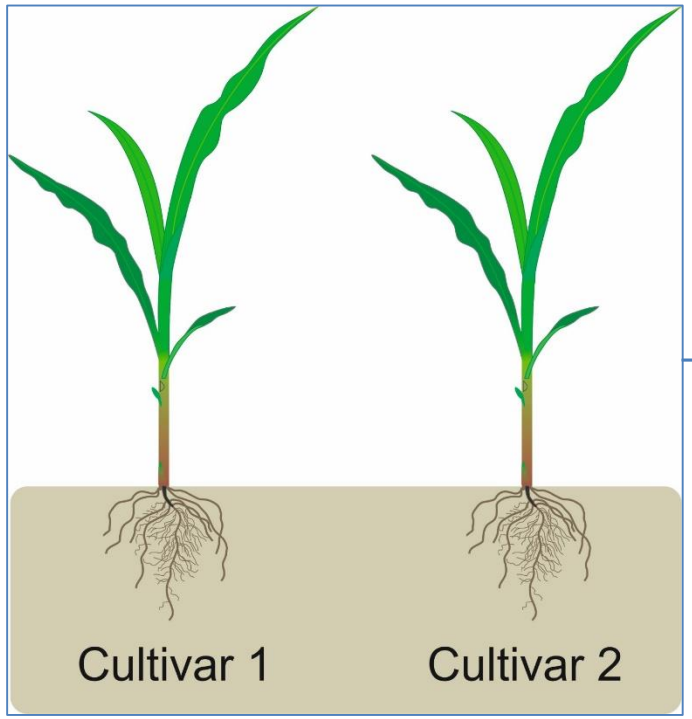
Cultivar mixtures for crop protection

June 3, 2022

Velemir Ninkovic, Swedish University of Agricultural Sciences (SLU)

EcoStacking effects in cultivar mixture?



