Mature Plant Resistance

in sugar beet against aphids

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Mature plant resistance (MPR)

Low fecundity

High mortality

Black stomachs

Project aim

Unravel which compound is produced in mature plants leading to the aphid's death

&

Identify what reaction leads to the black stomach deposit

Could we breed for varieties with an earlier onset of MPR?
Could agronomic solutions be an option?

What have we learned?

- Formation of black stomach deposits is a slow process and can take days

- Not all aphid species show the same level of susceptibility as *M. persicae*

  - *M. euphorbiae forms more black stomach deposits*

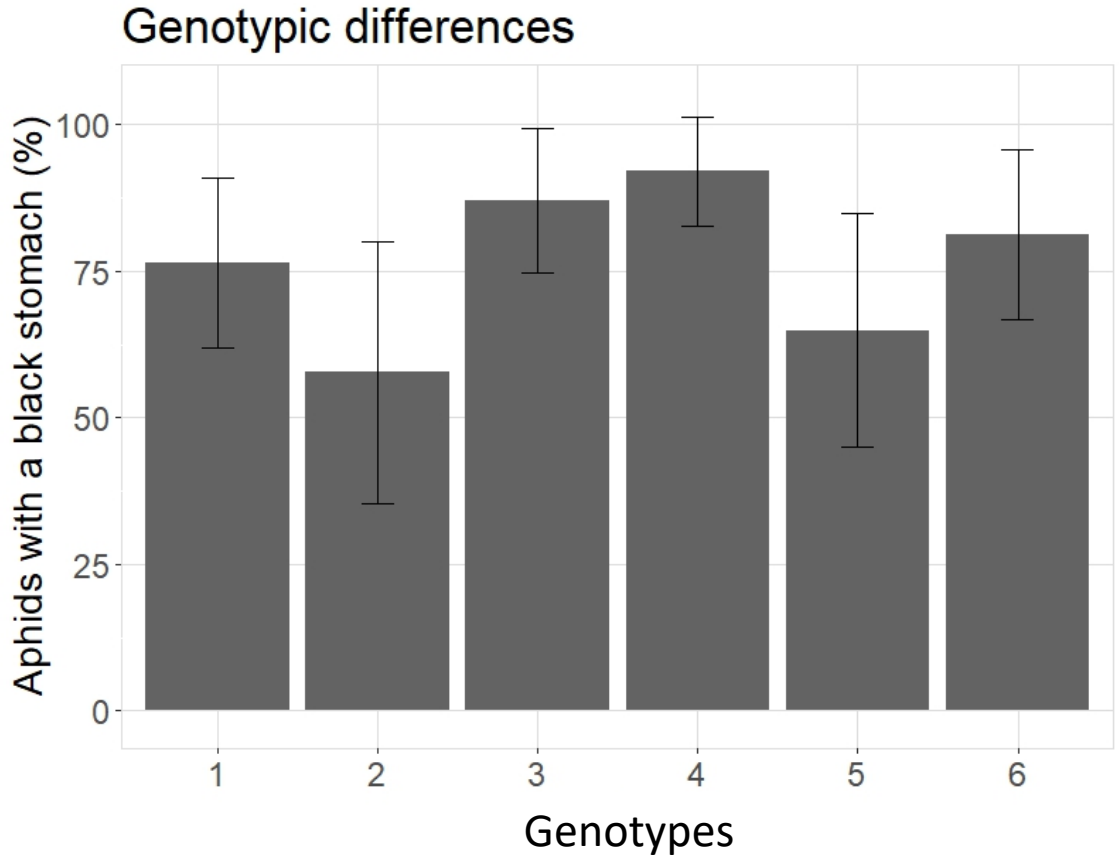
  - *A. fabae forms less black stomach deposits*

What have we learned?

- Similar black stomach deposits are formed on rhubarb

What have we learned?

