

# PNRI-C: developing strategies to manage beet yellows disease

National Research and Innovation Plan – from 2021 to 2027



**Tereos** CRISTAL UNION

C'est ensemble  
que nous avançons.

SAINT LOUIS  SUCRE



**FNAMS**

**INRAE**

Audrey FABAREZ, Paul TAUVEL, Fabienne MAUPAS (ITB)

08/07/2026 – IIRB Congress



# Yellows disease in France



Ban on neonicotinoids

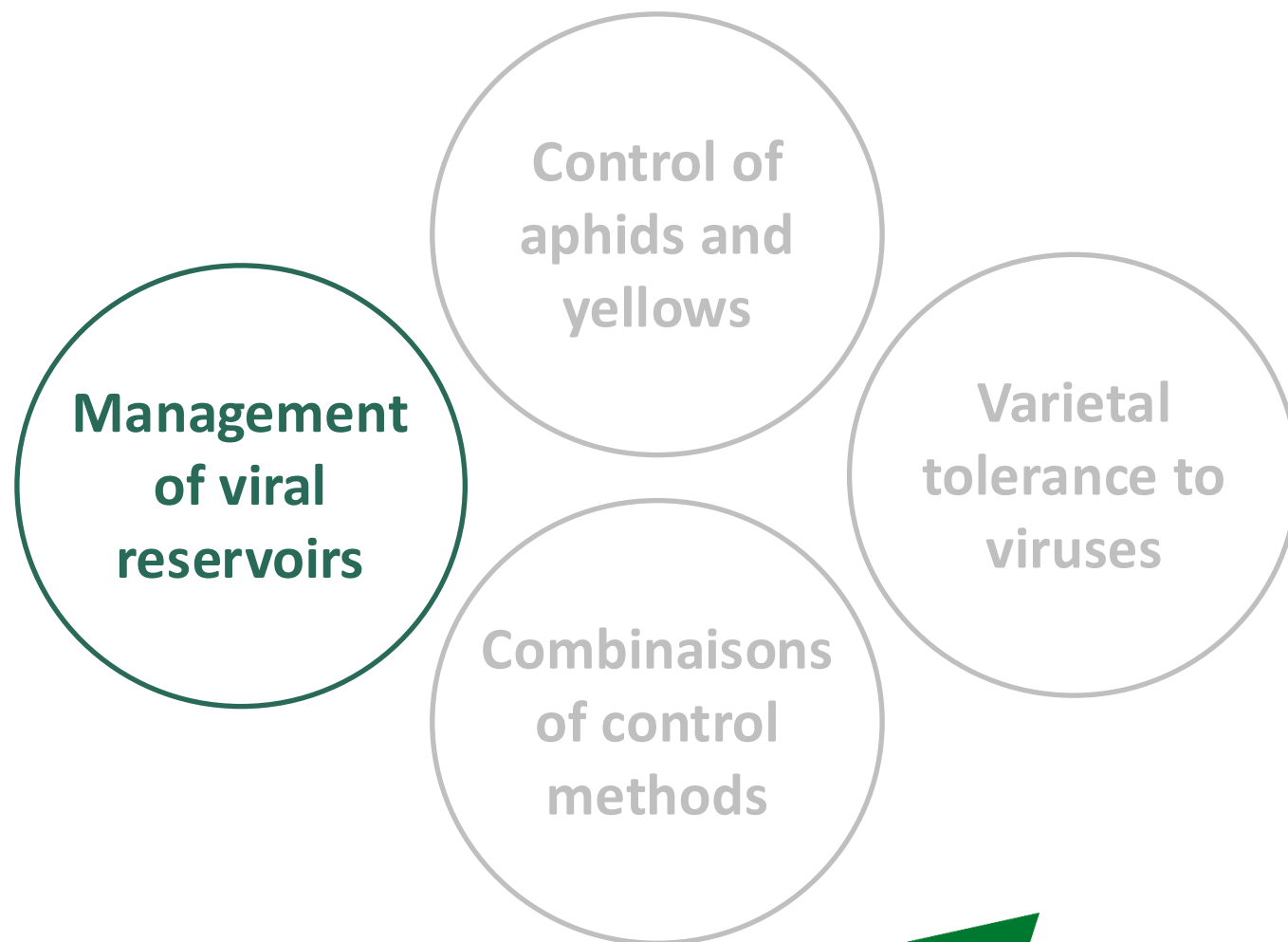
Situation in 2020:

- 30% yield loss nationwide
- Up to 50% locally

Foliar treatments only:

- Flomicamid
- Spirotetramat under annual exemption
- A new product since 2026

# Key findings



# Management of viral reservoirs

INRAE



Sugar beets regrowth



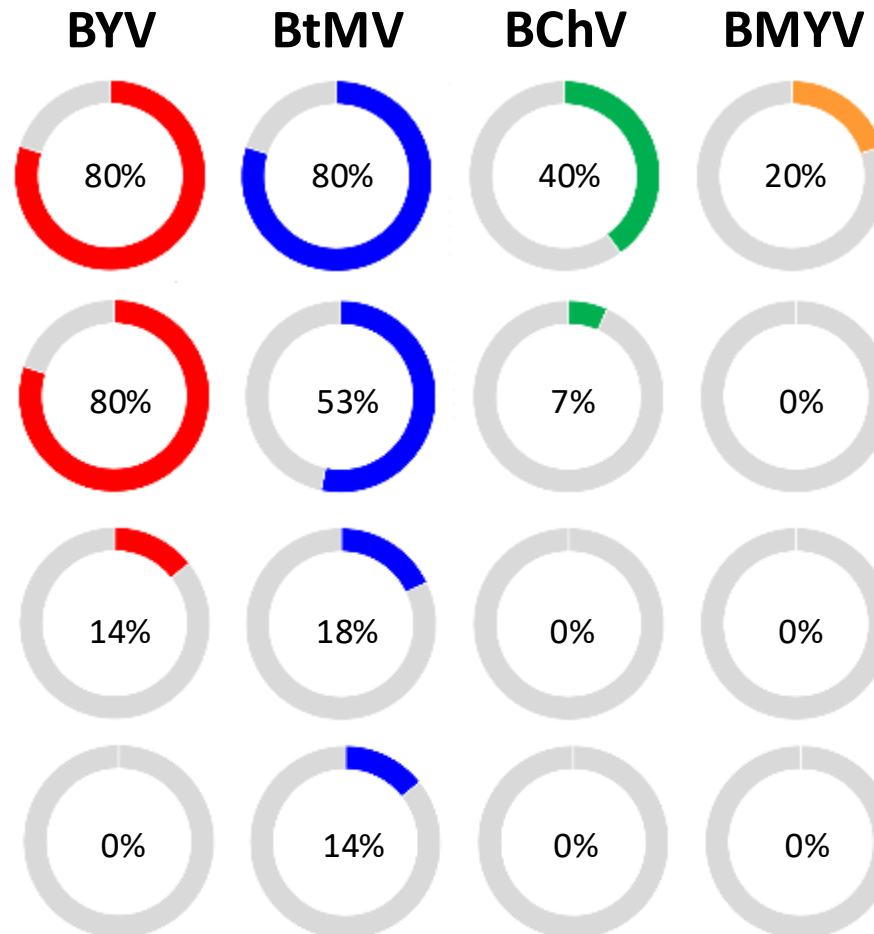
Wild sugar beets - *Beta maritima*



