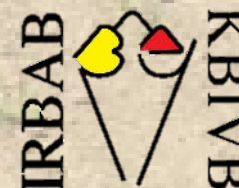


Companion plants to control pests in sugar beets

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Companion plants in sugar beet



End of use of neonicotinoids

Many restrictions on active ingredients have been or will be introduced

→ Urgent need to find alternatives



Companion plant (barley) was used to control wind erosion



To reduce aphids, virus yellows and other pests



Types of mode of action

- Camouflage
- Confusion
 - Visually/Optically
 - Olfactory
- Physical barrier
- Beet-barley interactions induce chemical “defence”
- Beneficials attracted by barley or by aphids on barley ?



Trials

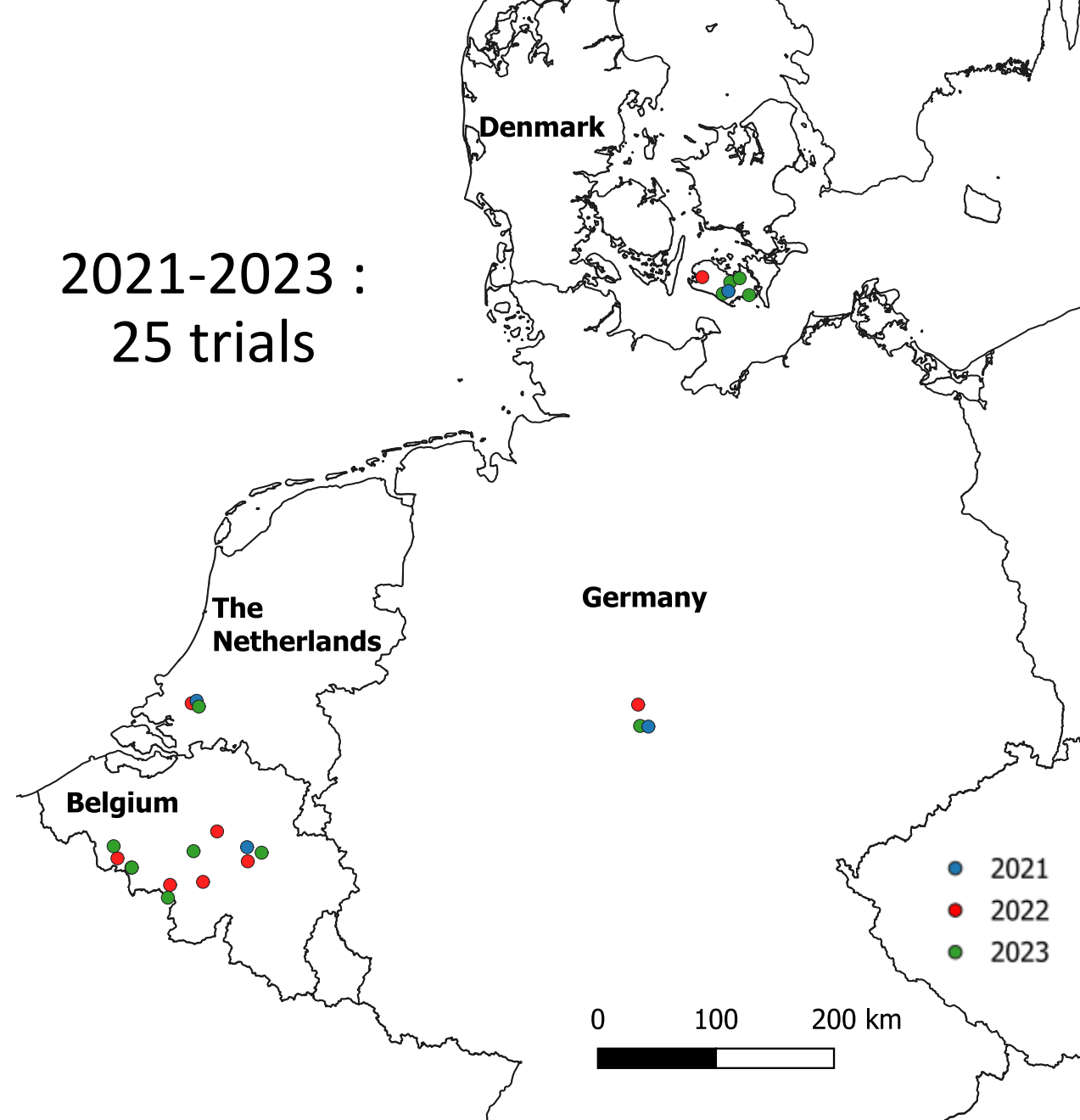


- Barley sown just before beets sowing
- Chemical and/or mechanical removing



- Aphids and beneficials
- Virus yellows
- Yield

2021-2023 :
25 trials



Trial design

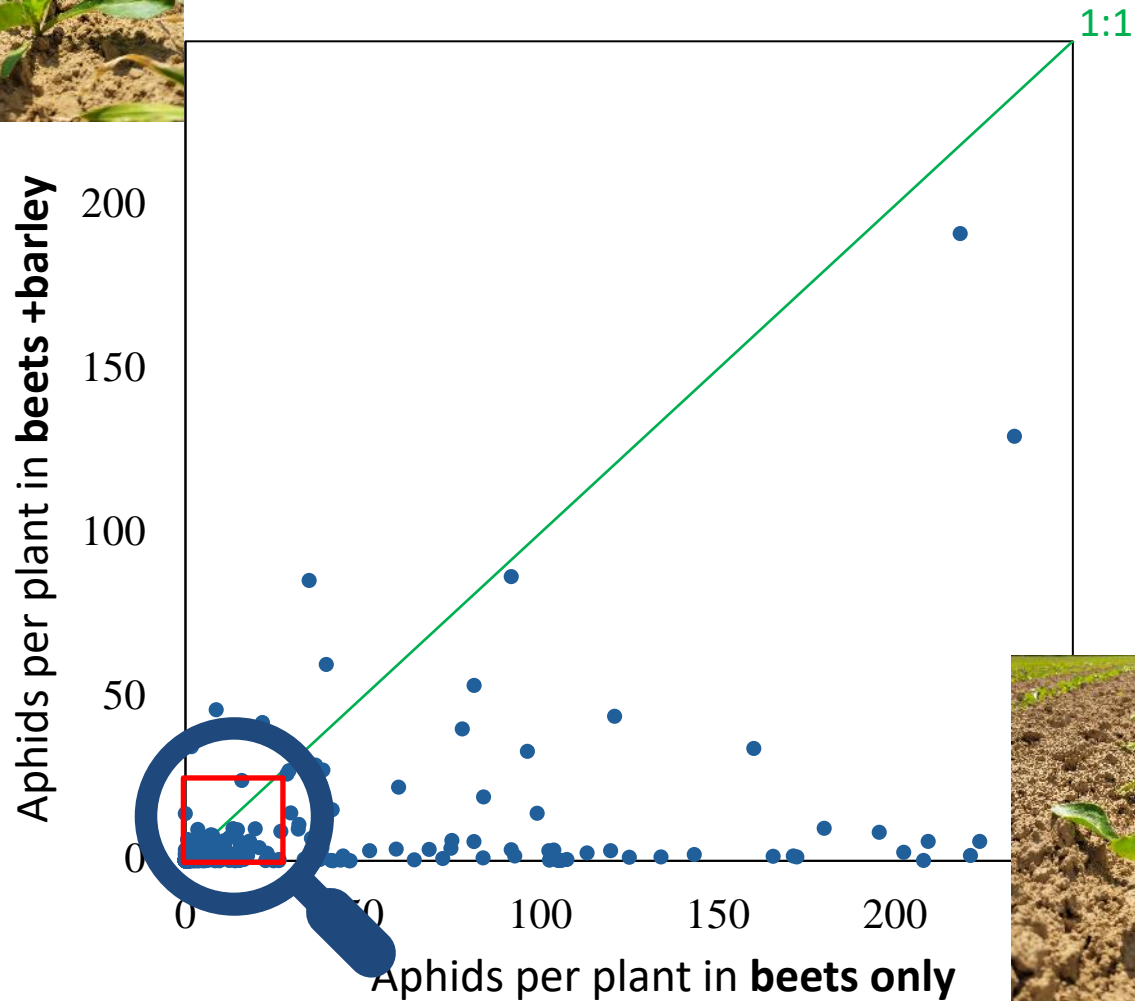
- Complete randomised block or wide strips
- 4 replicates
- Plots of around 30x30m
- Beets + Barley and Beets only
- A few other treatments depending on the site





