TRFIN Crimson clover (*Trifolium incarnatum*)
- ▶ MEDLU Black medic (*Medicago lupulina* L.)
- ▶ MEUAL White sweet clover (*Melilotus alba* Med.)
- ▶ LOLMU Italian ryegrass (*Lolium multiflorum* Lam.)
- ▶ LOLPE English/Perennial ryegrass (*Lolium perenne* L.)
- ▶ PLHPR Timothy (*Phleum pratense* L.)
- ▶ FESPR Meadow fescue (*Festuca pratensis* Huds.)
- ▶ FESAR Tall fescue (*Festuca arundinacea* Schreb.)
- ▶ SECCE Winter rye (*Secale cereale* L.)
- ▶ **After Harvest:**
- ▶ VICSA Common vetch (*Vicia sativa* L.)
- ▶ RAPSA Oilseed radish (*Raphanus sativus* L.)
- ▶ LOLMW Westerwold ryegrass (*Lolium multiflorum* Lam. var westerwoldicum)

# Field trials in Jokioinen Finland

- ▶ Two fields under organic cropping (3rd year in 2015)
  - 2013: Oats with undersown clover/grass mixture
  - 2014: Clover/Grass mixture (ploughed autumn 2014)
  - 2015: Spring Barley with cover crop mixtures (8)
    - Two long-term field experiments started:
      - a) Comparison of Crop Husbandry / Animal Farm
      - b) Comparison of primary tillage (plough vs. stubble, 2016)
        - Cover crops sown in barley (2015) either in May or early July
        - Oilseed rape as model WEED in addition to the natural infestation
  - 2015 Autumn: Winter Wheat
    - Cover crops sown in the Spring (04&06-05-2016)
    - Catch crops sown in the Autumn (25&26-08-2016)

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# Cover Crop Mixtures

- ▶ TRFPR (8 kg ha<sup>-1</sup>) + TRFRE (4 kg ha<sup>-1</sup>)
- ▶ MEDLU(6) + TRFRE(2) + TRFRM(3) + TRFIN(4)
- ▶ MEUAL(2) + TRFHY(2) + TRFPR(3) + TRFRE(1) + TRFSU(2) + LOLPE(10) + PHLPR(2) + FESPR(3) + FESAR(3)
- ▶ TRFRE(8) + LOLMU(8)
- ▶ SECCE(100)



# Assessments during the growing season 2015

- Emergence times and crop density
- Height
- Cover

## **Heading stage (weeks 31–32):**

- Crop density
- Cover crop densities
- Weed densities
- Plant biomass
- Leaf areas (not in 2016)

## **Harvest time (week 34):**

- Weed density per species
  - Weed biomass
  - Crop biomass
  - Cover crop biomass
- 
- YIELD, Barley 35/15, Wwheat 34/16