- Differences in MPR between genotypes



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Research Paper

The effect of mature plant resistance in sugar beet (*Beta vulgaris spp. vulgaris*) on survival, fecundity and behaviour of green peach aphids (*Myzus persicae*)

S. Schop[1], K. J. Kloth[2], E. Raaijmakers[3] and R. A. A. van der Vlugt[1]

What have we learned?

- Differences in MPR between genotypes

- Other genotypes performed well in the field

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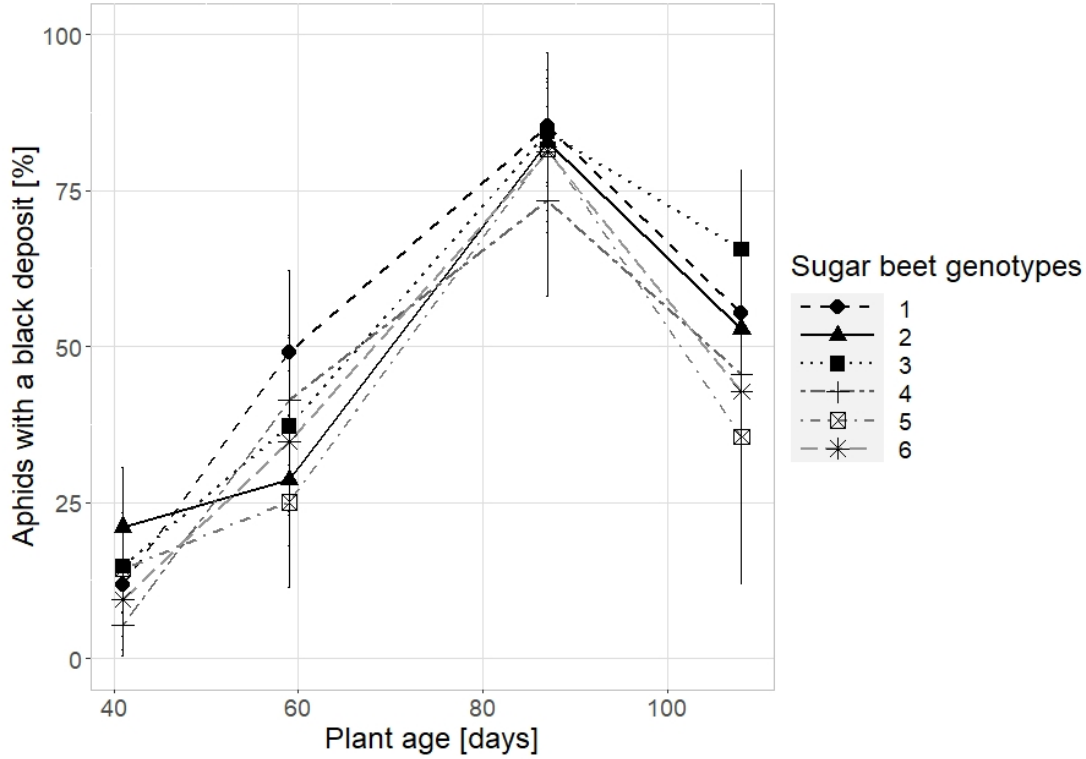
What have we learned?

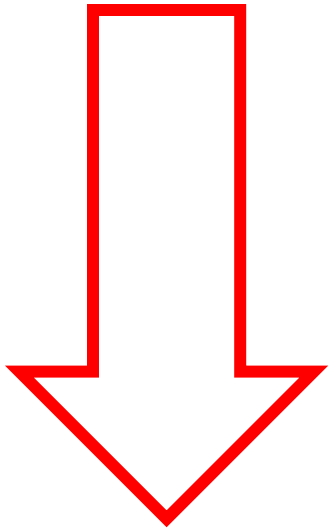
- Differences in MPR between genotypes
- Other genotypes performed well in the field
- Environmental factors play a role, affecting the physiological state of plant and thereby affecting MPR