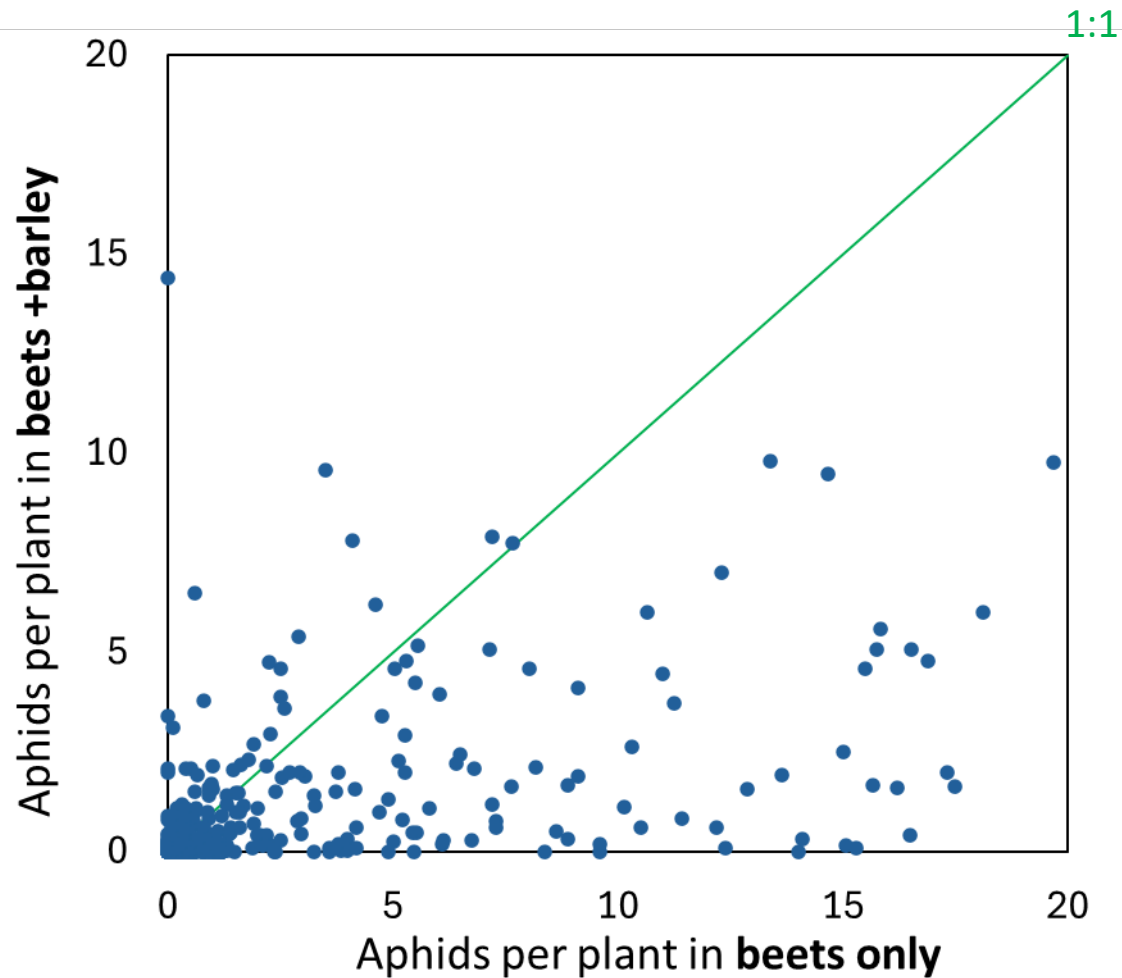
Germany, Mid-June 2021

Black bean aphid numbers



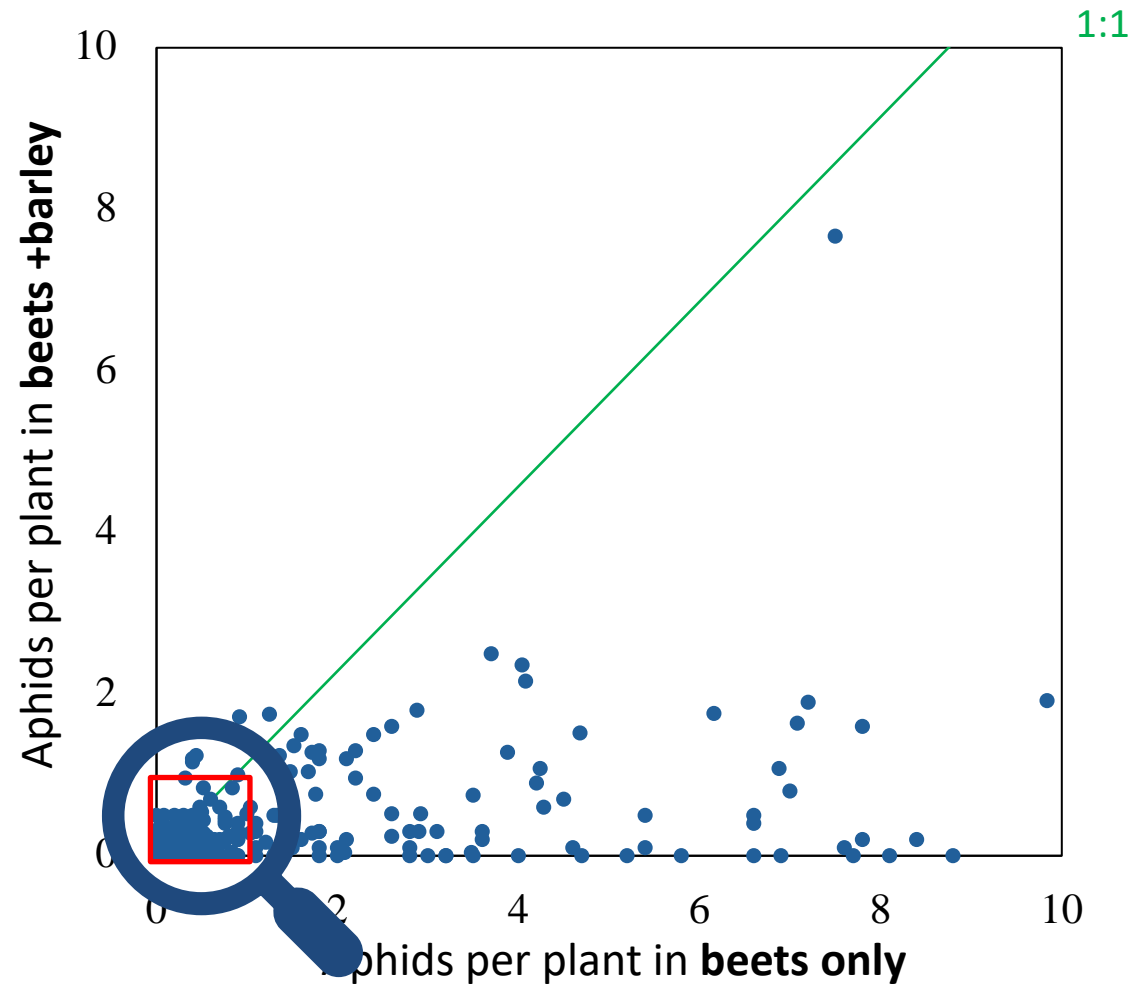
- Aphid population:
 - Winged, wingless + offspring
- In beets only :
 - Much more colonies
 - Larger colonies