Phacelia



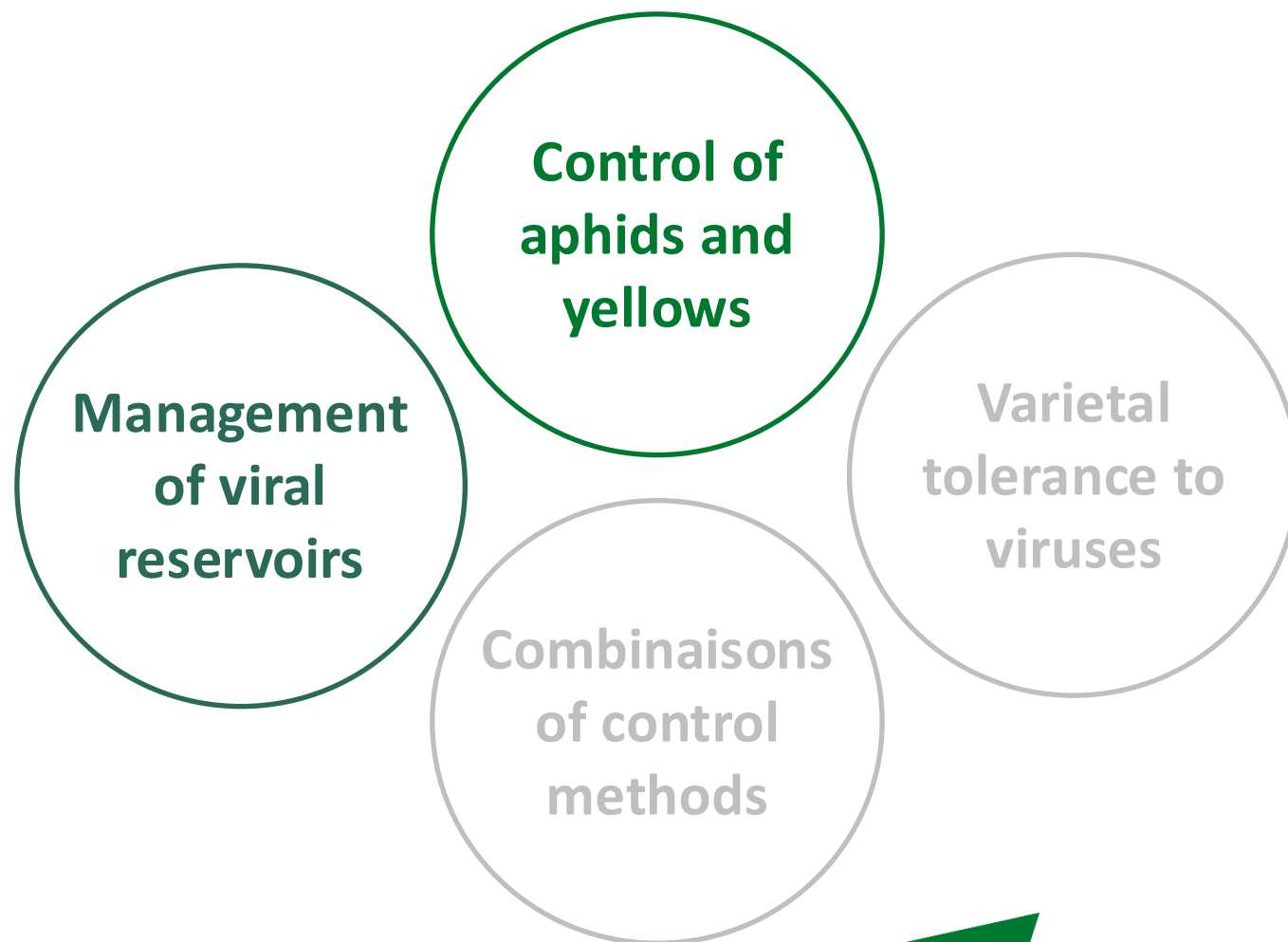
Faba bean



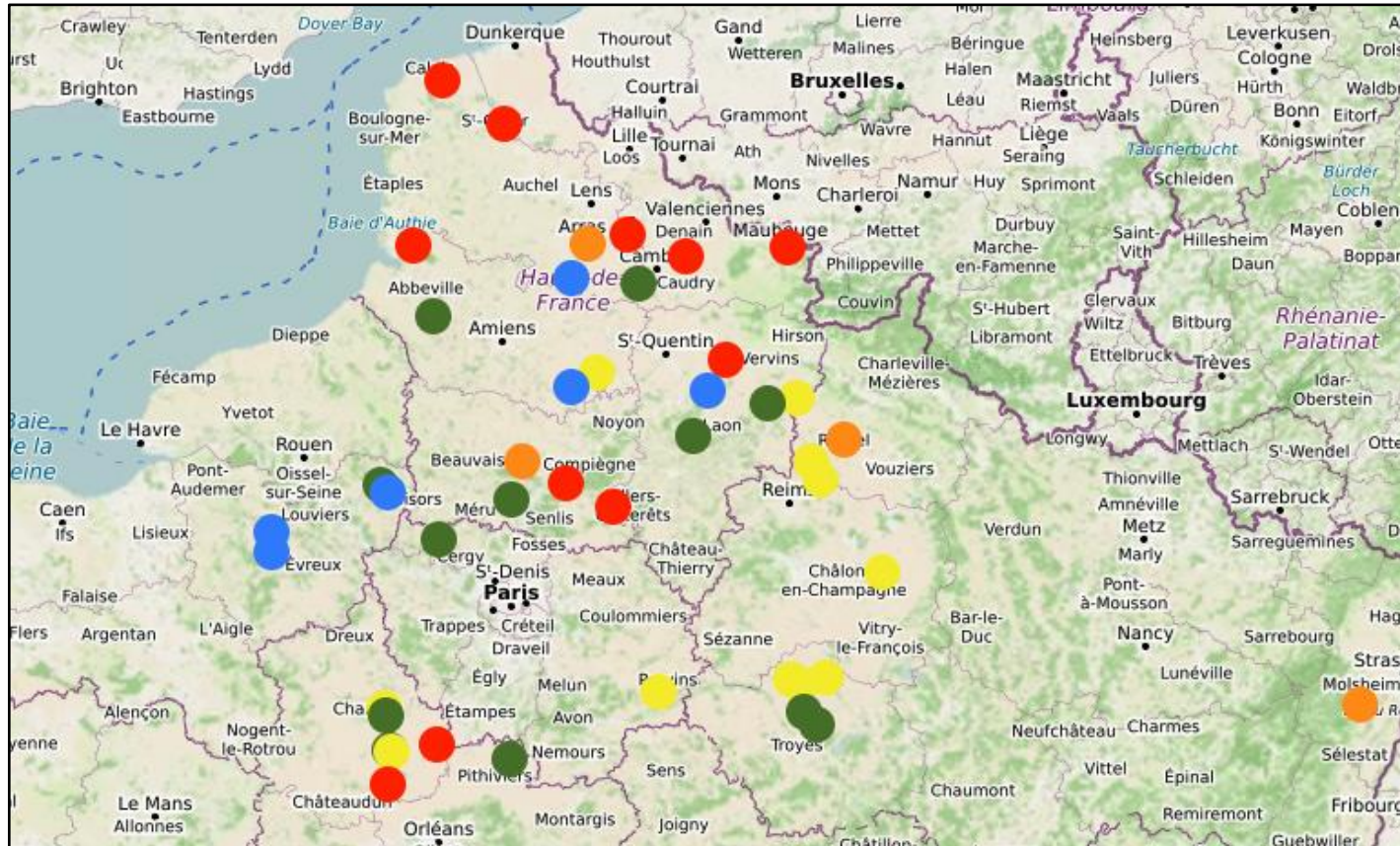
Aphid reservoir

9000 plants (42 species) analysed by RNA-Seq

# Key findings



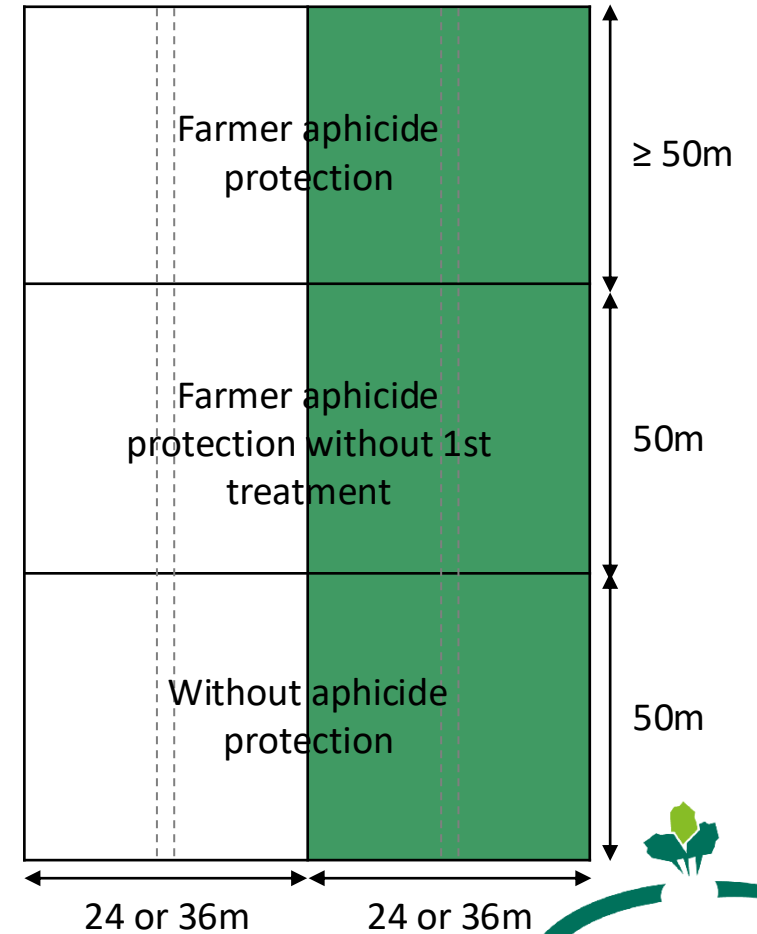