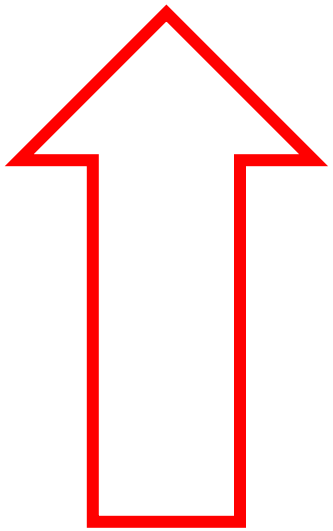
Virus effects

Virus inhibits MPR

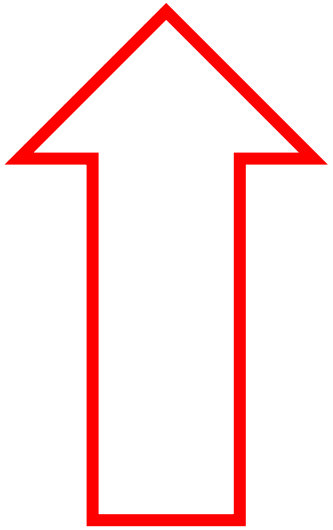
Virus leads to:



Lower plant resistance



Higher aphid survival

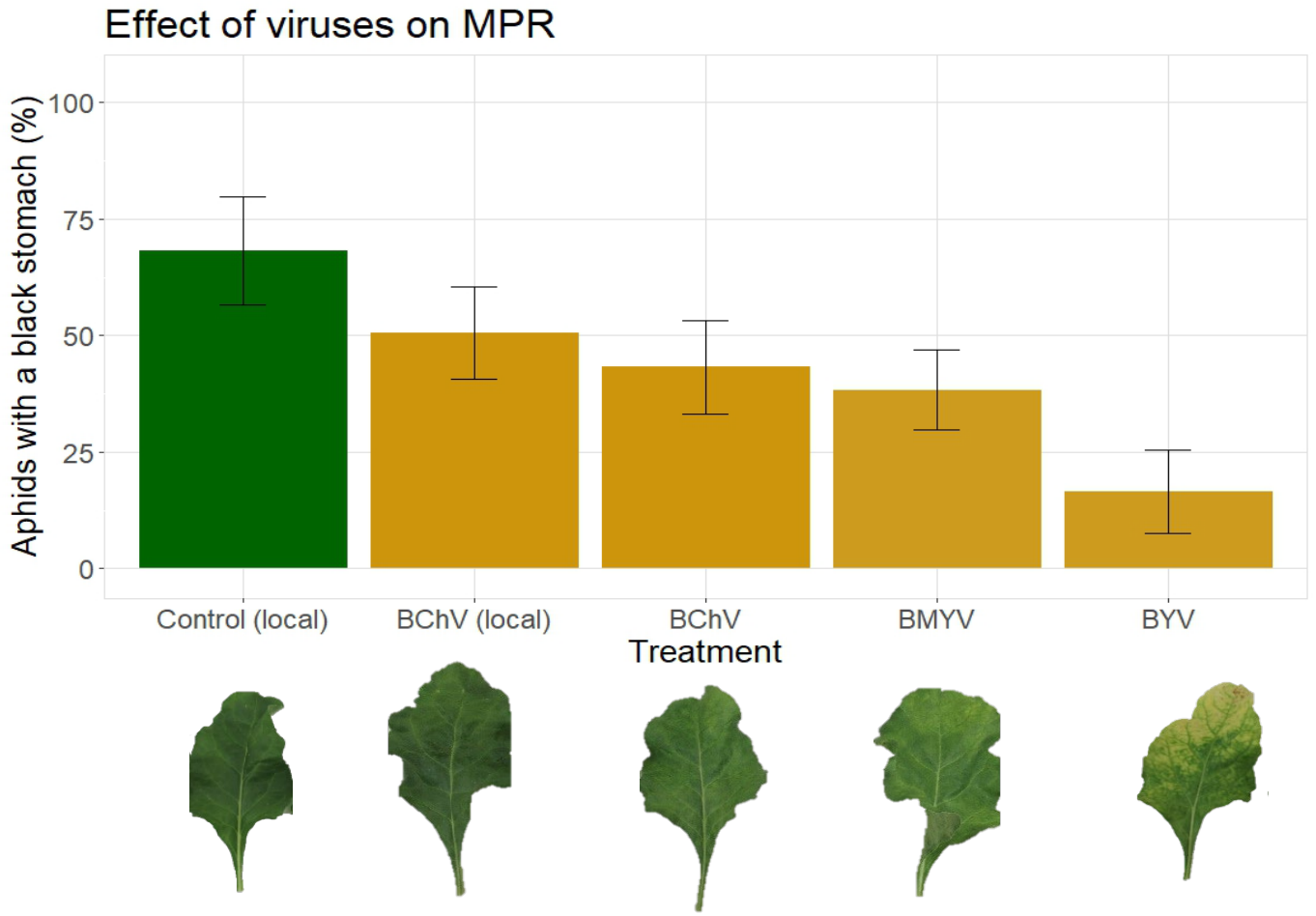


More virus spread

Virus effects

Virus inhibits MPR

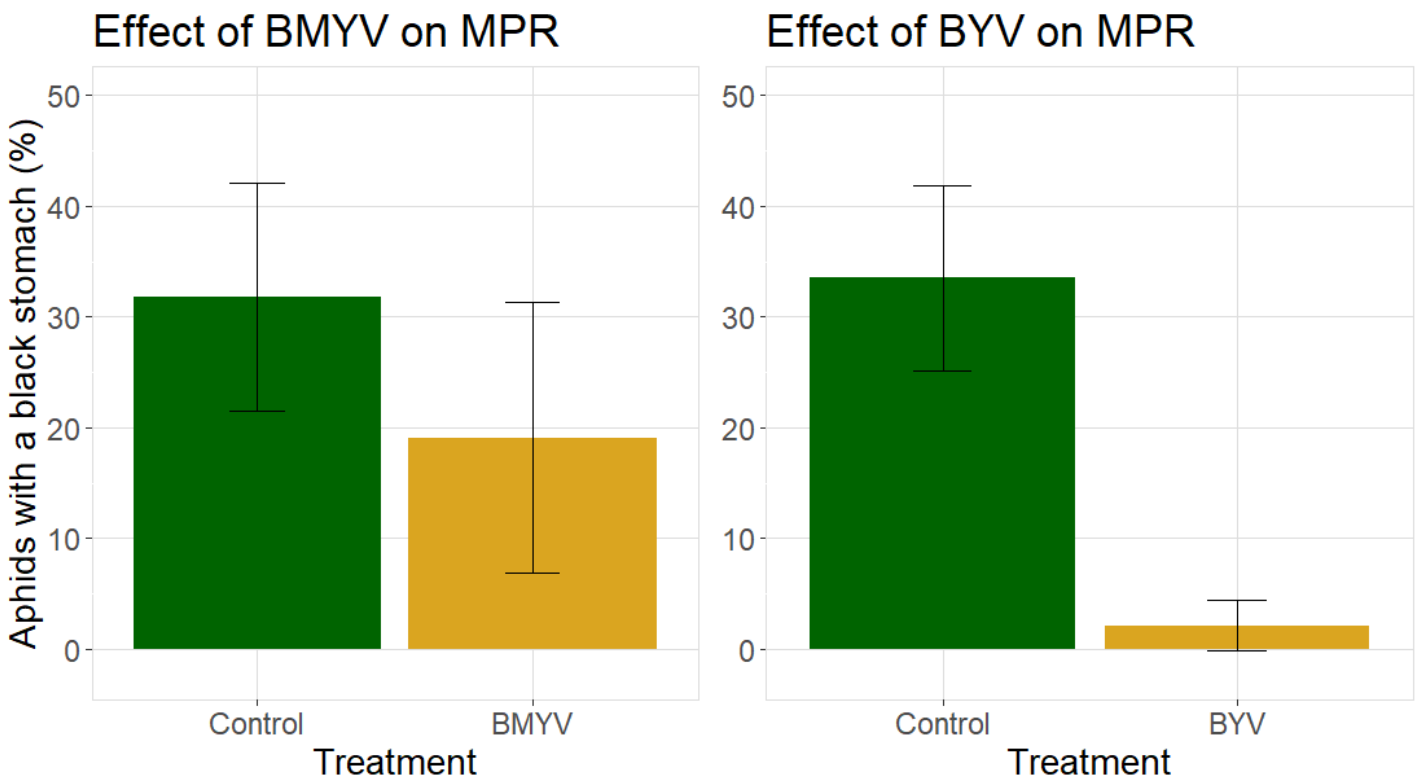