Black bean aphid numbers



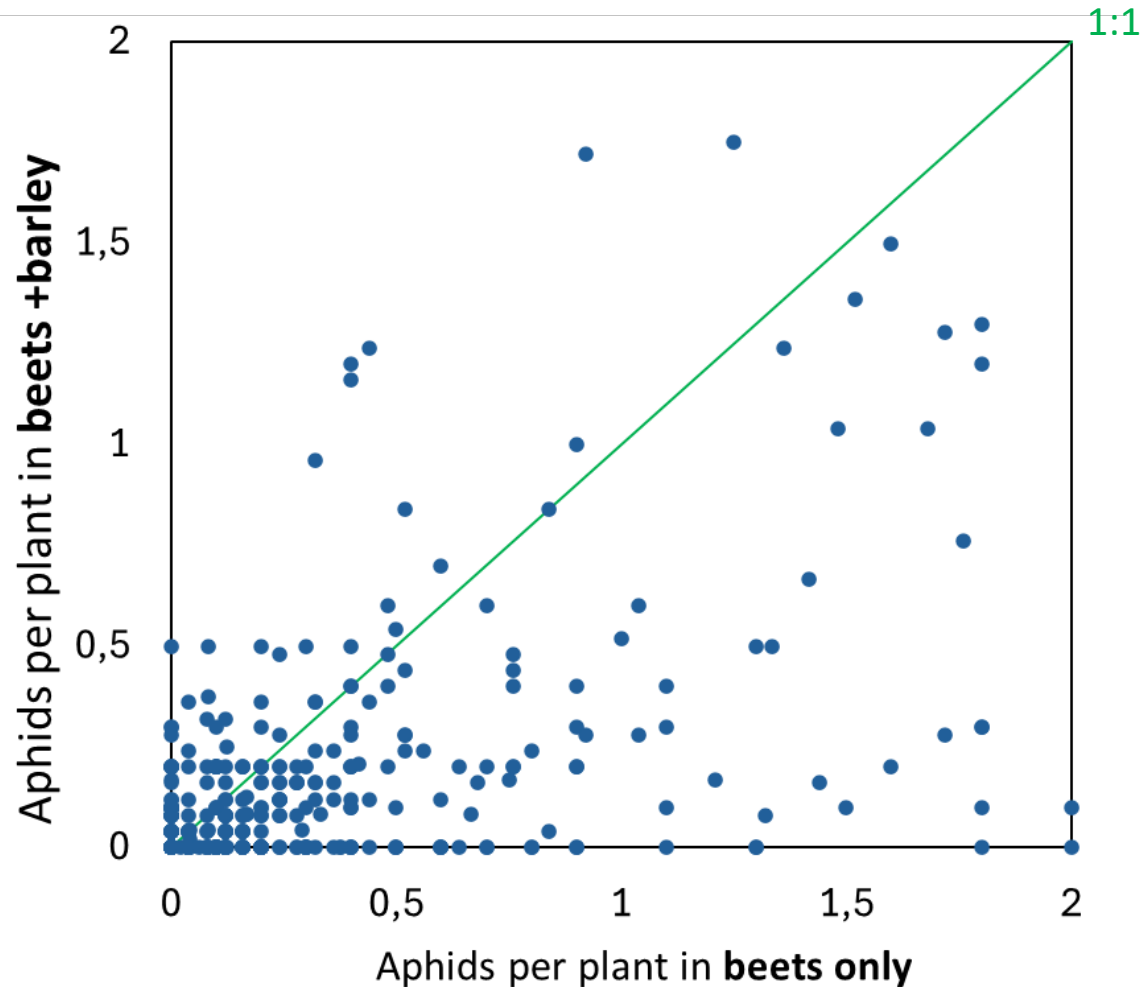
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Green peach aphid numbers



- Aphid population:
 - Winged, wingless + offspring
- In general, higher amounts of aphids in beets only
- High numbers in beets only with sometimes zero aphids in beets + barley