# A network of field plots



Network 2025

- Cristal Union
- Saint Louis Sucre
- ITB
- Tereos
- Lycées agricoles

Solution tested

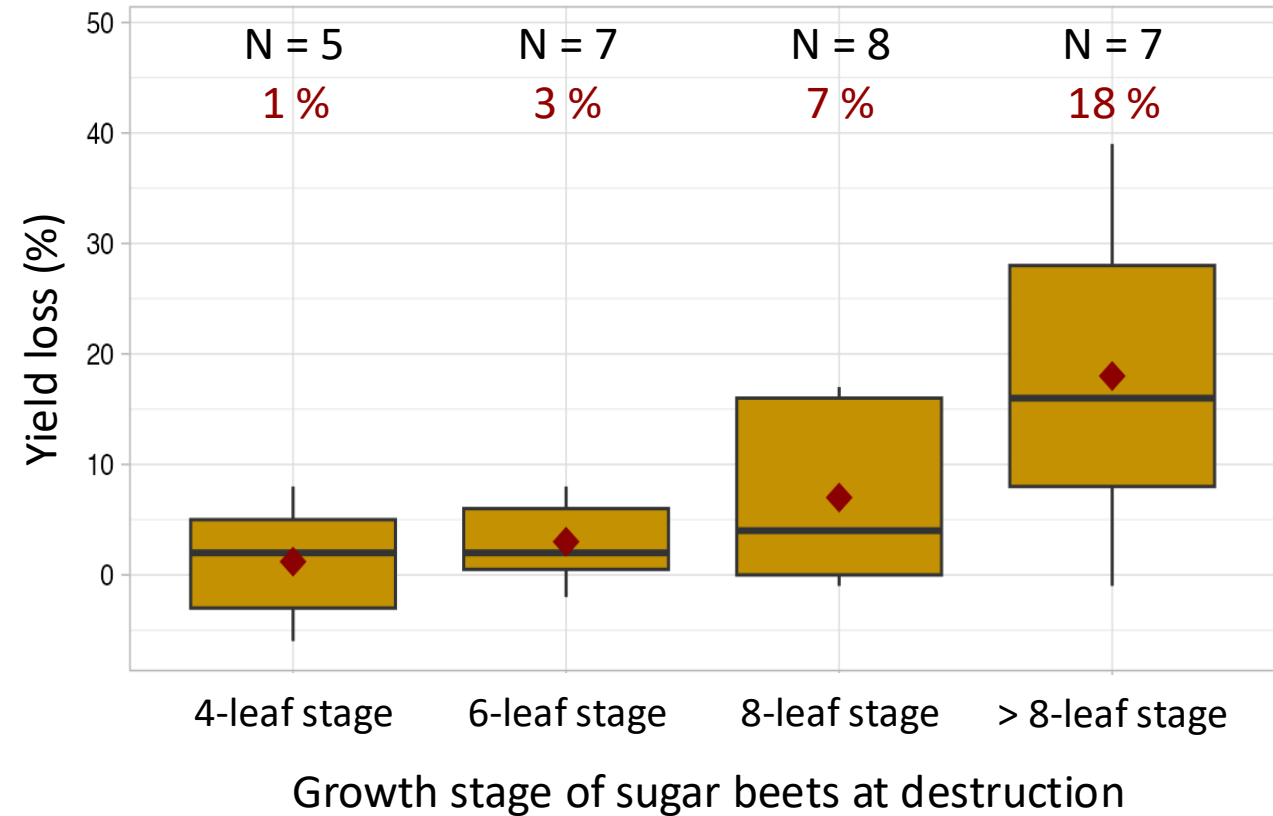


# Grasses as companion plants



Without

With (Oat)





