Insecticidal effects of foliar fertilizers in fruit crops

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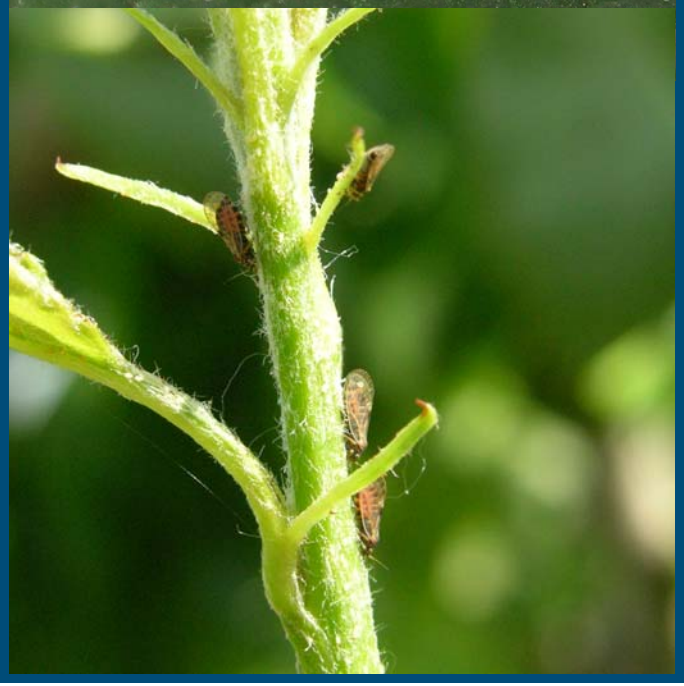
Introduction: fertilizer use and insects

- Research on fertilizers and entomology: separate worlds
- Intensive use of foliar fertilizers in fruit growing
- >30 recommended applications in apple and pear orchards
- Is there an effect on the insects in the crop?
- Can such an effect be used?

(How) can we use the insecticidal effects?

- (Potential) effects on
  - gooseberry sawfly, experiments
  - pear psylla, practical experience
  - other pests?
  - benificial insects?
- Conclusion



Gooseberry Sawfly /Gelbe Stachelbeerblattwespe (*Nematus ribesii*)