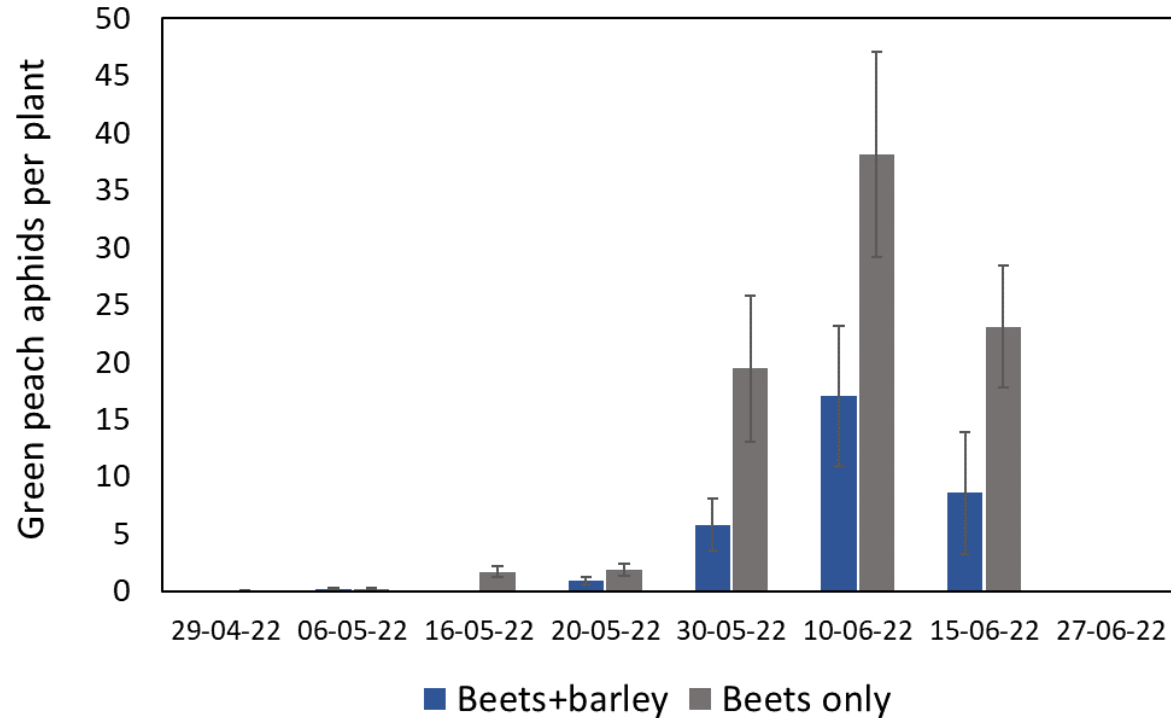
Green peach aphid numbers



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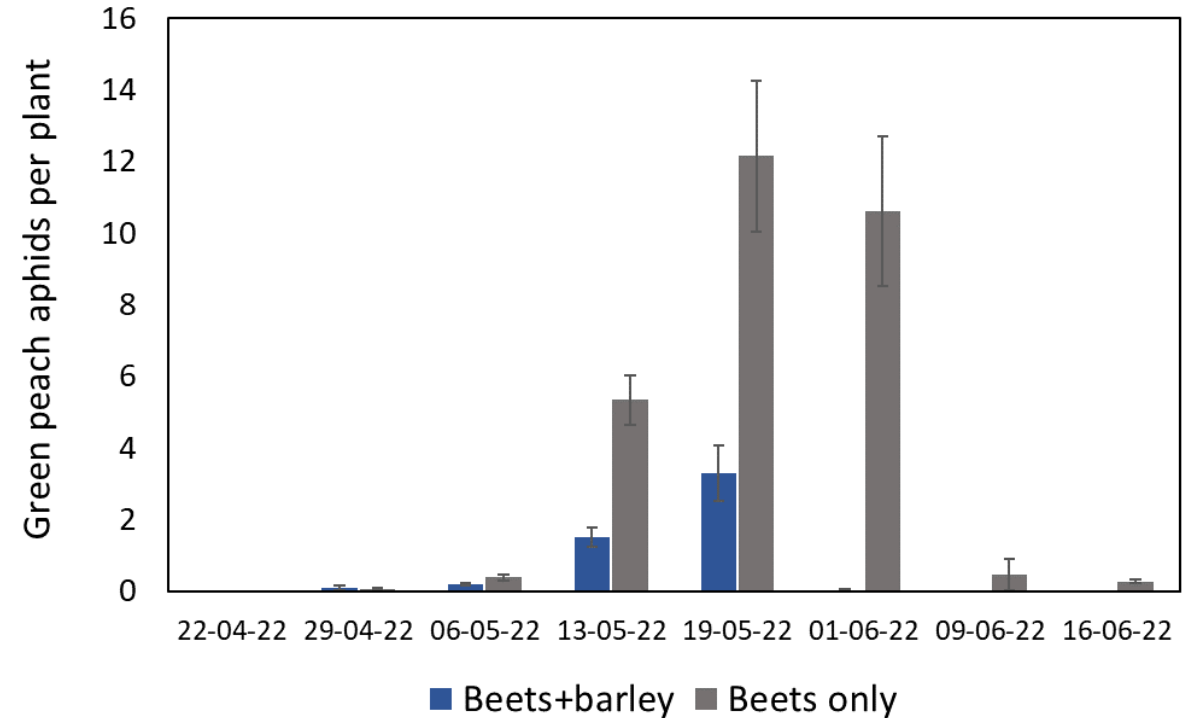