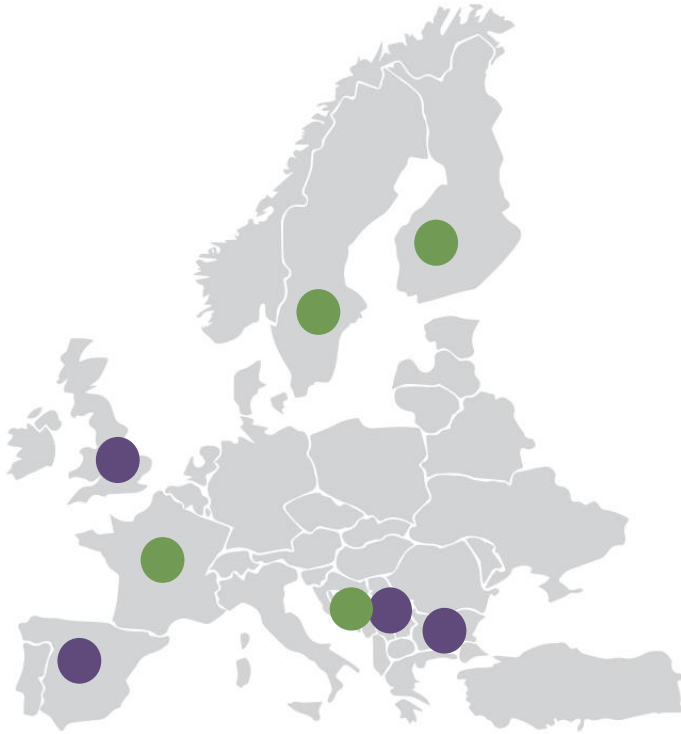
Cultivar Mixture

Ladybirds

Aphids

Plant diseases

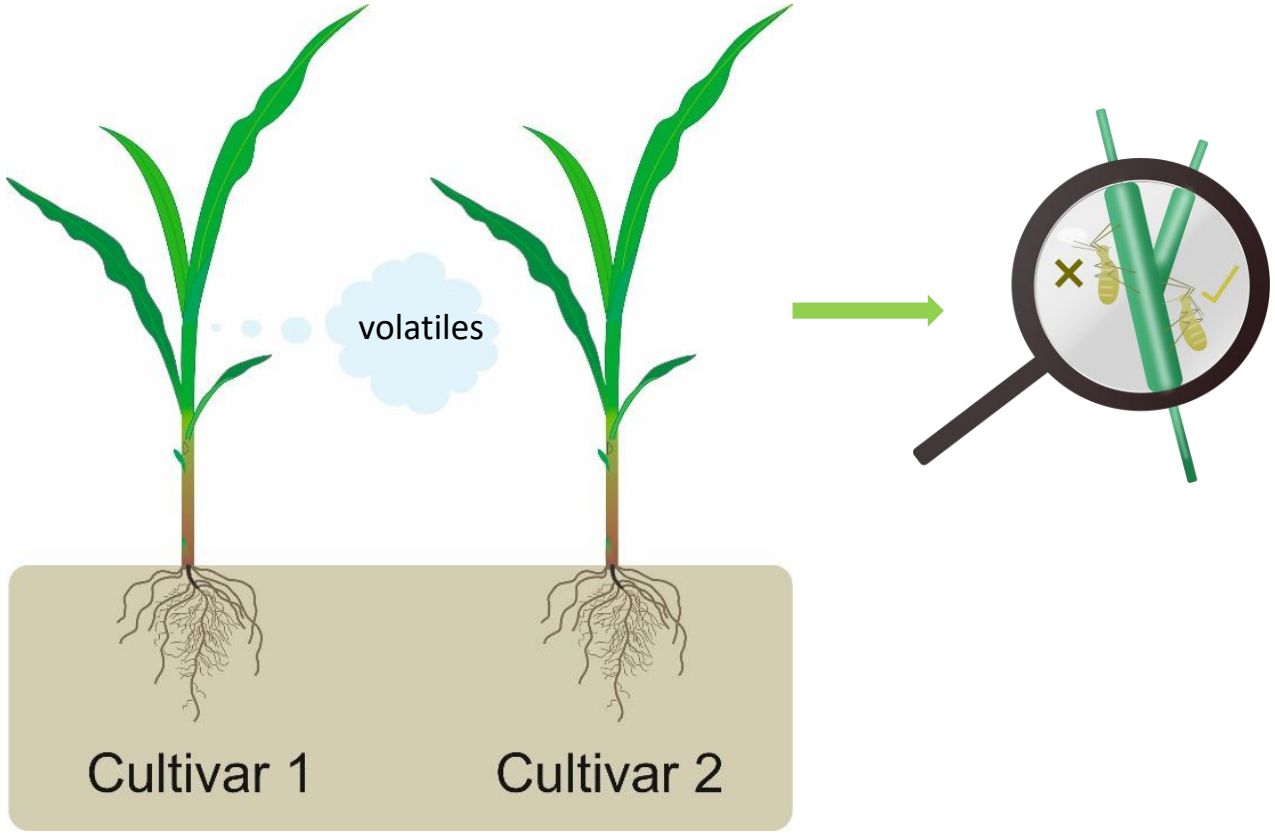
Nemathods and microbs



Fields experiment with barley

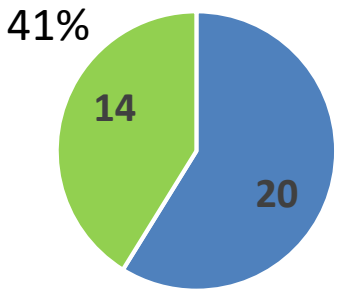
Field experiments with winter wheat

How to select genotype components for a cultivar mixture?