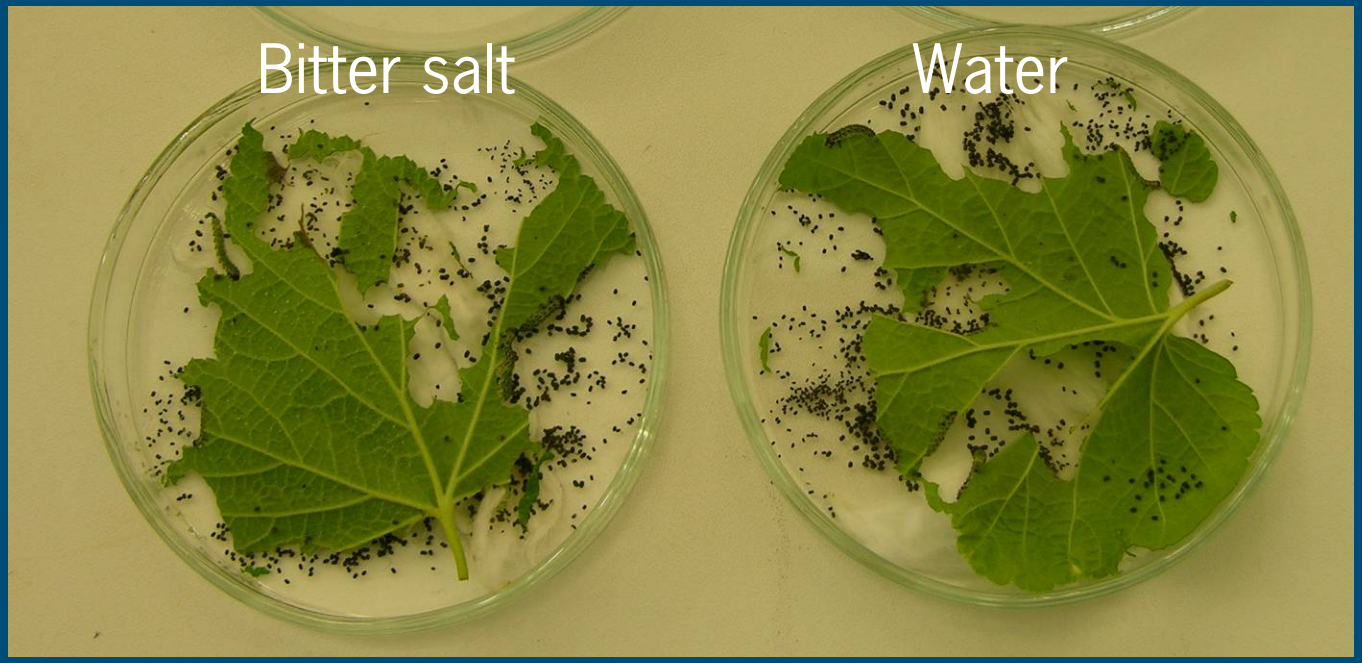
Gooseberry Sawfly

- Observation: treated currant plants with foliar fertilizer – bitter salt (magnesium sulphate) – had very low attacks of sawflies.

- → Detailed experiments
  - Has bitter salt an effect on saw flies?
  - If so, at which developmental stages?

Effect of bitter salt on older larvae?

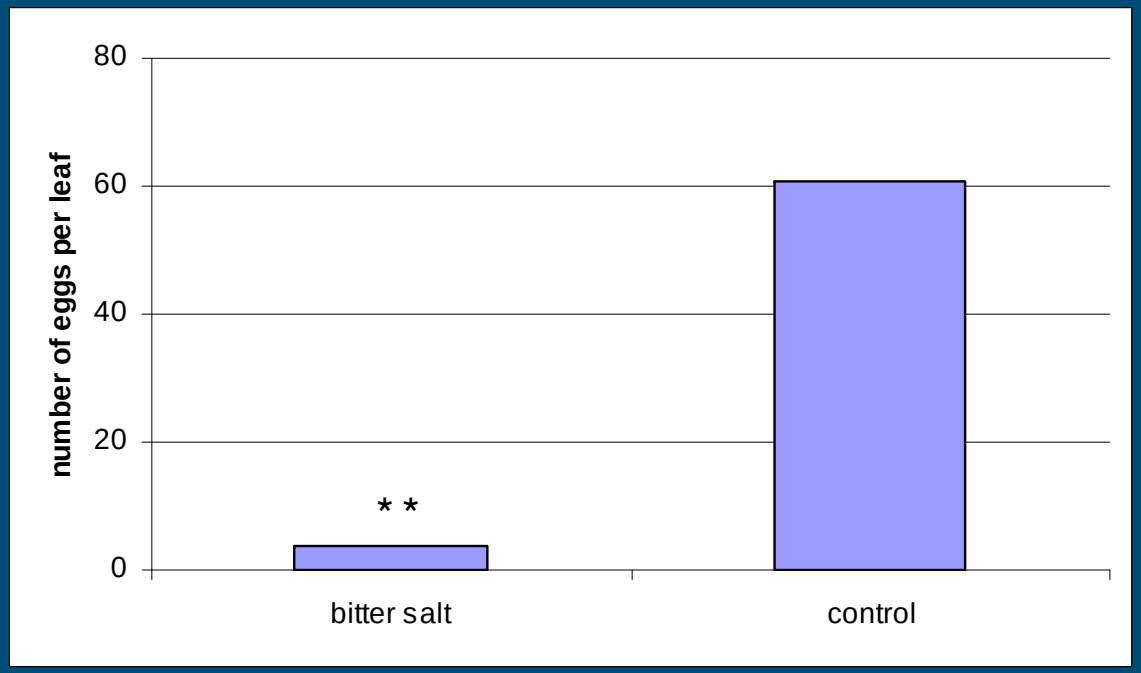
- Currant leaves were treated with bitter salt (2%).



