Leibniz Centre for
Agricultural Landscape Research
(ZALF)

Agroecological effects of diversifying soybean and wheat cropping systems

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Challenge

- Given the EU's biodiversity goals to decrease pesticide usage by 50%
- Imperative to find cropping systems that reduce pesticide needs while still providing high yields for farmers
- Concurrent need to increase arthropod diversity

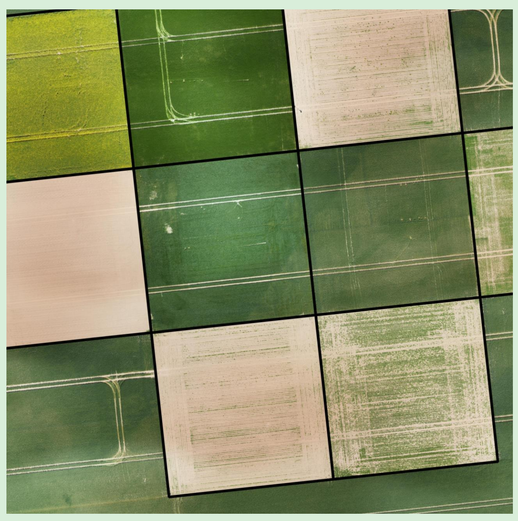
Research Question

- Do spatially diversified wheat and soy fields host more natural enemies than sole cropping systems and does this reduce pests?

Spatial diversification

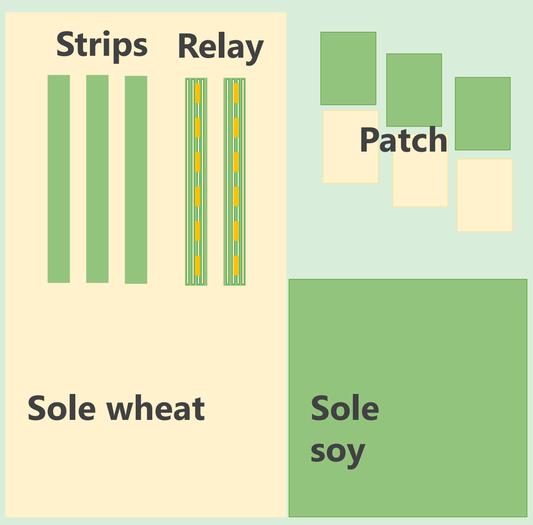
Relay intercropping
Alternating rows of crops with different seasons

Patch cropping
0.5 ha fields of crops suited for soil heterogeneity



Strip cropping
Strips of alternating crops with widths as wide as machinery, here 12 x 180 m strip

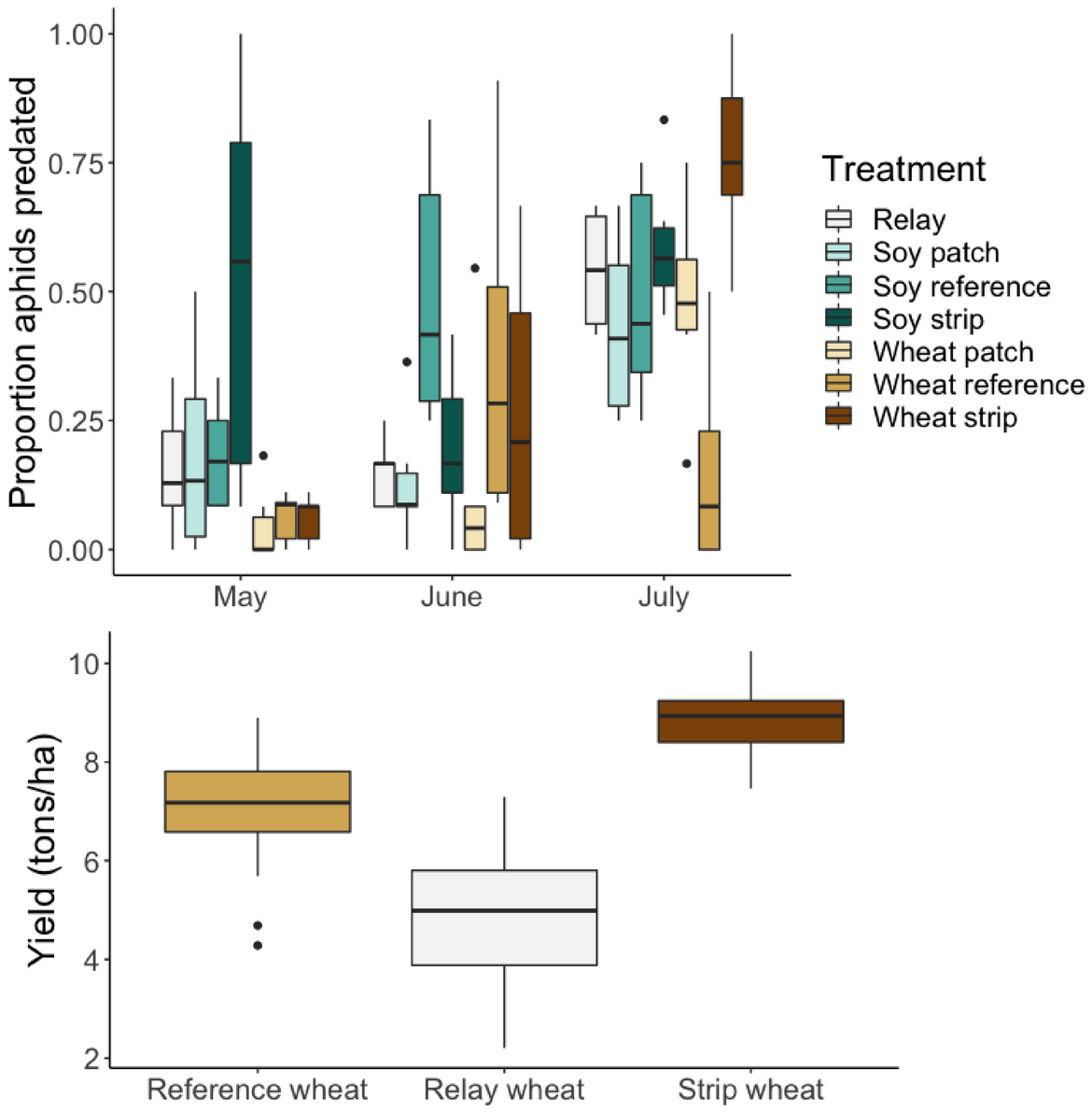
The experiment
5 different cropping systems in an on-farm trial in Tempelberg, Germany.



Methods

1. Visual monitoring of **pest** abundance
2. Measuring natural enemy diversity and abundance of **carabid beetles** and **spiders** with pitfall traps
3. Determining **pest control rates** by natural enemies with aphid predation cards – gluing aphids to cards in the field and counting the number of aphids predated by natural enemies

Results – 2022



- Relay intercropping soy did not establish due to drought
- Not enough aphids to trigger any pesticide usage but slightly more in wheat strip and relay than patch and reference
- Higher aphid predation in soy systems - reservoir for natural enemies?
- Strip wheat had highest yield and pest predation rates in July

What's next?

1. Determining natural enemy diversity metrics
2. Repeat all experiments in 2023
3. Comparing pest control and biodiversity benefits to system yields to determine overall system benefits and constraints to farmers

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