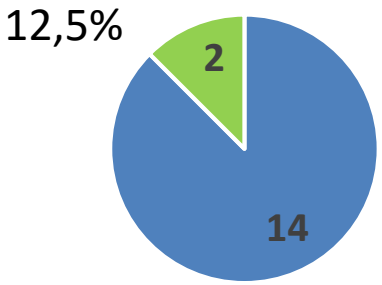


127 combinations tested

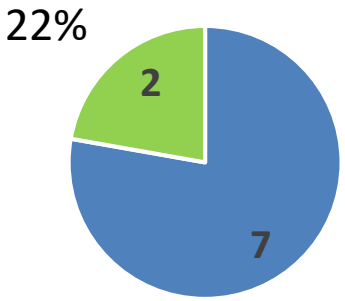
UK (old / bread)



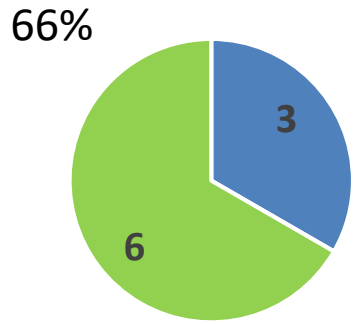
Spain



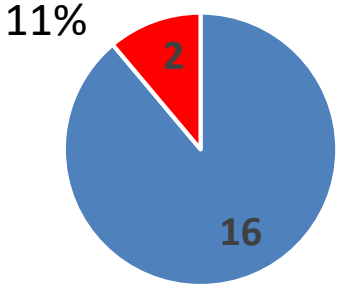
Serbia & Bosnia



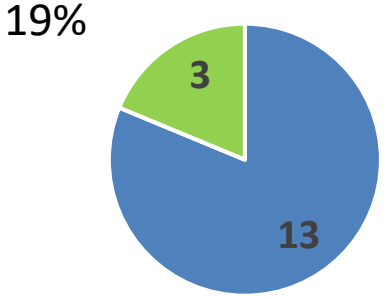
France



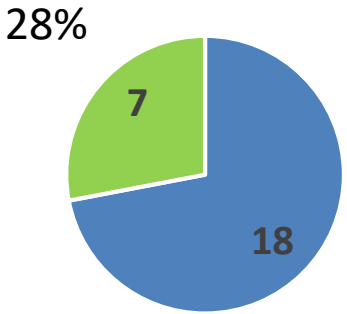
UK (new / feed)