- No effects: no mortality.

Effect of bitter salt on egg deposition?

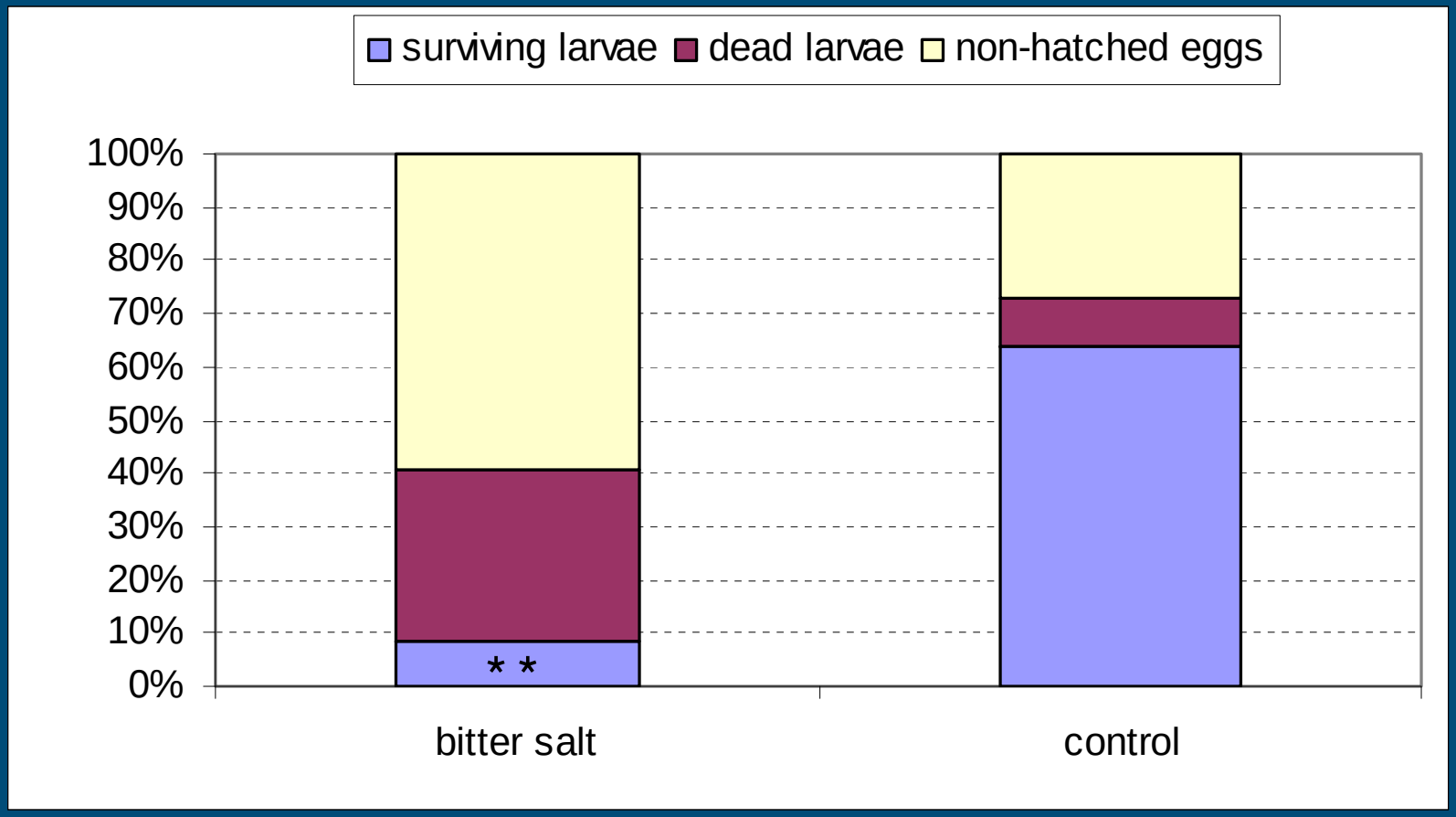
- Females on treated and untreated leaves.