# Assessments during the growing season 2016

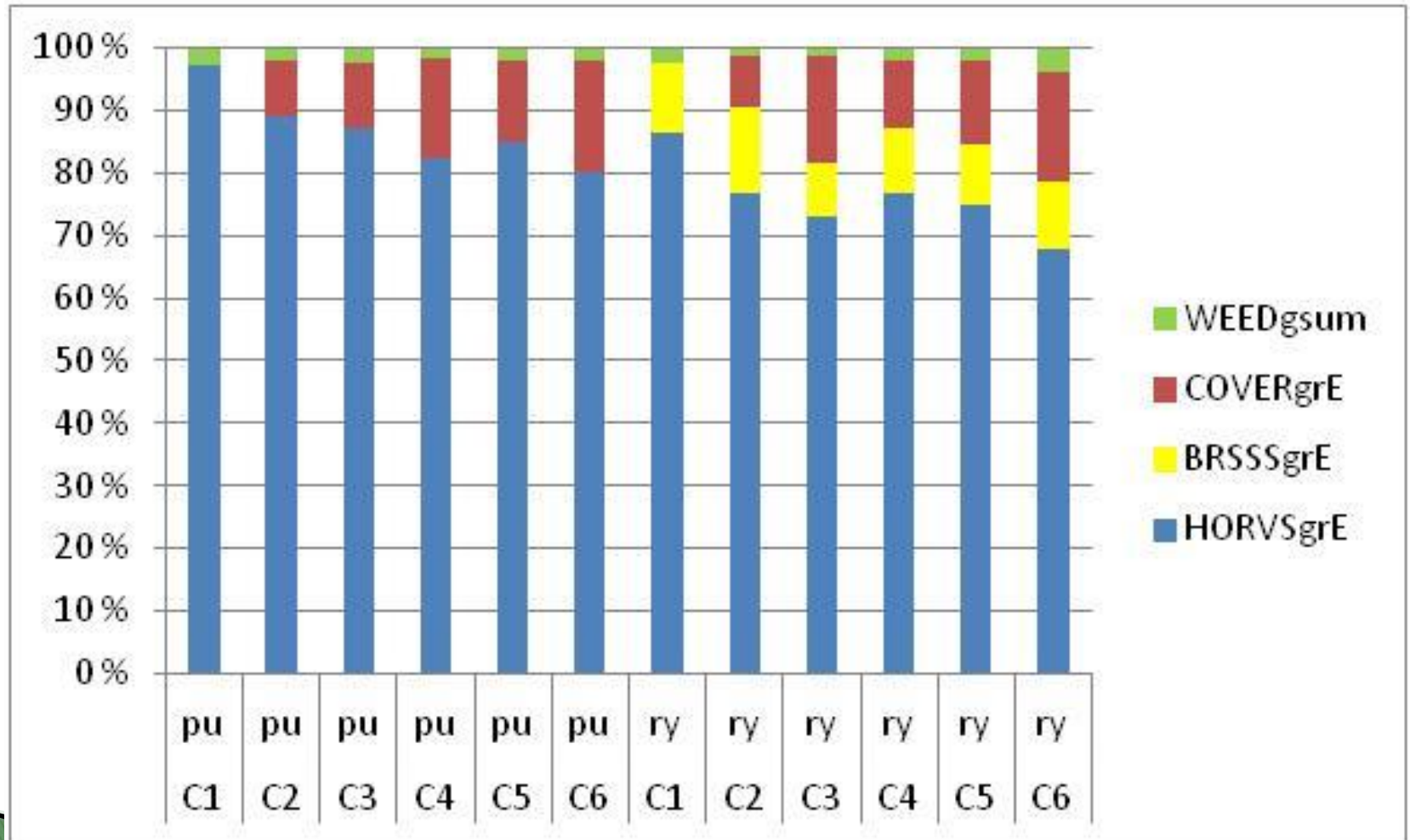
- Crop/Cover Crop/Weed densities
- Height
- Cover

## Harvest time (weeks 33–34):

- Weed density per species
  - Weed biomass
  - Crop biomass
  - Cover crop biomass
  - Cover
- 
- **YIELD**, Wwheat 33&34/2016
  - Amount & Quality
- 
- **Re-growth** of CCs after harvest