Bulgaria



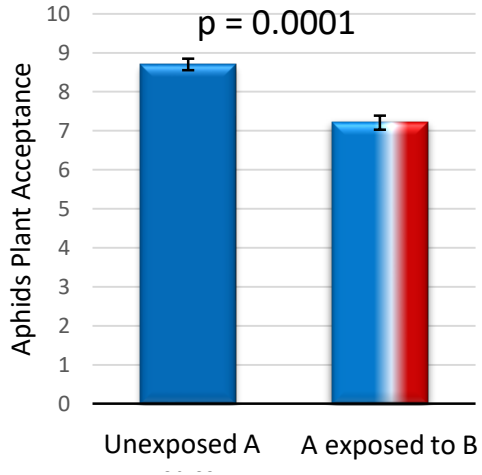
Sweden

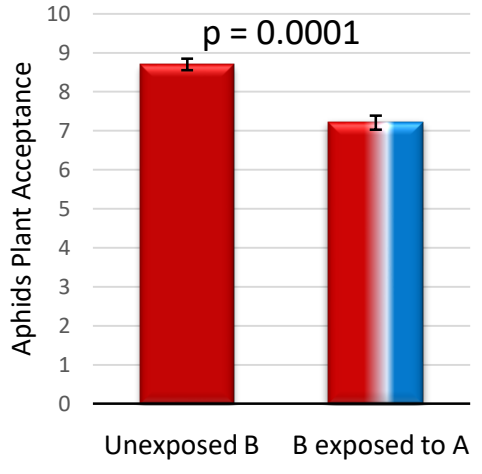


Winter wheat cultivar mixtures and aphids

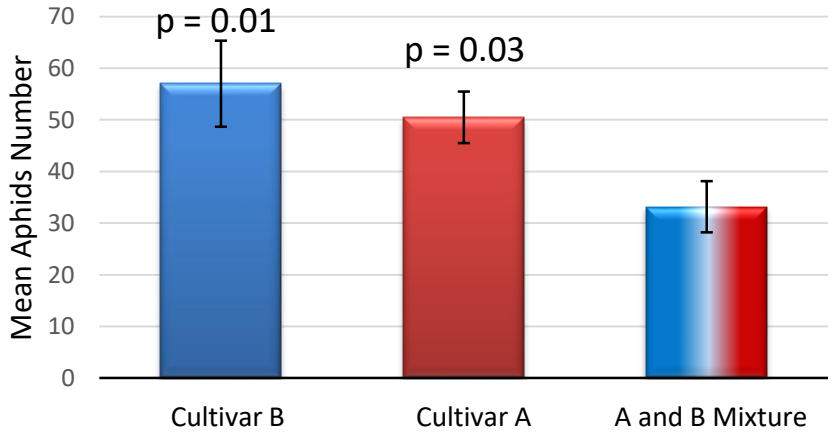
Field experiment with winter wheat in Serbia

