Weed management in cereals with cover crops - do they help or hinder?

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Introduction

Sustainable crop production calls for integrated weed management (IWM) approaches.

Cover crops (CCs) have been studied as feasible options for the IWM toolbox in cereal production.

Objectives and Methods

The aim of including undersown cover crops in cereal stands was to achieve efficient weed suppression without severely compromising weed species diversity and crop yield.

Several CC species, mainly in mixtures, were sown in spring barley and winter wheat in organically cropped field experiments in southern Finland during 2015-2016.

Treatments in spring barley (2015) and winter wheat (2016):

C1. No undersown cover crop

C2. Standard clover mixture (TRFPR 8 kg ha^{-1} + TRFRE 4 kg ha^{-1})

C3. Legume mixture (MEDLU 6 + TRFRE 2 + TRFRM 3 + TRFIN 4)

C4. Dense clover mixture (TRFPR 12 + TRFRE 6)

C5. Undersown grass (SECCE 100 in 2015, LOLMU 8 in 2016)

C6. Legume_Grass mixture (MEDLU 20 + LOLMU 8)

The subsequent effect of CC treatments on weeds and crop yield was studied in spring wheat in 2017.

Response of weeds and crops to cover crops

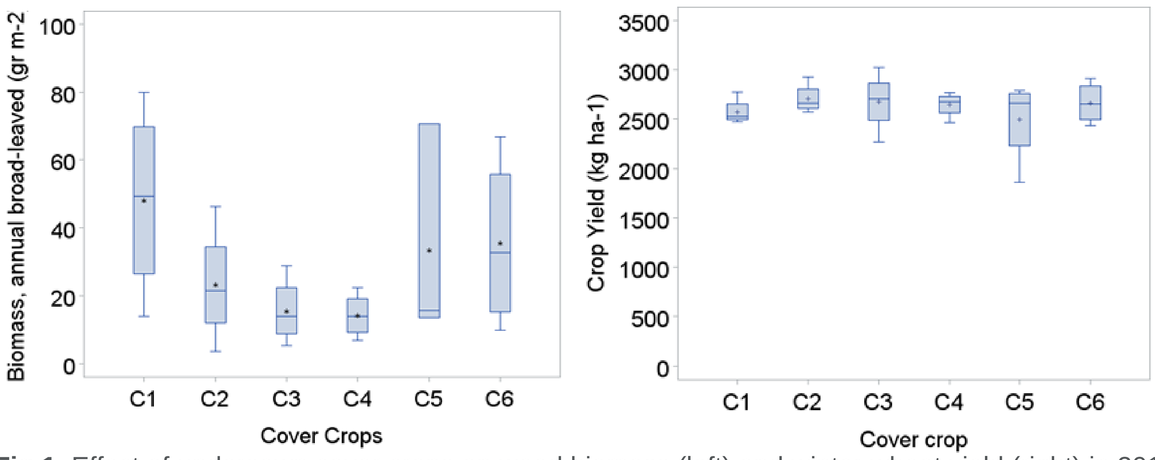

Fig 1. Effect of undersown cover crops on weed biomass (left) and winter wheat yield (right) in 2016.

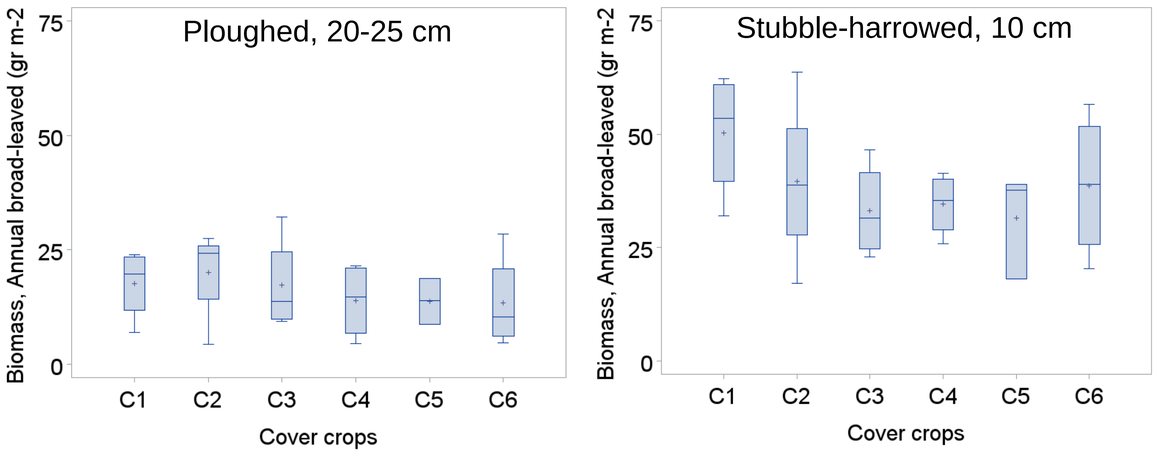

Fig 2. Subsequent effect of CCs on the occurrence of annual broad-leaved weeds in spring wheat in 2017. Preceding CC treatments in 2015 and 2016 as described above. Primary tillages were carried out in the autumns of 2015 and 2016. The main weed species: STEME, MYOAR, GALSP.

Main findings

- The early growth of CCs is too slow to effectively compete with tall annual weeds in the beginning of summer
- Spring-sown CCs fit well with winter cereals
- Proper CCs do not significantly reduce crop yields
- White clover easily becomes a volunteer weed
- CCs did not support transition to reduced tillage because perennial weeds and volunteer CCs became a problem
- Reduced tillage favored GALSP, MYOAR, STEME, TAROF
- Exploit the weed suppression by CCs also after the harvest
- CCs combined with mechanical control merits research

Sow early in the soil.

Take care of the main crop.

Let the CCs grow after harvest.

Happy End NOT Guaranteed!

Photos: *Jukka Salonen*

Conclusions

CC mixtures promote the establishment of competitive stands which hinder weed growth in variable growing conditions.

Clovers mixed with Italian ryegrass provide cover and catch benefits also after the crop harvest.

Grow CCs both during the growing season and non-crop periods for constant competition against weeds.

Recommendations for undersown CCs in organic cereals:

- **Go for:** *Trifolium pratense, T. repens, T. subterranum*
- **With caution:** *Festuca* spp., *Lolium* spp., *T. hybridum, Medicago lupulina, Phleum pratense*
- **Avoid:** *Melilotus alba, Secale cereale, T. incarnatum, T. resupinatum*

This study was part of the PRODIVA project (2015-2018) in which crop diversification for better weed management in organic production has been studied (http://projects.au.dk/coreorganicplus/research-projects/prodiva/ and Organic eprints at http://www.orgprints.org)