A few examples

The Netherlands, 2022



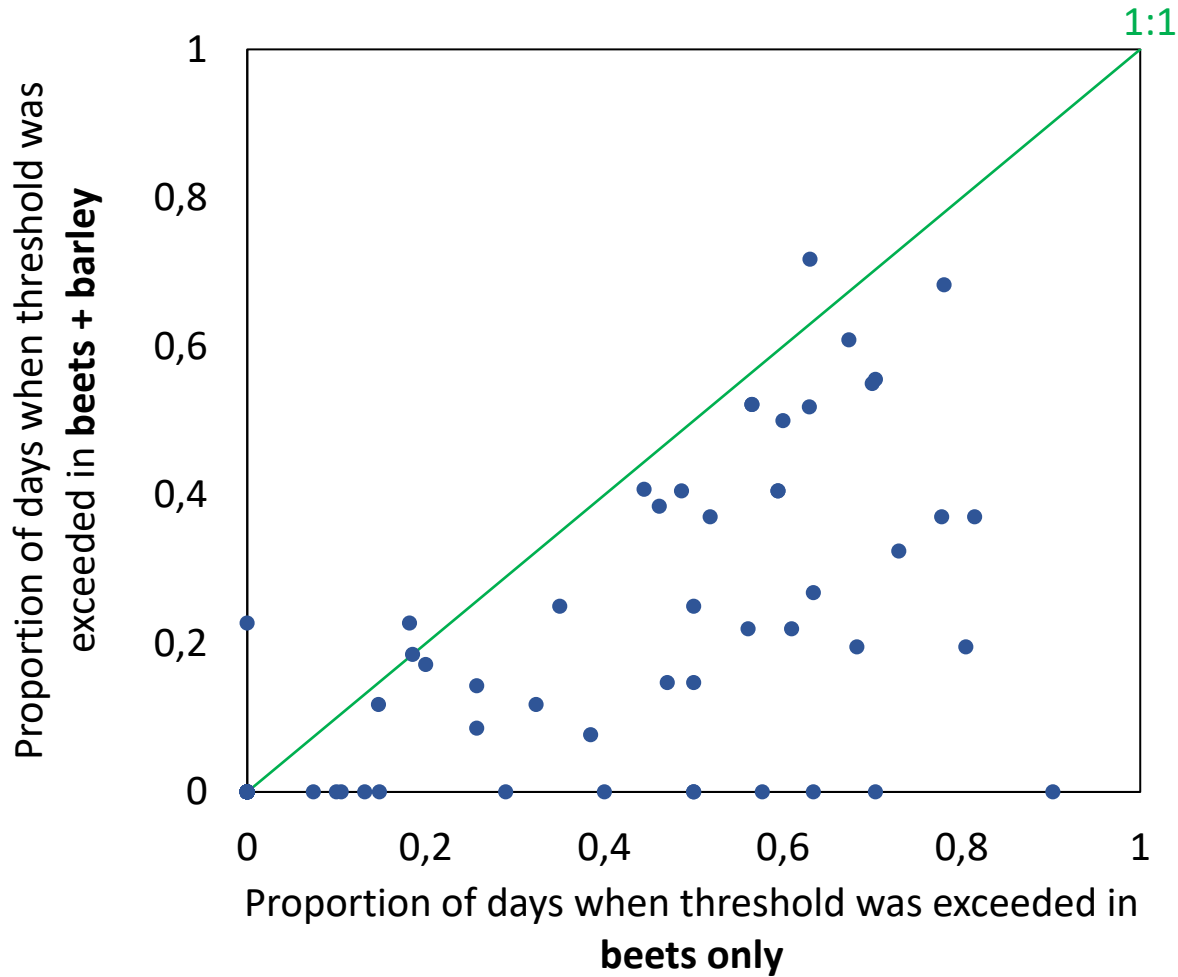
With aphids inoculation
(4 plants per plot)