- Volatile interactions between cultivars reduced aphids acceptance in the lab



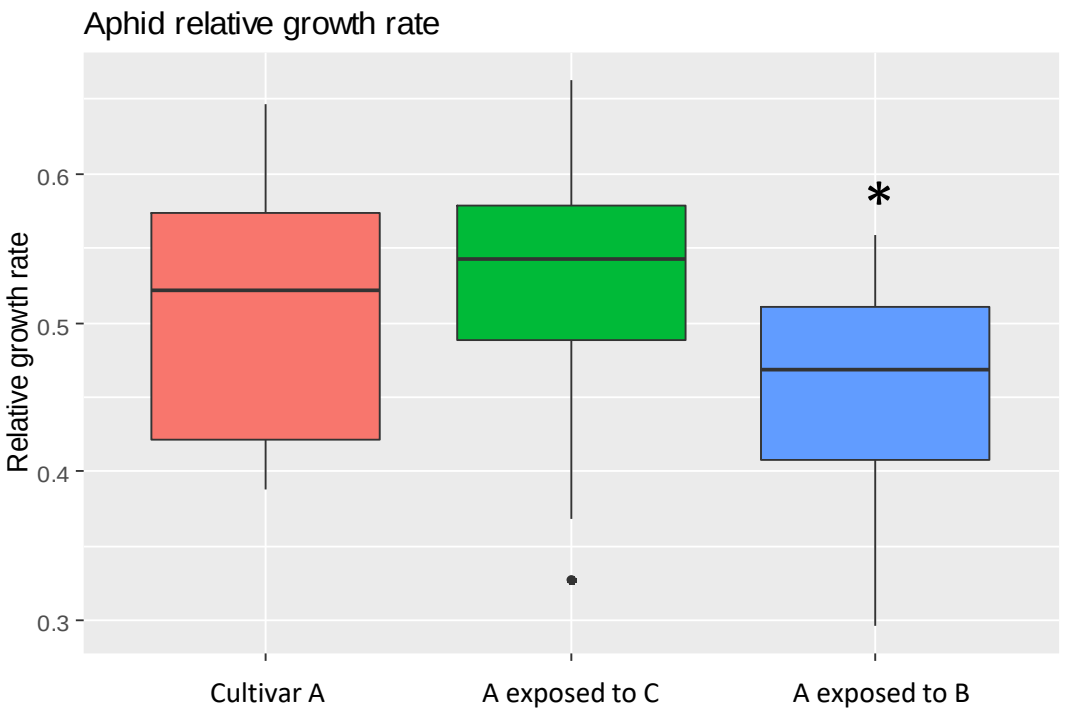


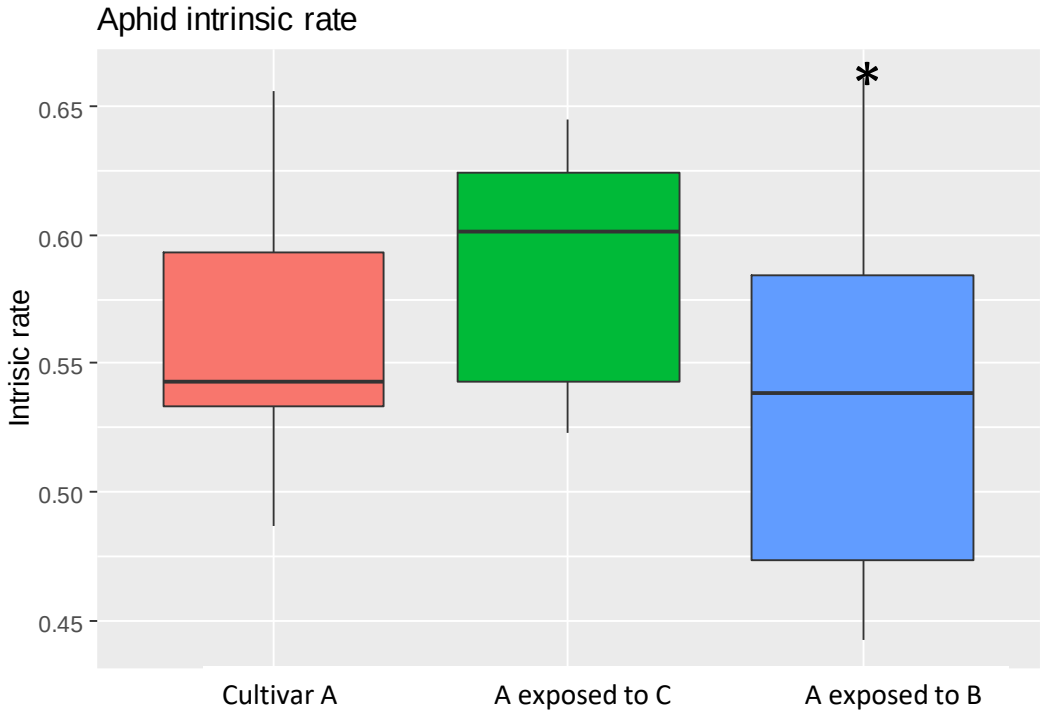
- Reduced aphids number in the mixture at population maximum in the field



P-value after Tukey test

Plant volatiles from a certain cultivar induce resistance to aphids in the receiving cultivar

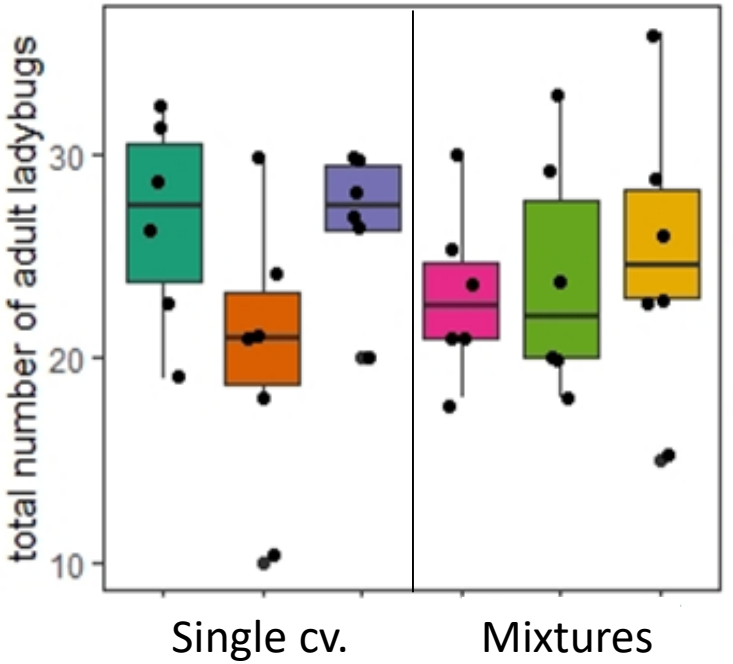




Aphids has significantly reduced weight in A exposed to B, compared to A exposed to C and unexposed A. However, no difference was detected between A exposed to C and unexposed plant.