- Climate chamber experiments



Virus effects

Virus inhibits MPR

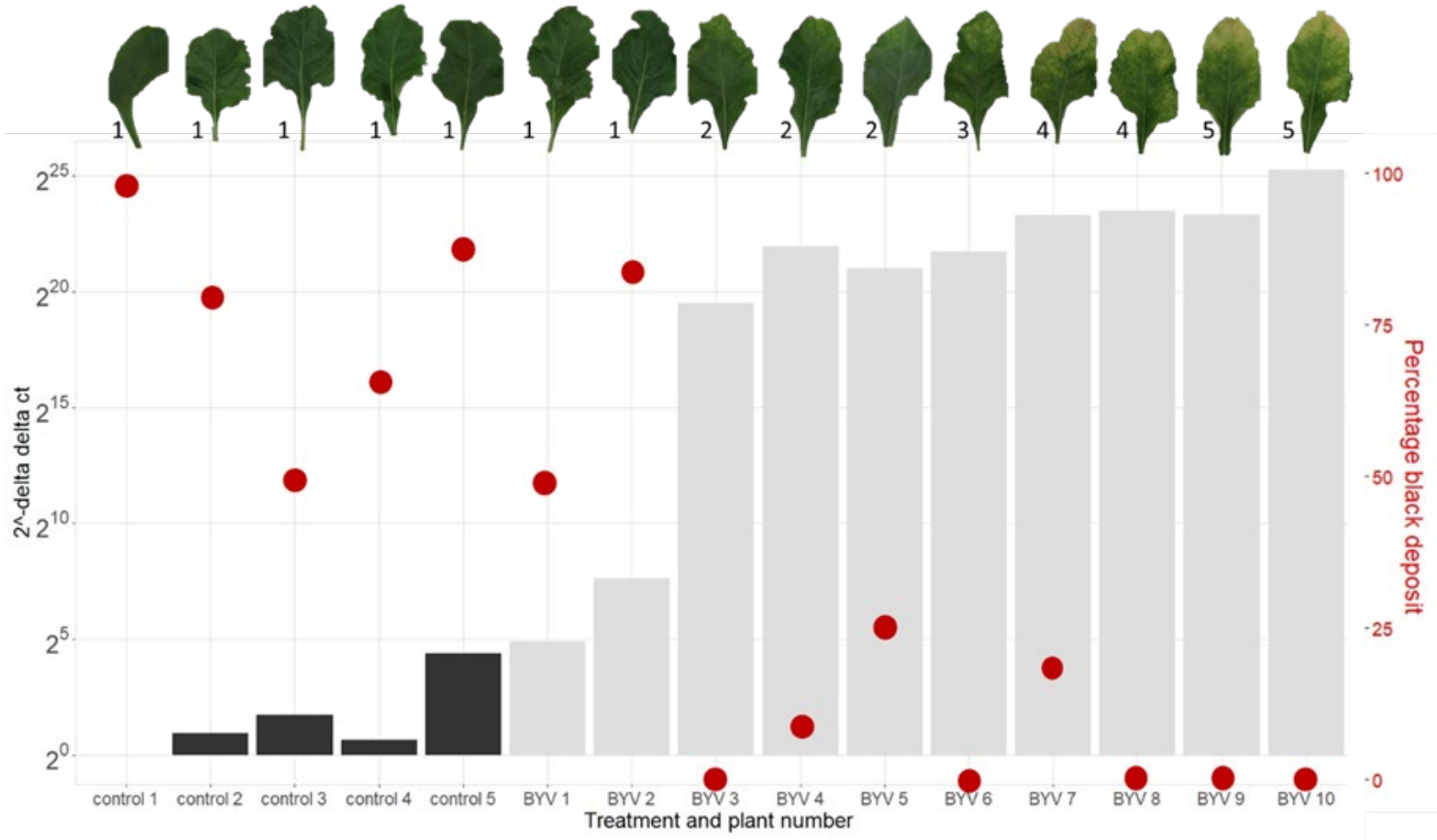
- Climate chamber experiments
- Field trials