Belgium, Héron 2022



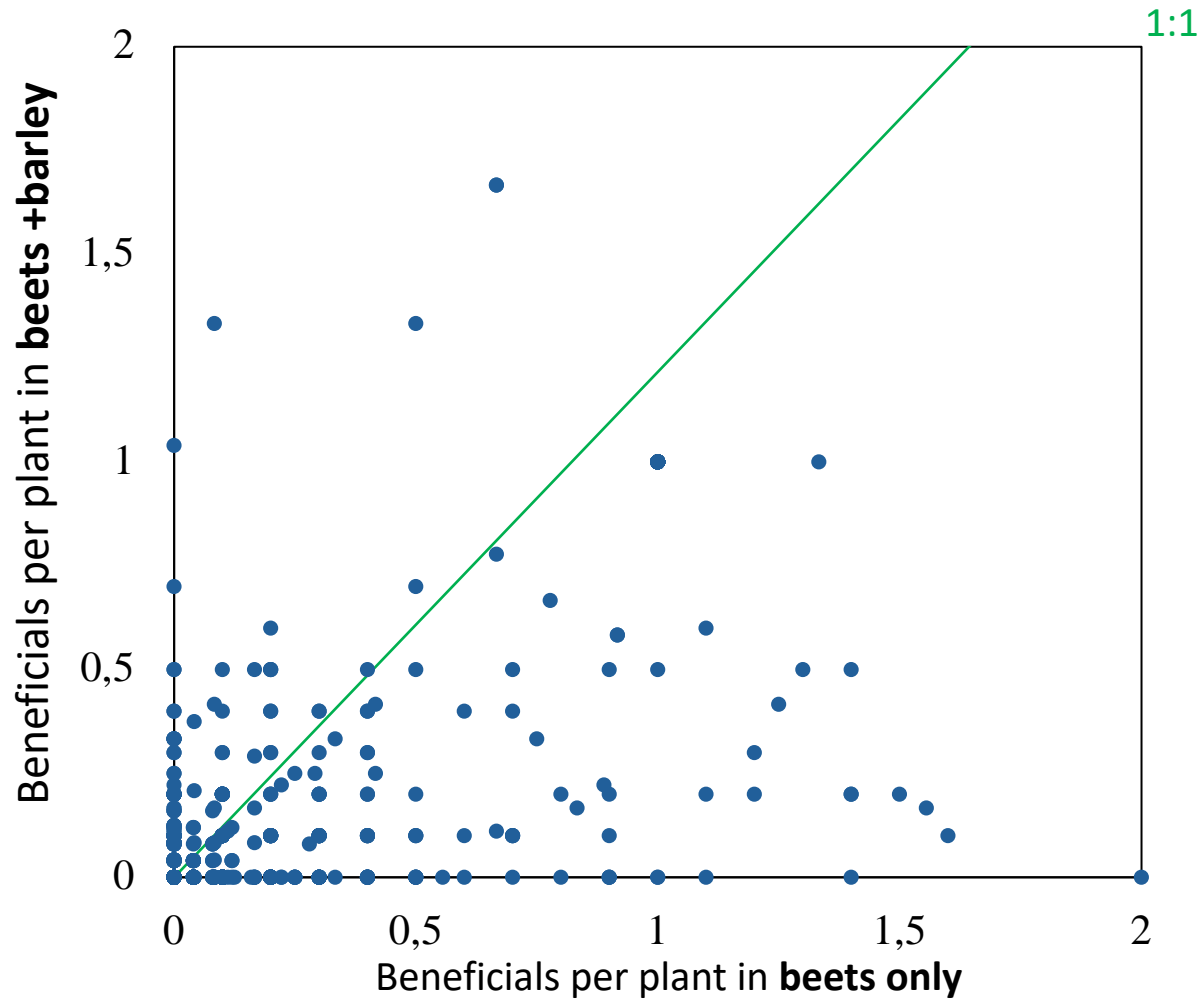
Without aphids inoculation

What about the threshold ?



- Threshold : 0,2 green peach aphid per plant
- Higher proportion of days when threshold was exceeded in beets only
- Threshold still relevant today ?

Beneficial numbers



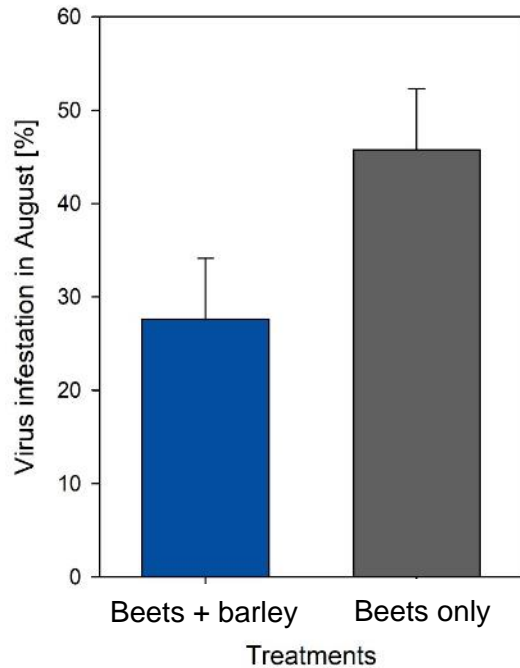
- Ladybugs, Soldier beetles, Hoverflies, Lacewings
- Trend towards more beneficials in beets only
- More aphids in beets only = more food