Aphids has significantly produced less offspring in in A exposed to B, A exposed to C and unexposed A. However, no difference was detected between A exposed to C and unexposed cultivar A.

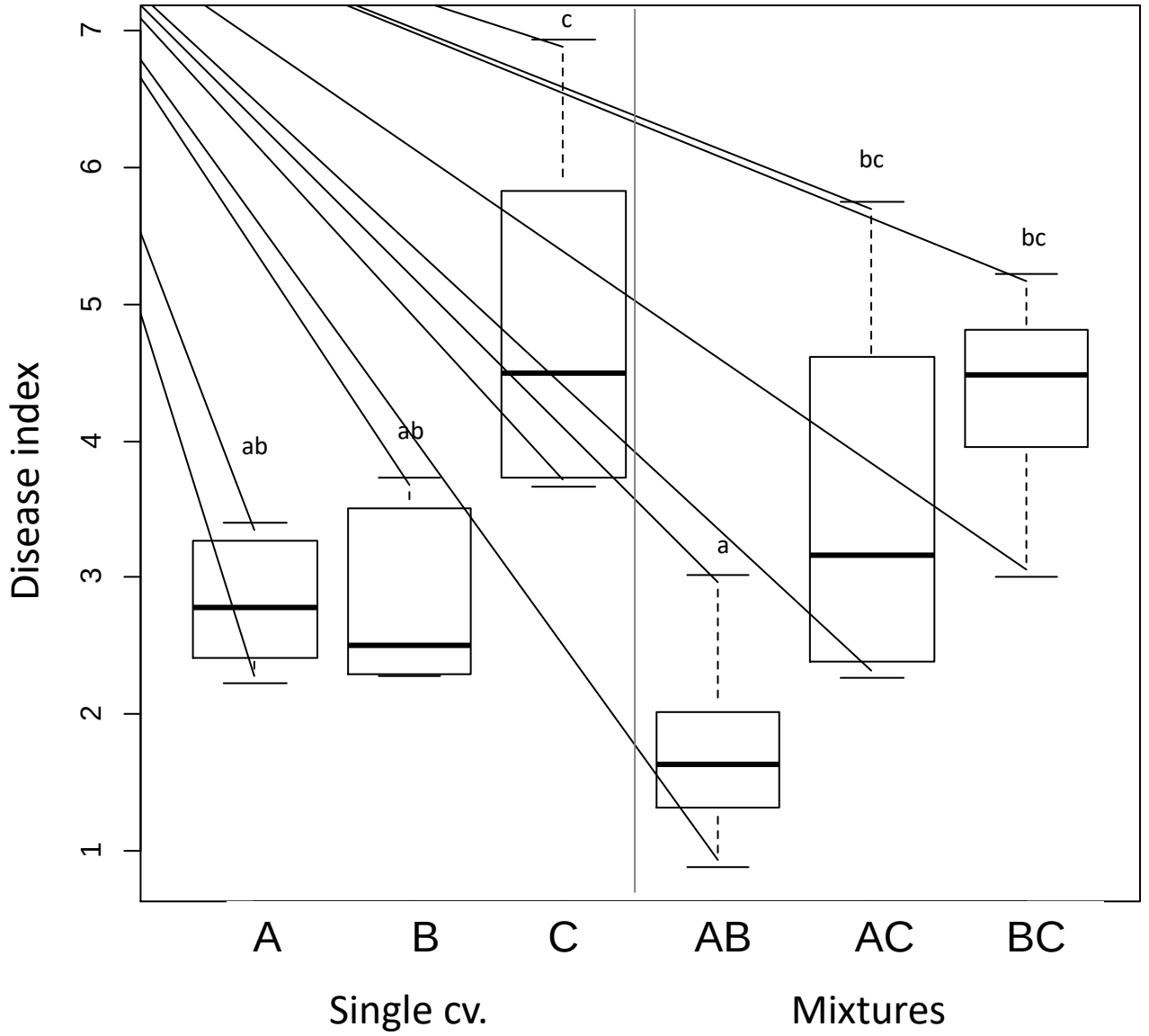
No negative effect of the mixtures on the abundance of ladybird beetles in the filed