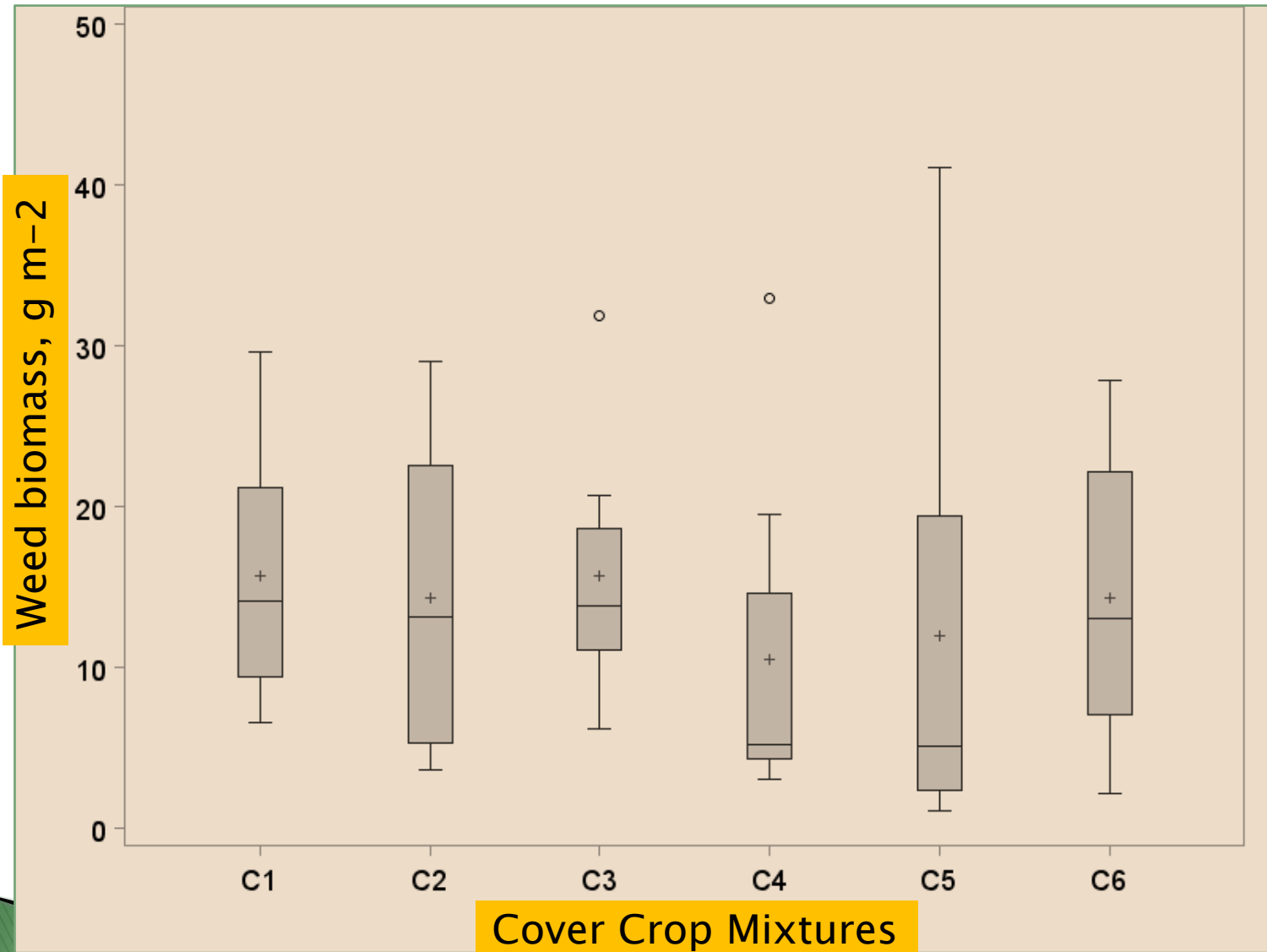
# Spring barley with "fellows"