Virus yellows

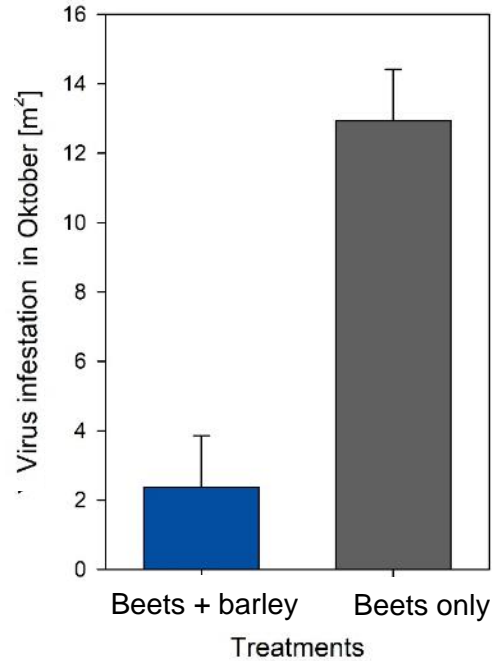


Infestation with virus yellows was reduced in plots with barley

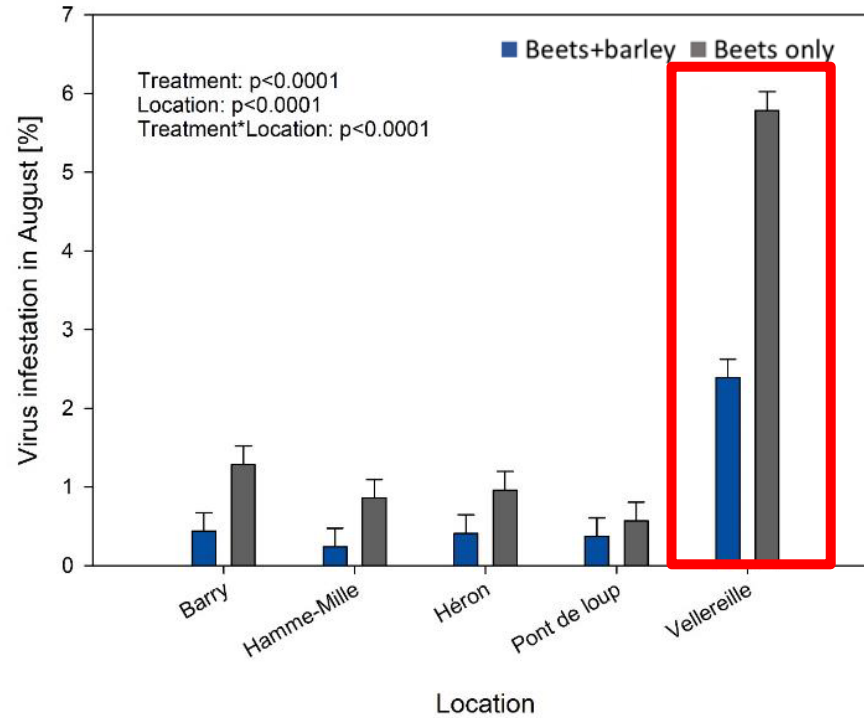
Klaaswaal, NL 2022



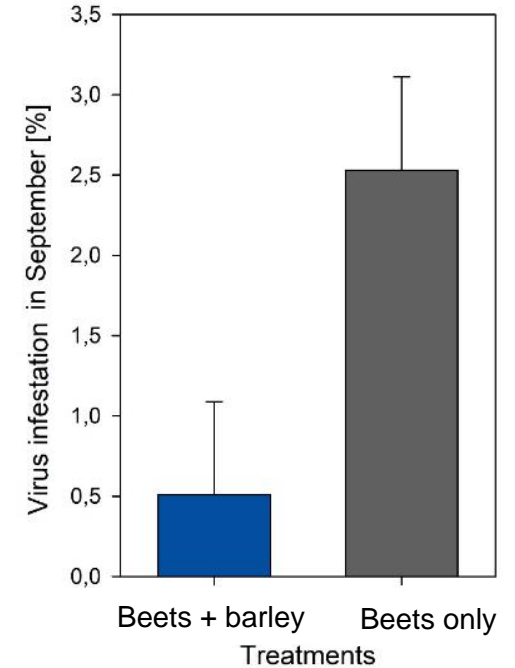
Klaaswaal, NL 2023



Different locations in Belgium 2022



Faimes, BE 2023



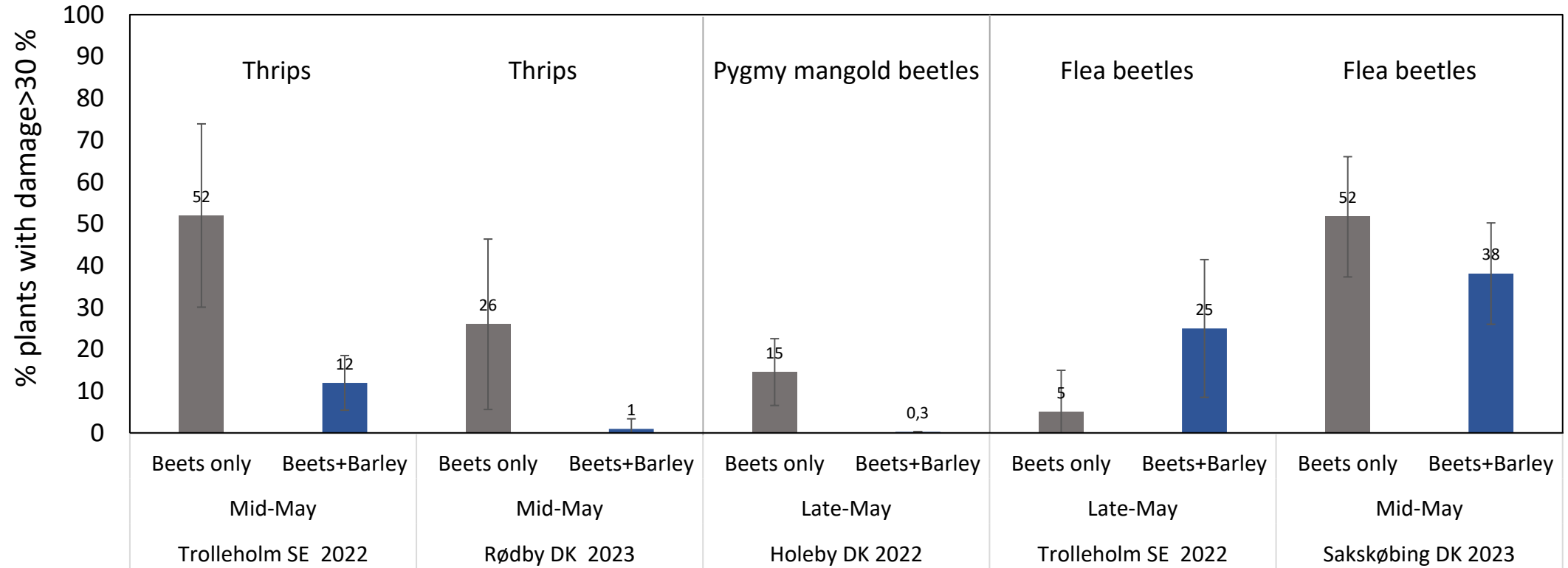
Infested aphids were released to 4 plants per plot in Klaaswaal