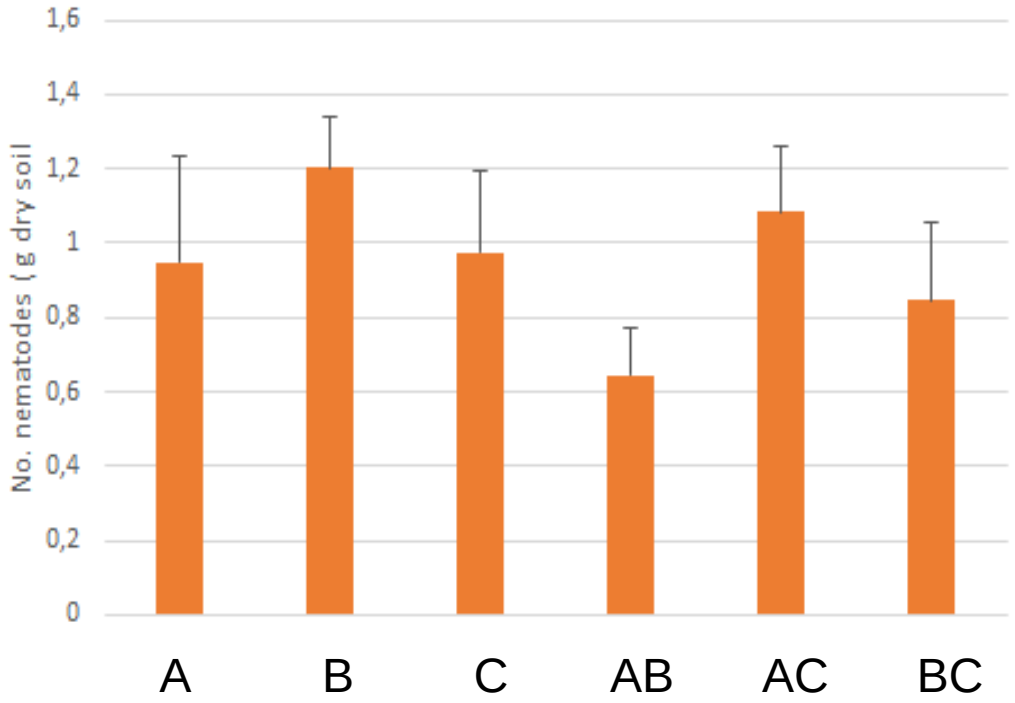
Effects of barley cultivar mixture on net blotch, *Pyrenophora teres*

Preliminary statistics
(on log transformed data)