Biomass proportion

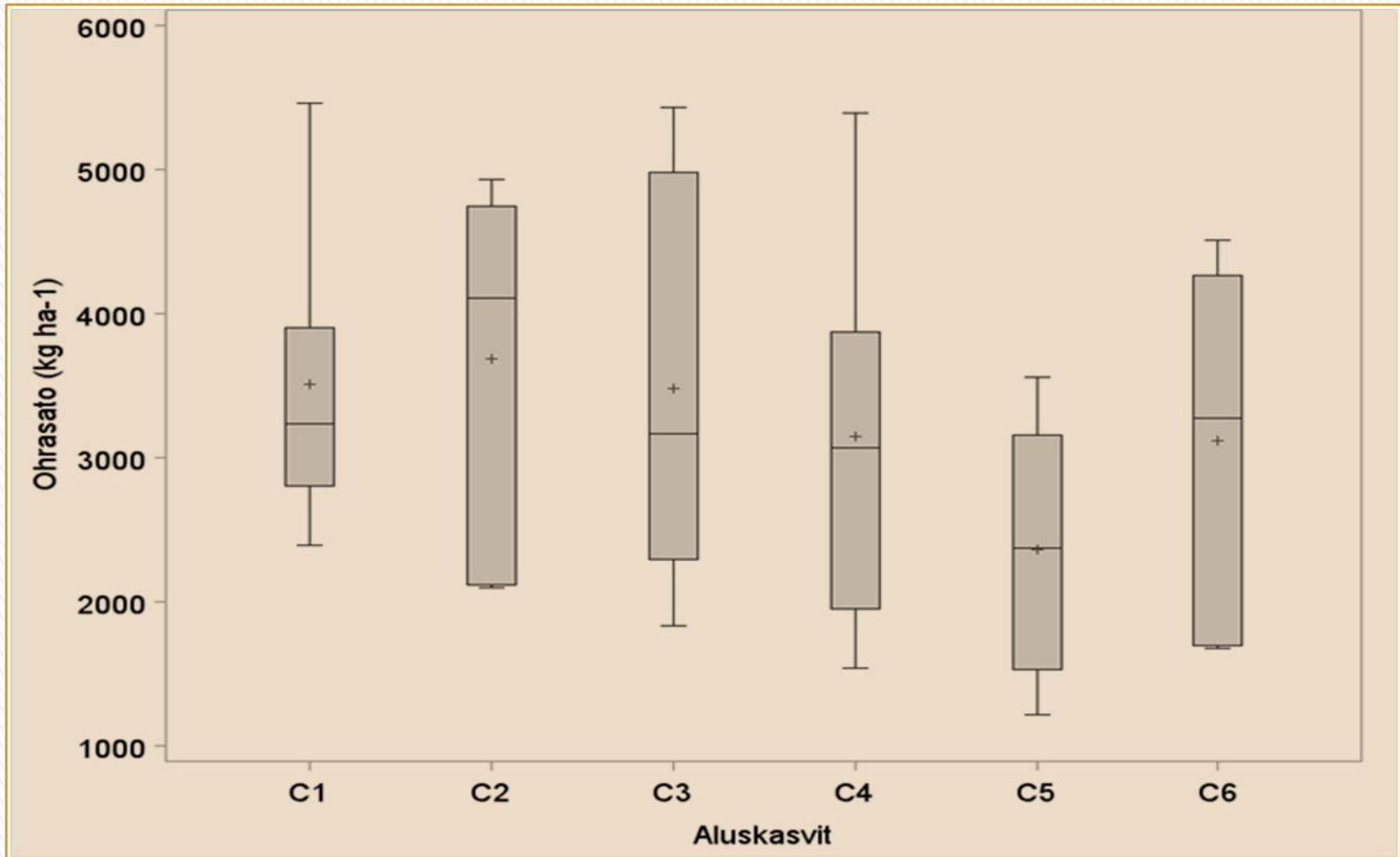


Cover crop options

# No major differences in weed biomass

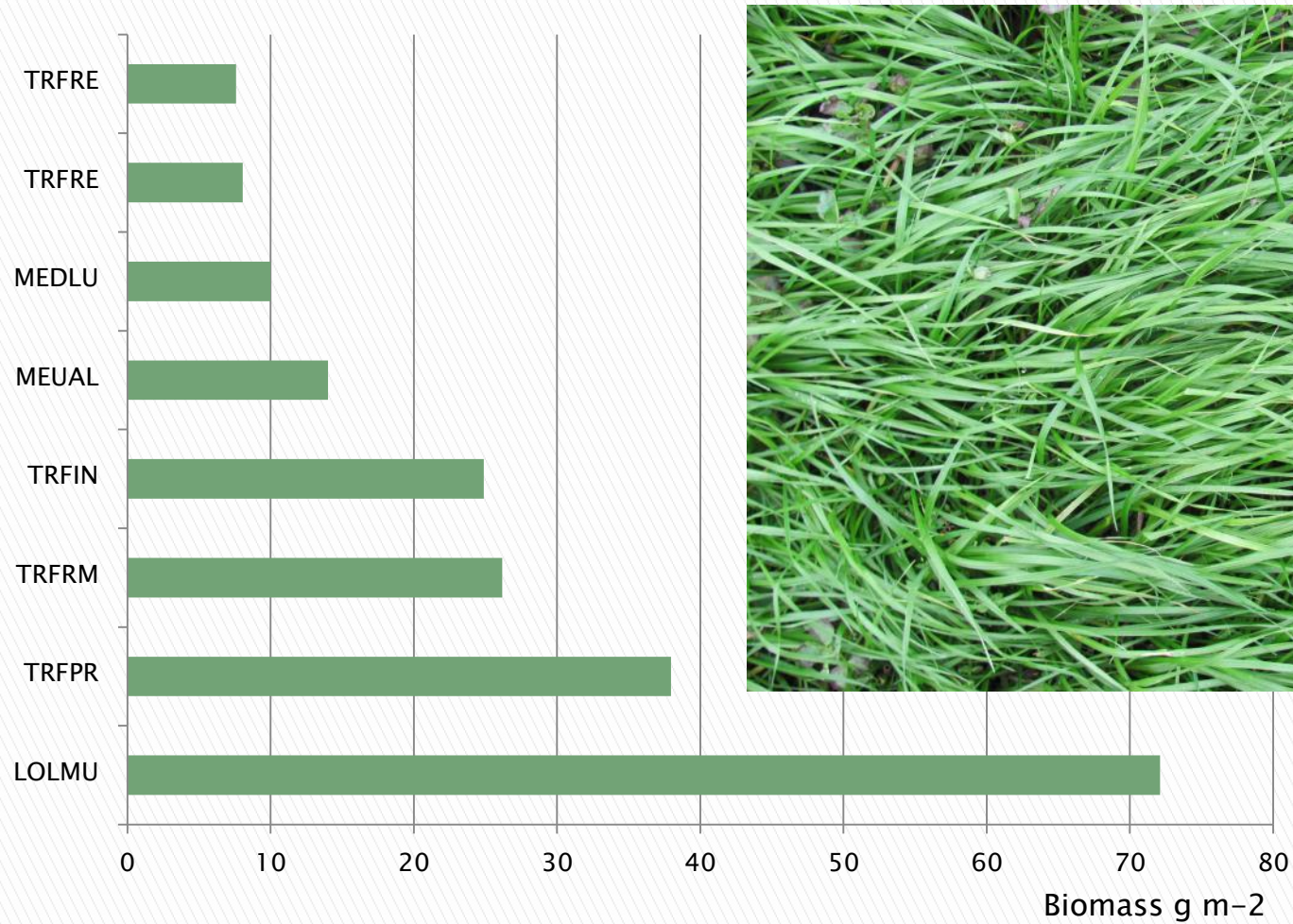


# ► Differences in barley yields....

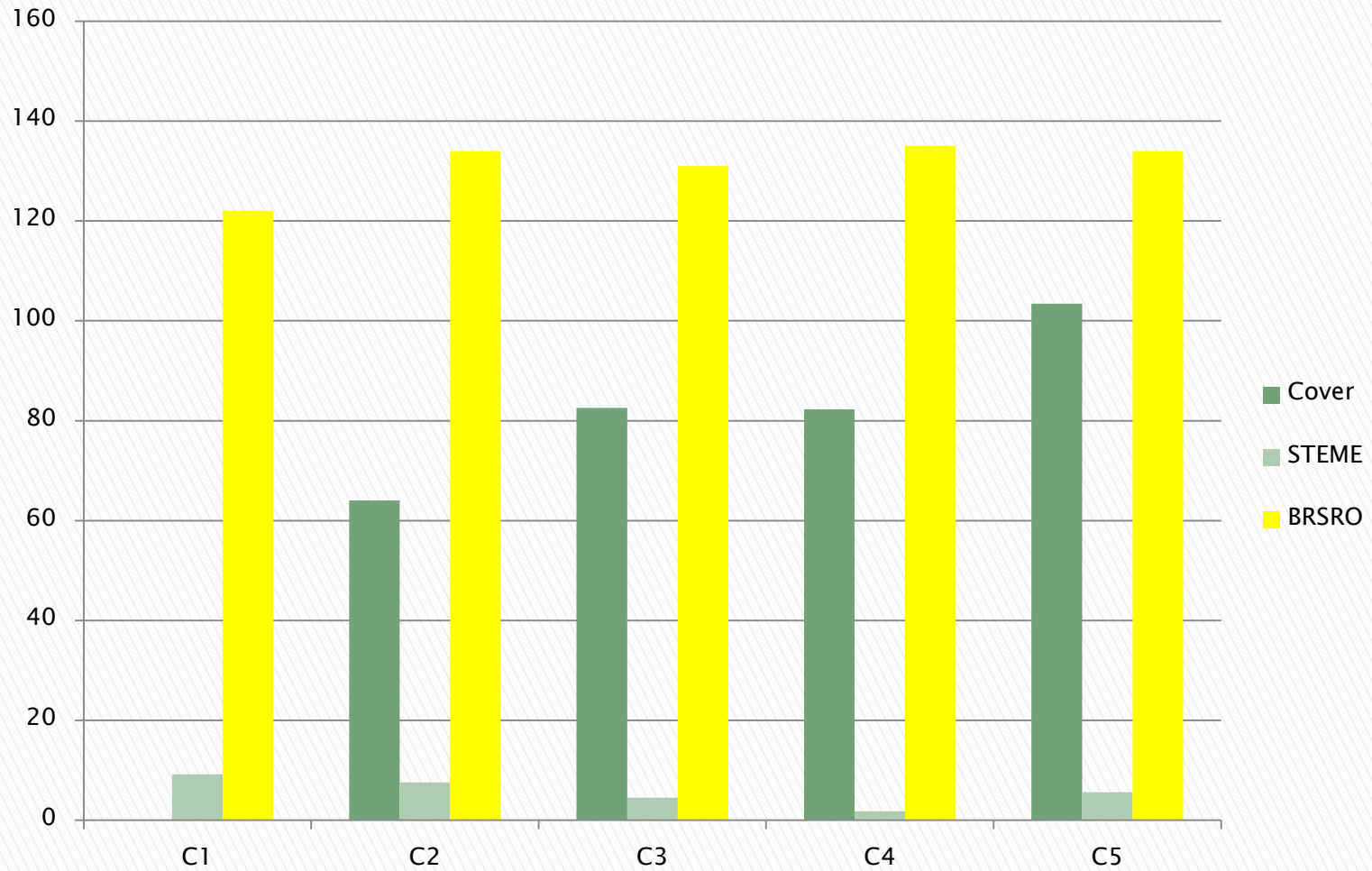


C1 = Barley without cover crop.....C5 = rye as cover crop