# Biocontrol solutions

Release of lacewings

Chemical mediators

Biocontrol products

# Biocontrol solutions

## Release of lacewings



Lacewing eggs



Koppert



Lacewing larvae

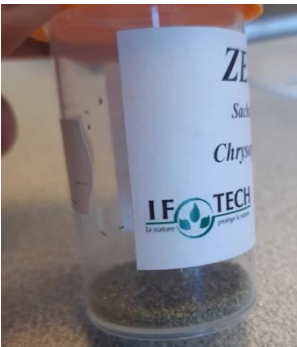


## Chemical mediators

## Biocontrol products

# Biocontrol solutions

## Release of lacewings



Lacewing eggs  
la nature protège la nature  
**IF TECH**



Koppert



Lacewing larvae

## Chemical mediators



Allomones: scented granules

**aGRiODOR**

Pheromones: attractant for ladybugs



## Biocontrol products



# Biocontrol solutions

## Release of lacewings



Lacewing eggs



Koppert



Lacewing larvae



## Chemical mediators



Allomones: scented granules

aGRiODOR

Pheromones: attractant for ladybugs



## Biocontrol products

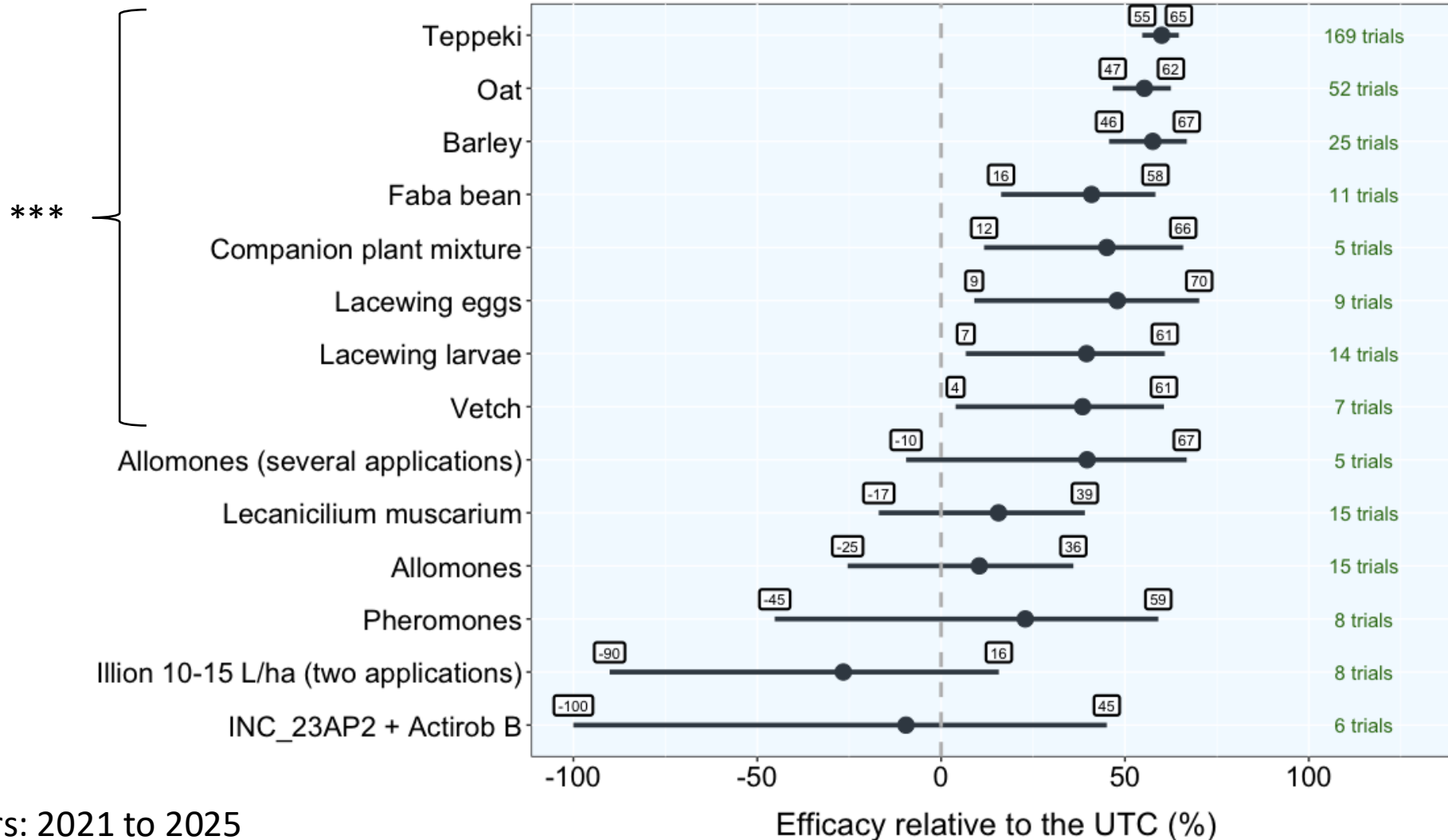
- Entomopathogenic fungus
- Paraffin oil (Illion)
- Essential oils