Pyrenophora teres

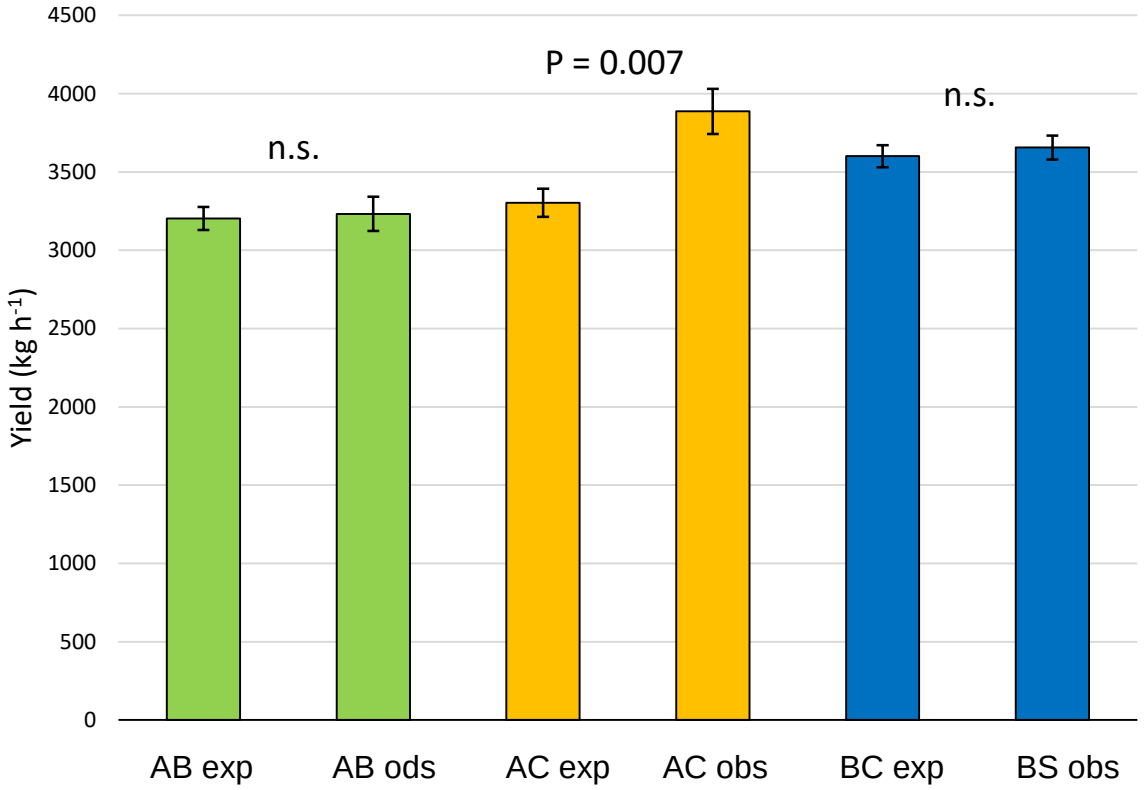


Effects of cultivar mixture on plant-feeding nematodes



Effects of cultivar mixture on yield

Field experiment with barley in Finland



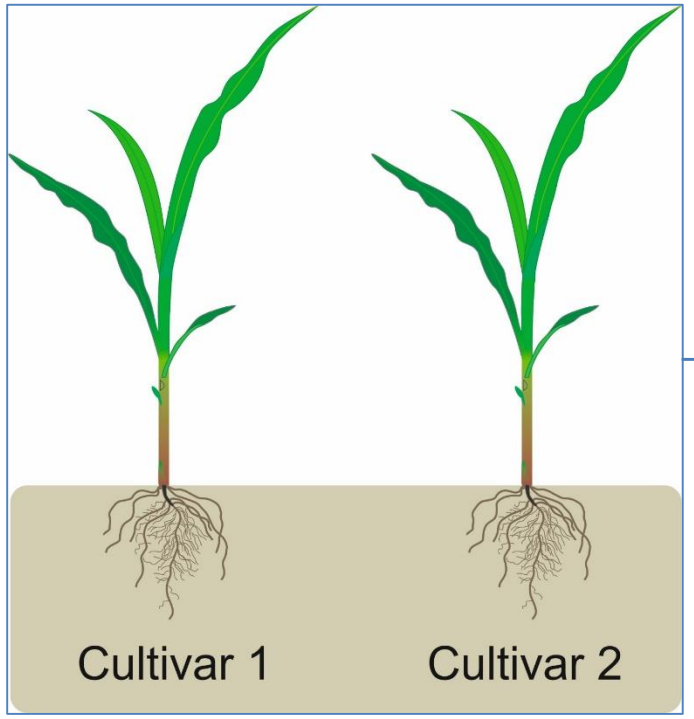
Exp- expected
Obs-observed

P-value after Tukey test

$F_{(5, 20)} = 7.3393,\ p = 0.00047$

Conclusions

Effects of the plant interactions in cultivar mixtures on:



Cultivar Mixture

Ladybirds

Aphids

Plant diseases

Nemathods and microbs

- No effect on the abundance
- Reduced attack
- Less infection
- Reduced number of plant-feeding nematodes

but only in certain cultivar mixture