# ▶ Relative growth potential of CCs



# ► Competition potential of CCs



# Findings and Speculation

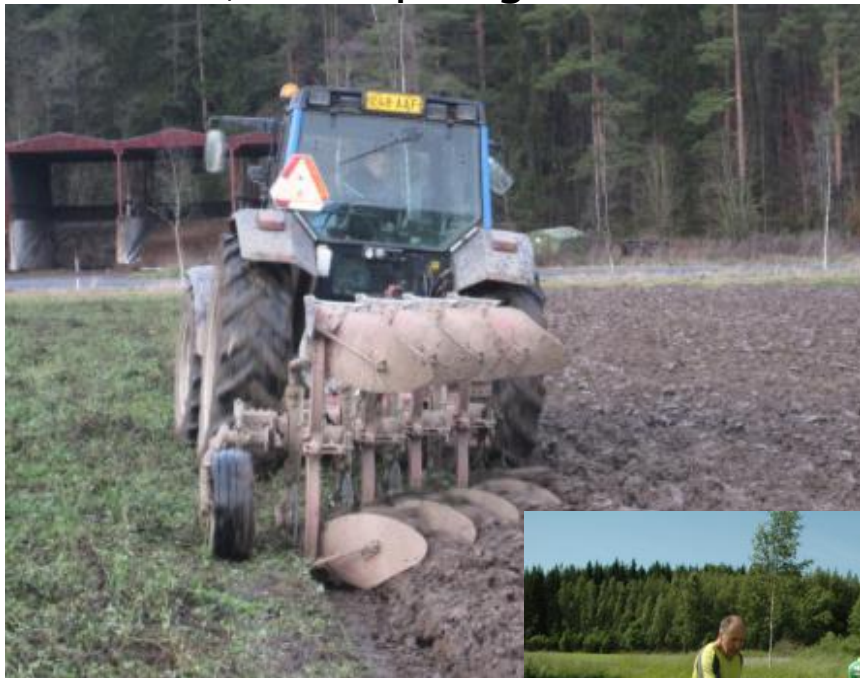
- ▶ CCs are too slow against spring–**emerging** annual weeds in spring cereals
- ▶ CCs suppress weed growth after harvest
- ▶ Red Clover, Alsike Clover and White Clover are most promising in Northern conditions
- ▶ Persian and Crimson Clover are too tall if sown in the together with spring barley