Virus effects

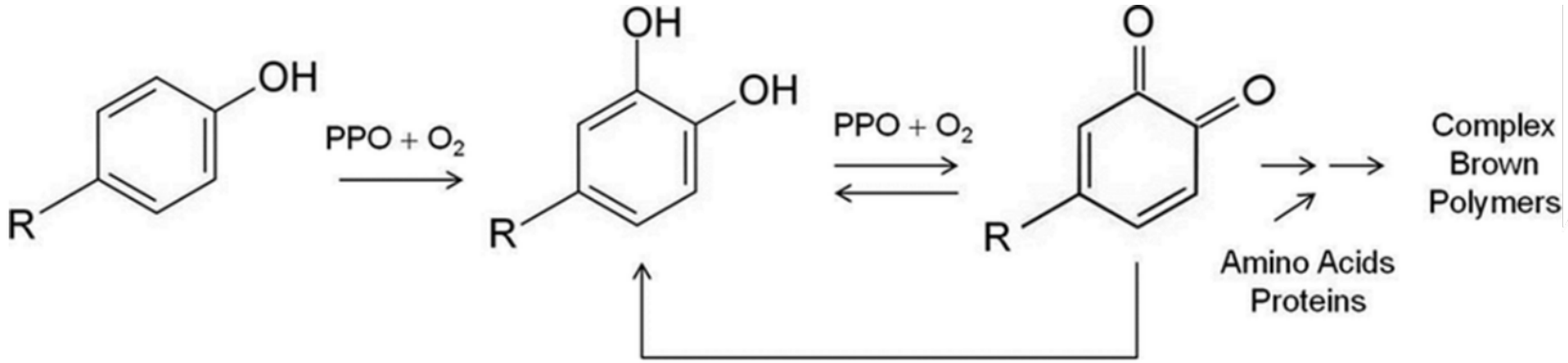
Virus inhibits MPR

- Climate chamber experiments
- Field trials
- Link viral titer and symptoms

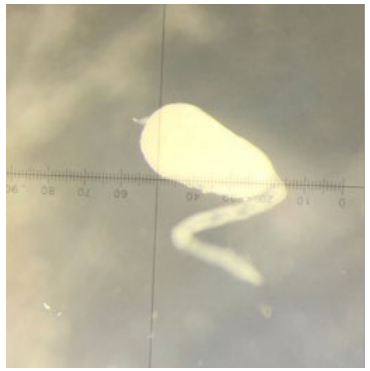


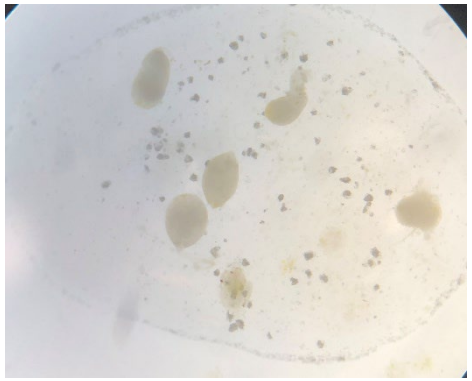
Which pathway is involved?