Beets + Barley

Beets only

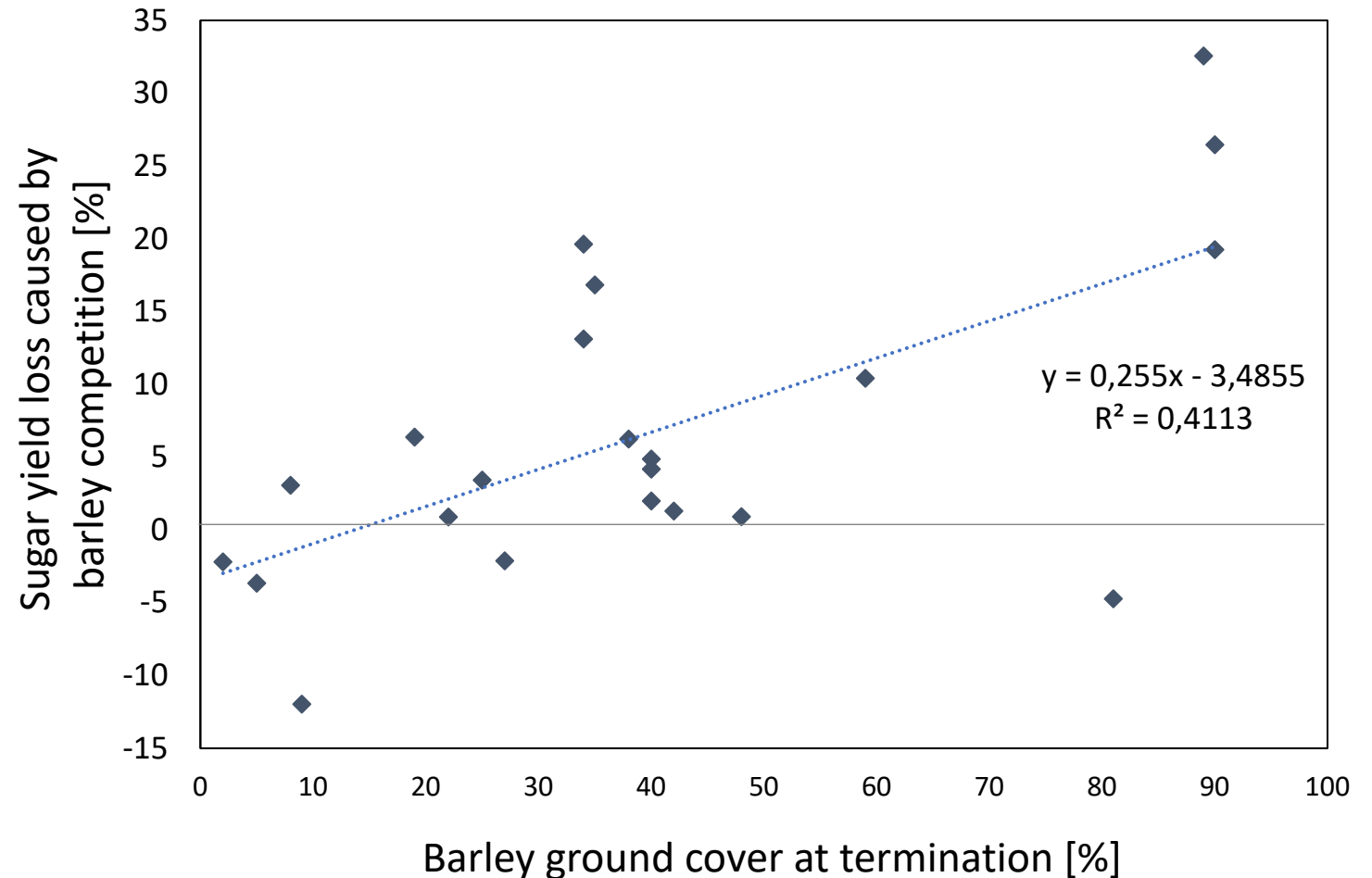


Early pests



Competition of barley and sugar beets

- Barley competes with sugar beet
- Depending on site conditions, sugar beets yield may suffer at high barley coverages



Conclusion

Barley as a companion plant reduced :

- the number of aphids in sugar beet
- the proportion of virus yellows
- the number of thrips and pygmy mangold beetles
- the proportion of days when threshold was exceeded

But barley as a companion plant :

- Can lead to yield losses due to competition (depending on the site conditions)
- Requires increased management effort



Expected yield losses due to virus infection, efforts required to establish barley and possible yield losses due to competition must be carefully weighed against each other.



Need to study more the influence of barley biomass on pest reaction and on sugar beet yield

Acknowledgements

- COBRI partners : Christel Anne Ross, Elma Raaijmakers, Anne Lisbet Hansen, Levine de Zinger, Nika Jachowicz, Nicol Stockfisch, Heinz-Josef Koch and Otto Nielsen
- All the teams at the four institutes for their work

Thank you all for your attention !