Koppert



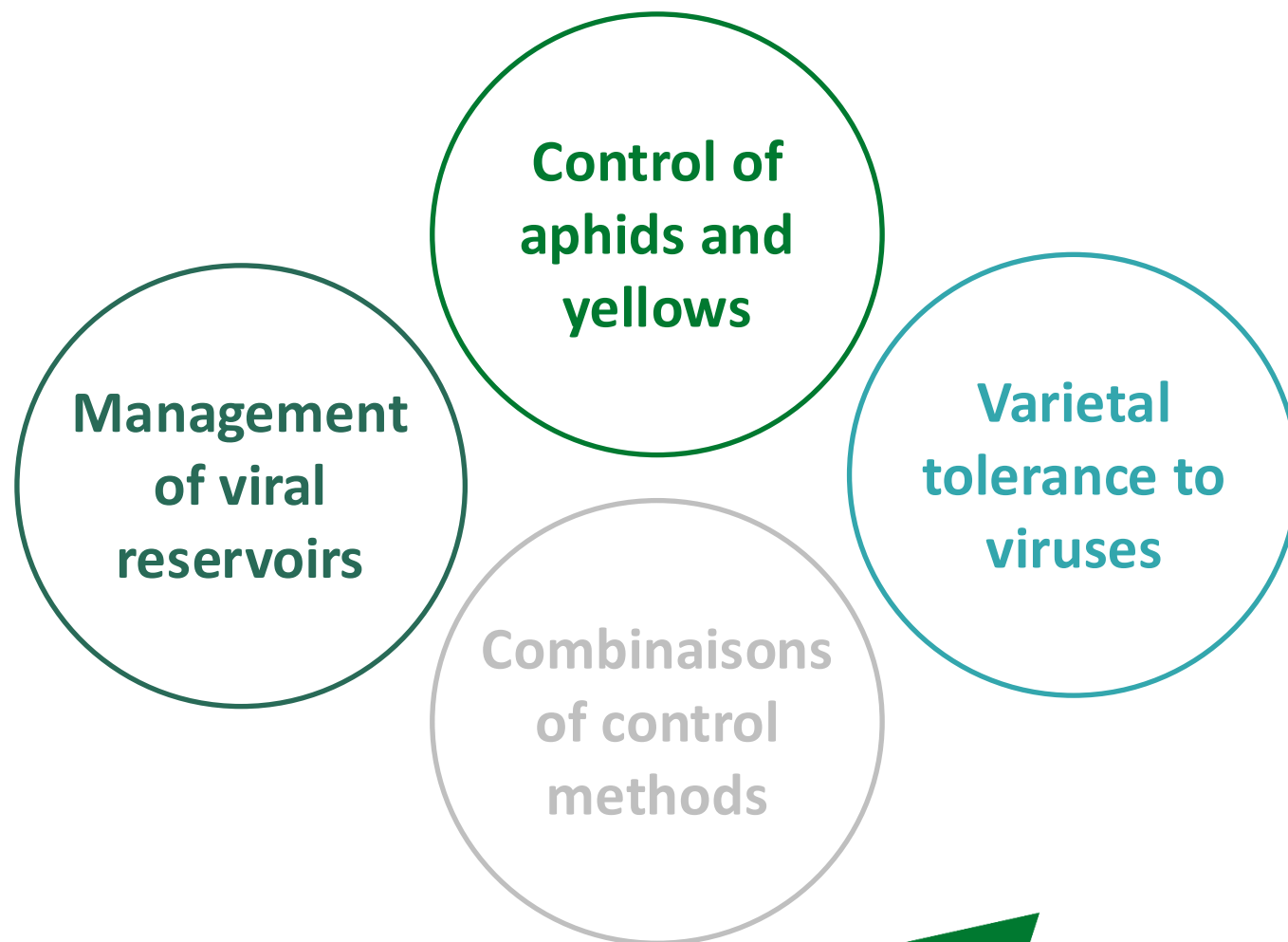
# Efficacy of solutions against aphids

Assessment 14 days after 1st treatment



Trial years: 2021 to 2025

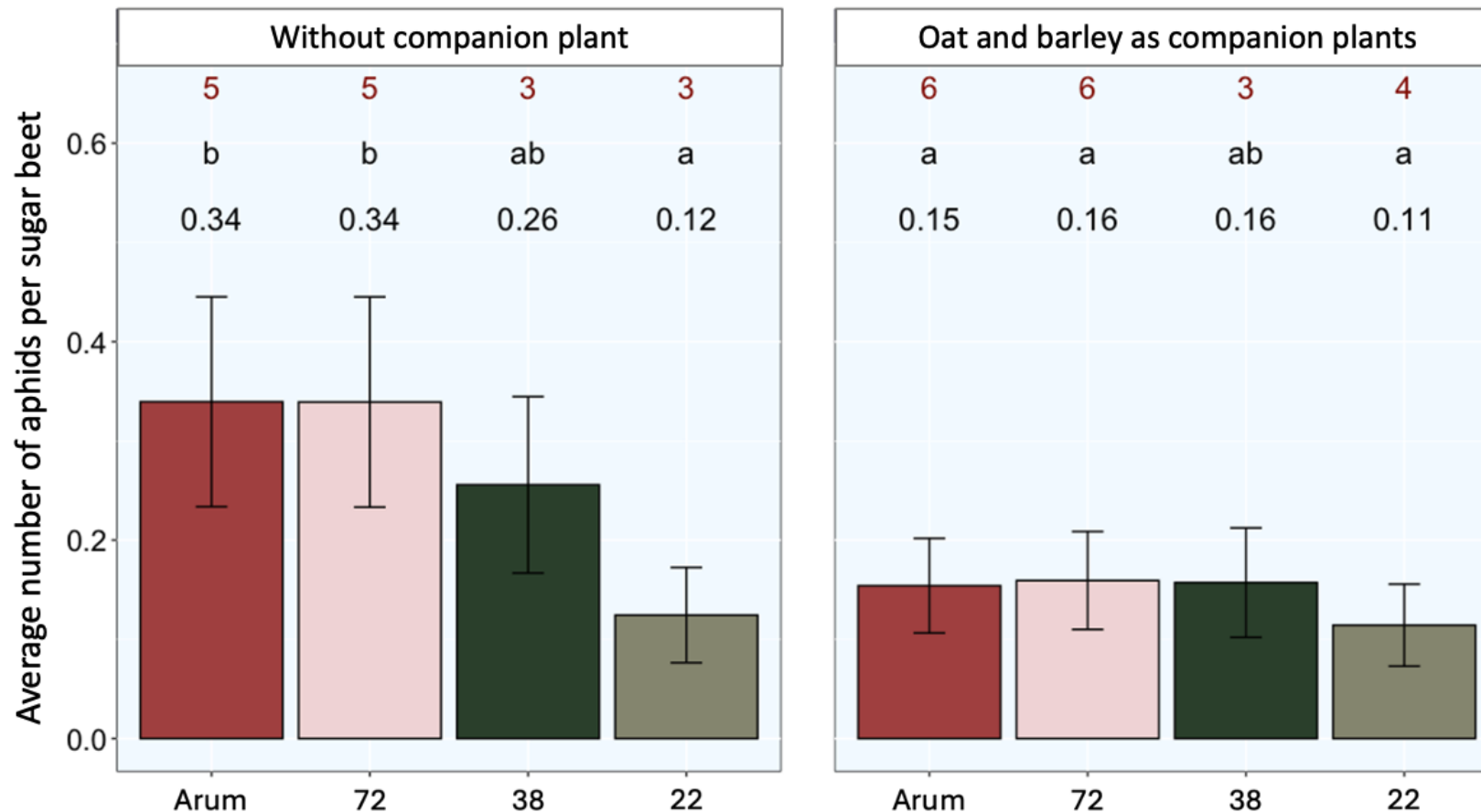
# Key findings



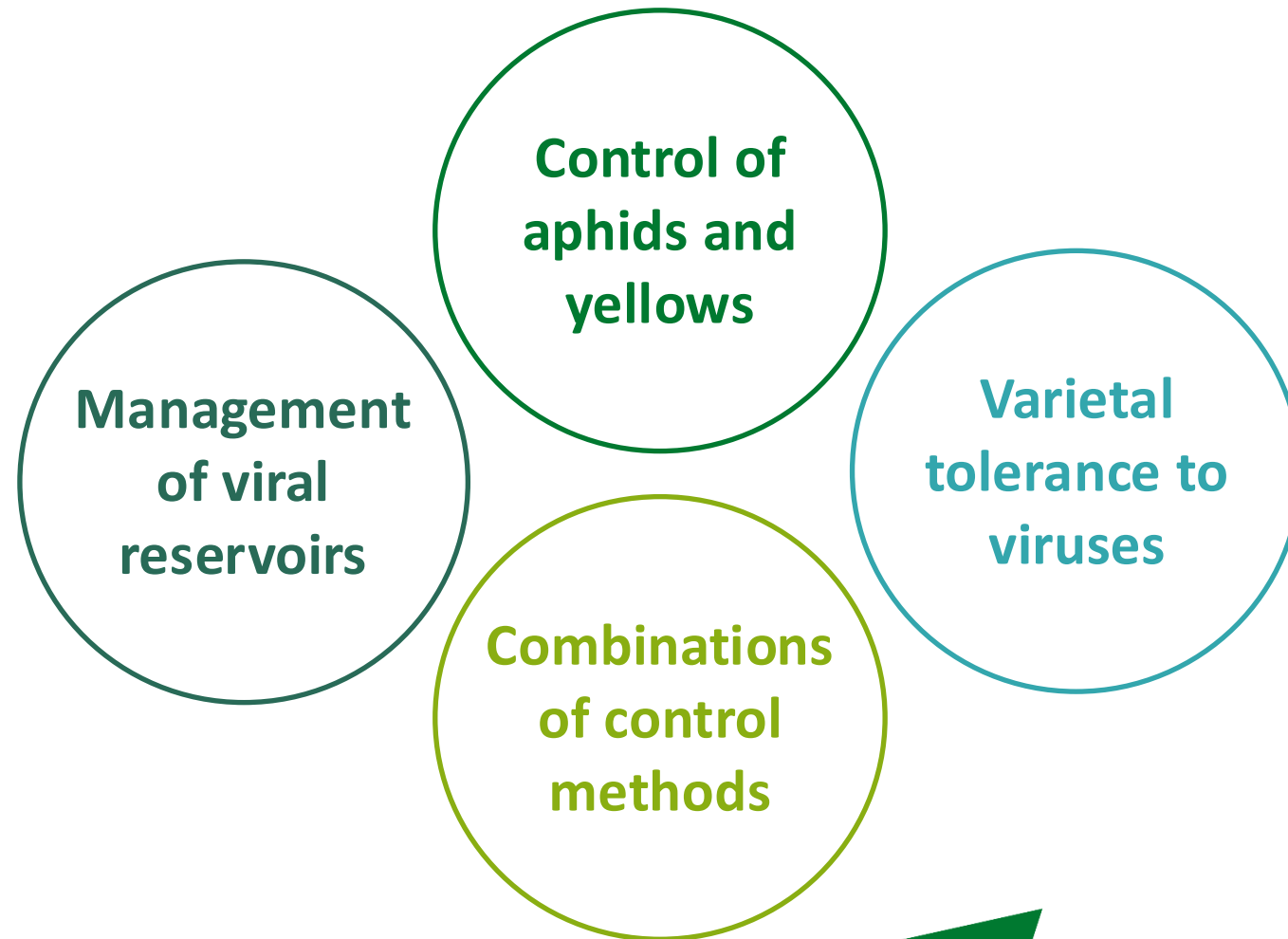
# Varietal tolerance/resistance to viruses

- No resistant or tolerant variety identified
- Existence of « aphid-arresting varieties » :

For more details, see  
Poster 5.41



# Key findings



# Combinations of control methods

## Improve the efficacy of aphicide protection

Companion plants X Farmer aphicide protection  
Chemical mediators X Farmer aphicide protection  
Biocontrol products X Farmer aphicide protection

