

**Crop diversity** – a crucial remedy for weed management in organic cropping

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# Crop Diversity

## A. Season for crop establishment

- spring / autumn

## B. Sowing time

- early / late, spring/autumn

## C. Crop species

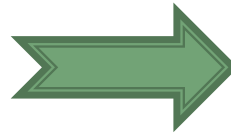
- annual / perennial
- non-legume / legume (N fixation in organic production!)
- cover / catch crops



# Objective for growing **cover crops** in cereals



To replace harmful weeds with Useful plant species



# Cover crops in field experiments in Finland 2015&2016

- ▶ TRFPR Red clover (*Trifolium pratense* L.)
- ▶ TRFRE White clover (*Trifolium repens* L.), 2 cultivars
- ▶ TRFHY Alsike clover (*Trifolium hybridum* L.)
- ▶ TRFRM Persian clover (*Trifolium resupinatum* var. *majus*)
- ▶ TRFSU Subterranean clover (*Trifolium subterraneum* L.)
- ▶ TRFIN Crimson clover (*Trifolium incarnatum* L.)
- ▶ MEDLU Black medic (*Medicago lupulina* L.)
- ▶ MEUAL White sweet clover (*Melilotus alba* Med.)
- ▶ LOLMU Italian ryegrass (*Lolium multiflorum* Lam.) 2 cvs.
- ▶ 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.)

## Post-Harvest:

- ▶ VICSA Common vetch (*Vicia sativa* L.)
- ▶ RAPSA Oilseed radish (*Raphanus sativus* L.)
- ▶ LOLMW Westerwold ryegrass (*Lolium multiflorum* Lam. var westerwoldicum)

# Undersown cover crops in winter wheat

## SPRING time

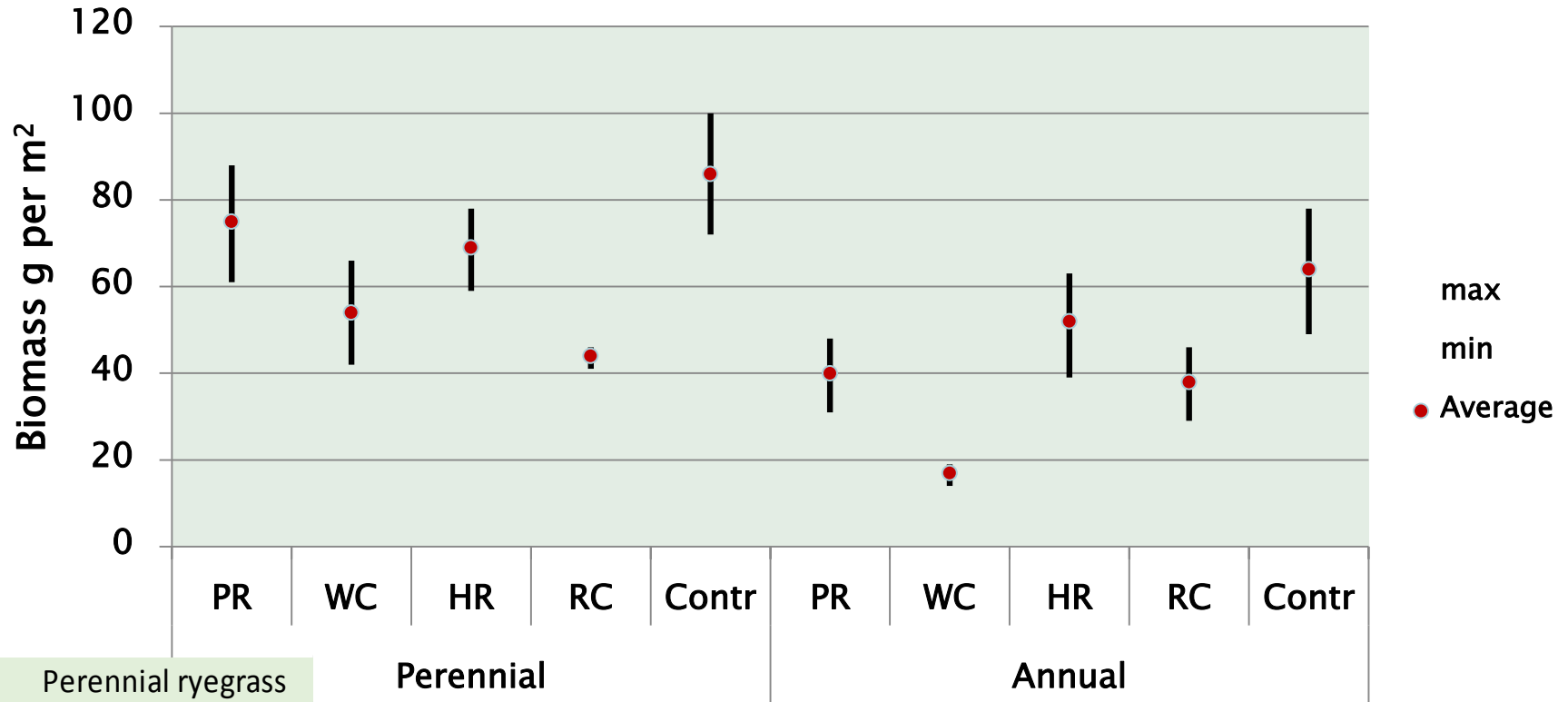
- sowing early
- sowing IN the soil
- crop gains the lead



## Expected outcome

- reduced weed biomass
- no significant yield loss
- competition continues after the crop harvest

# Weed biomass in Spring Barley with undersown species



PR Perennial ryegrass  
 WC White clover  
 HR Hybrid ryegrass  
 RC Red clover  
 Contr Control

**Clovers are more effective against weeds than ryegrasses**

Source:  
 PRODIVA Experiments in Latvia  
 by *Livija Zarína*

# Crop diversification

## — Five rules from Danish experiments

1. Diversity
2. At least 20 % N-fixating perennial crops suitable for mowing
3. Room for mechanical control of *E. repens*
4. Clean row crops
5. Crop competitiveness



## 2. $\geq 20\%$ perennial N-fixating crops

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1. Undisturbed soil
2. Adds nitrogen to the system
3. Adds fertility – carbon and organisms
4. **Weed management**
  - by competition
  - by mowing
  - by ploughing in the end





# Main Conclusions

**Weed management** in organic cropping can be enhanced by

- Extending the rotation (other crops between cereals)
- Including perennial crops in cereal rotation
- Including leguminous crops in rotation (Nitrogen for the next crop)
- Undersowing (leguminous) cover crops
- Mowing the clover\_grass stands
- Keeping the row crops clean from weeds (Mechanical control)
- Paying attention to perennial weeds

Further research:  
IWM efforts in non-crop periods

Bo Melander from



Thank you.  
Any Questions ?

Livija Zarina from



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Jukka Salonen from



More about the PRODIVA Project at:

<http://projects.au.dk/coreorganicplus/research-projects/prodiva/>