- ▶ White Sweet Clover as tall as barley
- ▶
- ▶ Winter wheat gets enough lead against CCs

# Cover Crop Management

- ▶ Species / Cultivars / Mixtures
- ▶ Seed rates
- ▶ Sowing time
- ▶ Cover / Catch
- ▶ Short term / Long term
- ▶ Target weed species
- ▶ Services (N, soil structure, feed)



Clover/Grass ploughed 2014



Barley sown in 2015



Cover crops sown in 2015

Barley harvested 2015



09-09-15



22-12-15



04-05-16



17-05-16



17-05-16



08-08-16



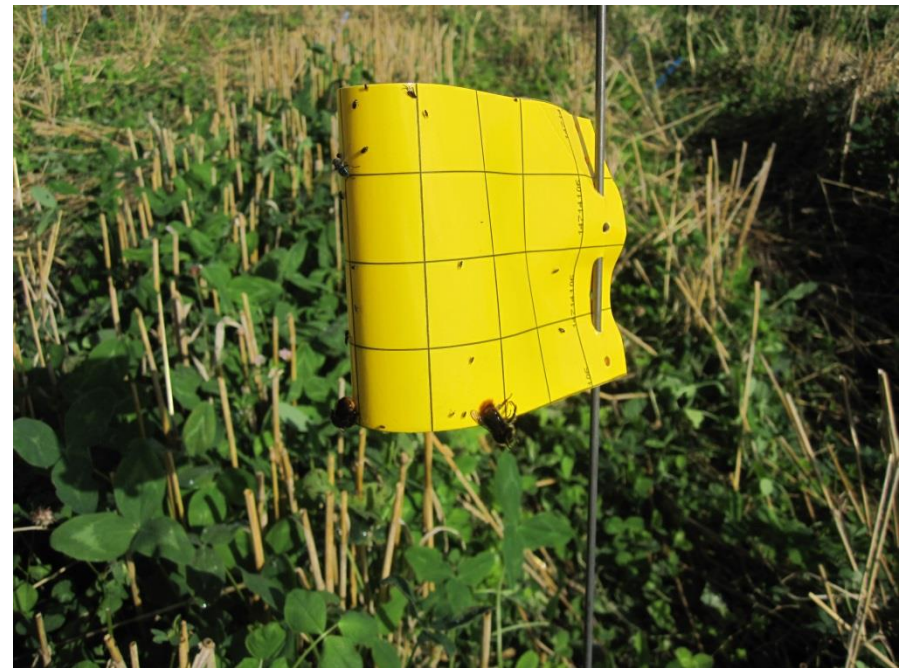
08-08-16



# Catch crops after the harvest: LOLMW, RAPSA, VICSA mixtures



## Monitoring of "flying objects" after harvest 2016





Kiitos  
Thank You