## Test strategies without aphicide treatment

Companion plants X Release of lacewings  
Companion plants X Biocontrol products

## Reduce or delay aphicide treatments

Companion plants X Without 1st treatment  
Chemical mediators X Without 1st treatment  
Biocontrol products X Without 1st treatment

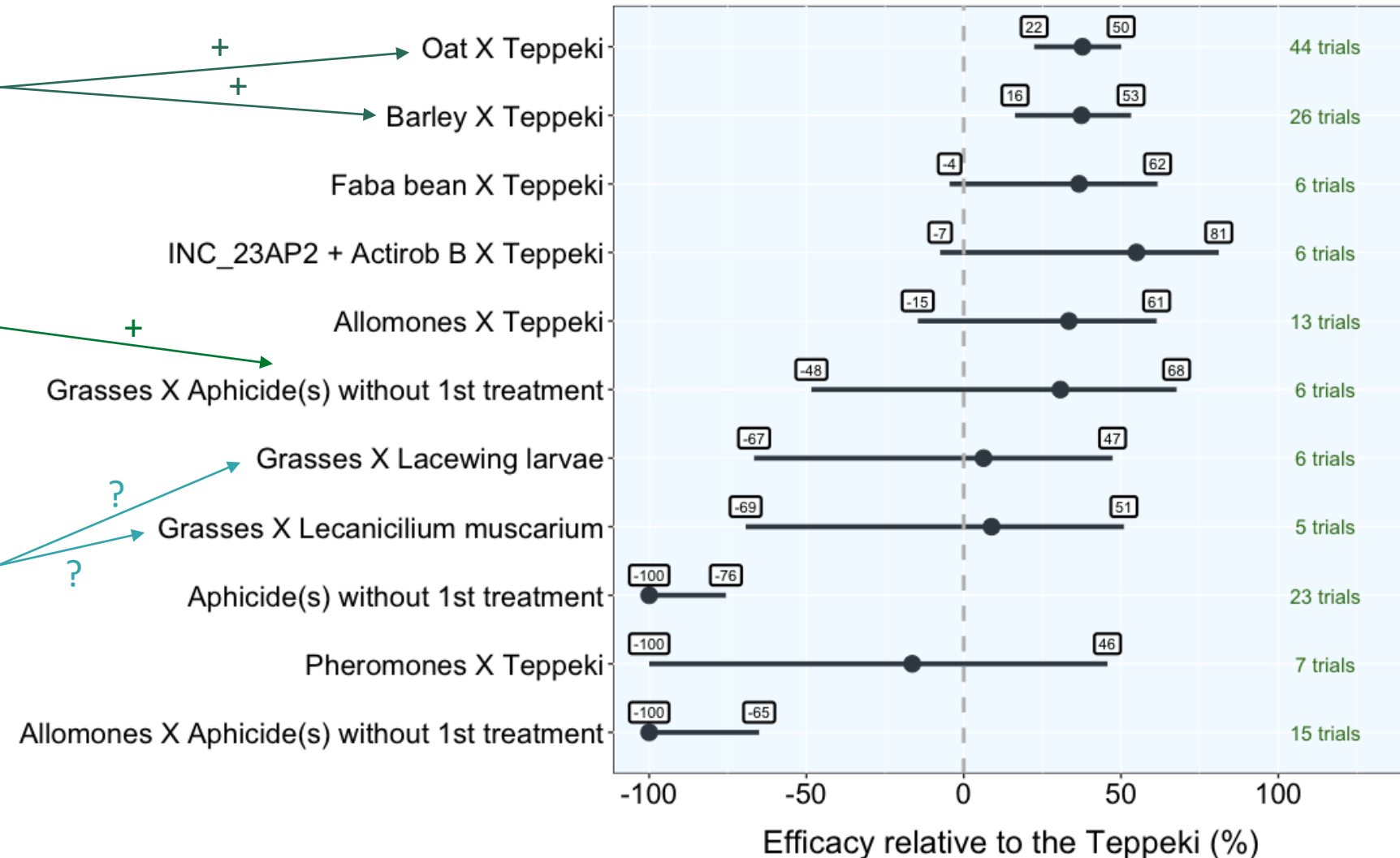
# Efficacy of combinations of solutions

Improve the efficacy of aphicide protection

Reduce or delay aphicide treatments

Test strategies without aphicide treatment

Assessment 14 days after 1st treatment





# Costs of alternative solutions

| Control methods           | Cost per hectare<br>(indicative price) |                  |
|---------------------------|----------------------------------------|------------------|
|                           | Product / Seeds                        | Mechanisation    |
| Flonicamide (Teppeki)     | 26 €                                   | 12 €             |
| Spirotetramat (Movento)   | 55 €                                   | 12 €             |
| Oat as companion plant    | 14 € + 25 €                            | 30 à 90 € + 12 € |
| Barley as companion plant | 5 € + 25 €                             | 30 à 90 € + 12 € |
| Lacewing eggs release     | 100 €                                  | 20 €             |
| Lacewing larvae release   | 150 €                                  | 20 €             |
| Allomones                 | 50 €                                   | < 5 €            |
| Pheromones                | 20 €                                   | 12 €             |
| Paraffin oil (Illion)     | 40 €                                   | 12 €             |
| Essential oils            | 35 €                                   | 12 €             |

Avec  
la contribution  
financière du compte  
d'affectation spéciale  
développement  
agricole et rural  
CASDAR



**MINISTÈRE  
DE L'AGRICULTURE  
ET DE L'ALIMENTATION**

Thank you for your attention