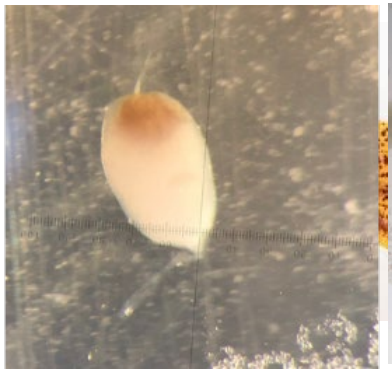
Enzymatic browning reaction

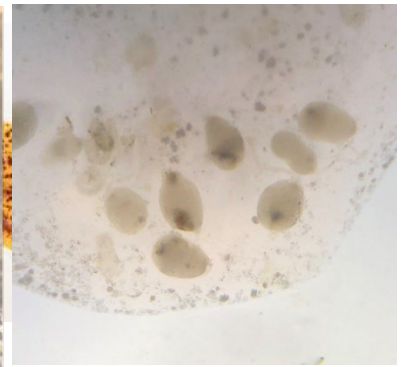


Mono-phenols **Di-phenols** **Quinones** **Melanin**









Conclusion

- Breeding for earlier onset could be an option as genotypic effects were observed

  More information and prove on the molecular pathway is needed

- Other agronomic solutions are also an option:
  - Early sowing

    (SESVanderHave selects varieties and seed treatments to support this)
  - Nutrients

This research led to a better understanding:

- Toxicity effects of MPR
- Virus-vector-plant interaction
- Pathway involved in MPR

Thank you for your attention!

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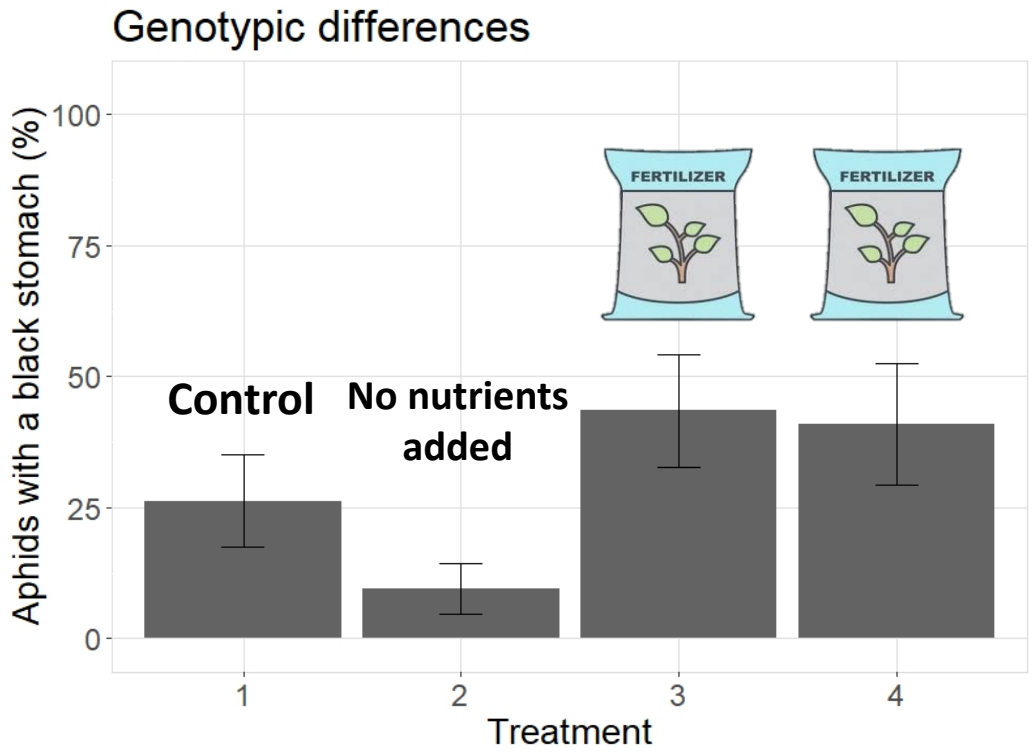
What have we learned?

- Effect nutrient availability and darkening



Organic plant food (Action):
4% organic nitrogen
6% potassiumoxide
Vinasse kali