- Significant effect on egg deposition.

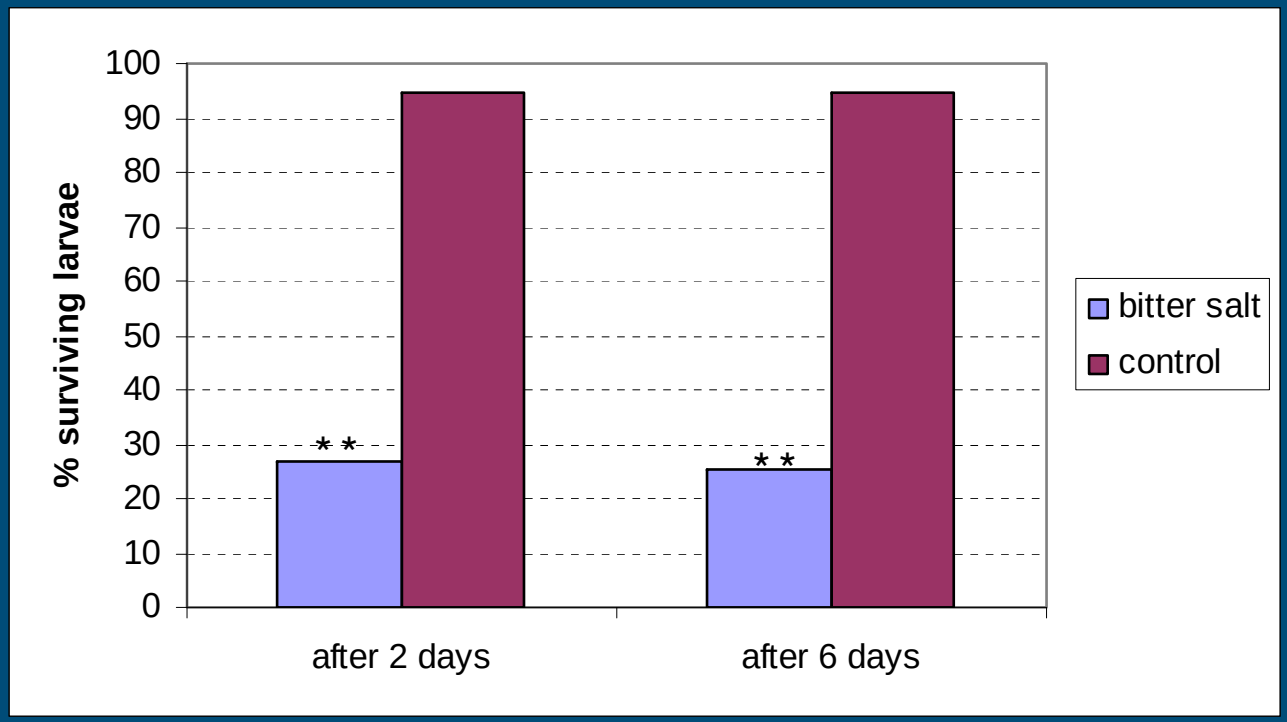
Effect of bitter salt on egg mortality?

- Leaves with eggs were treated with bitter salt.



Effect of bitter salt on neonate larvae?

- Young larvae (L1) were placed on treated leaves and survival rate was determined.



- High mortality of neonate larvae on treated leaves
- Larvae that survive the first days, do not die afterwards

Conclusions

- Reduced egg deposition on treated leaves.
  - In laboratory experiments significant effect.
- Mortality of eggs and very young larvae.
- Survival of older larvae.

→ Bitter salt: a promising method to control gooseberry saw flies.

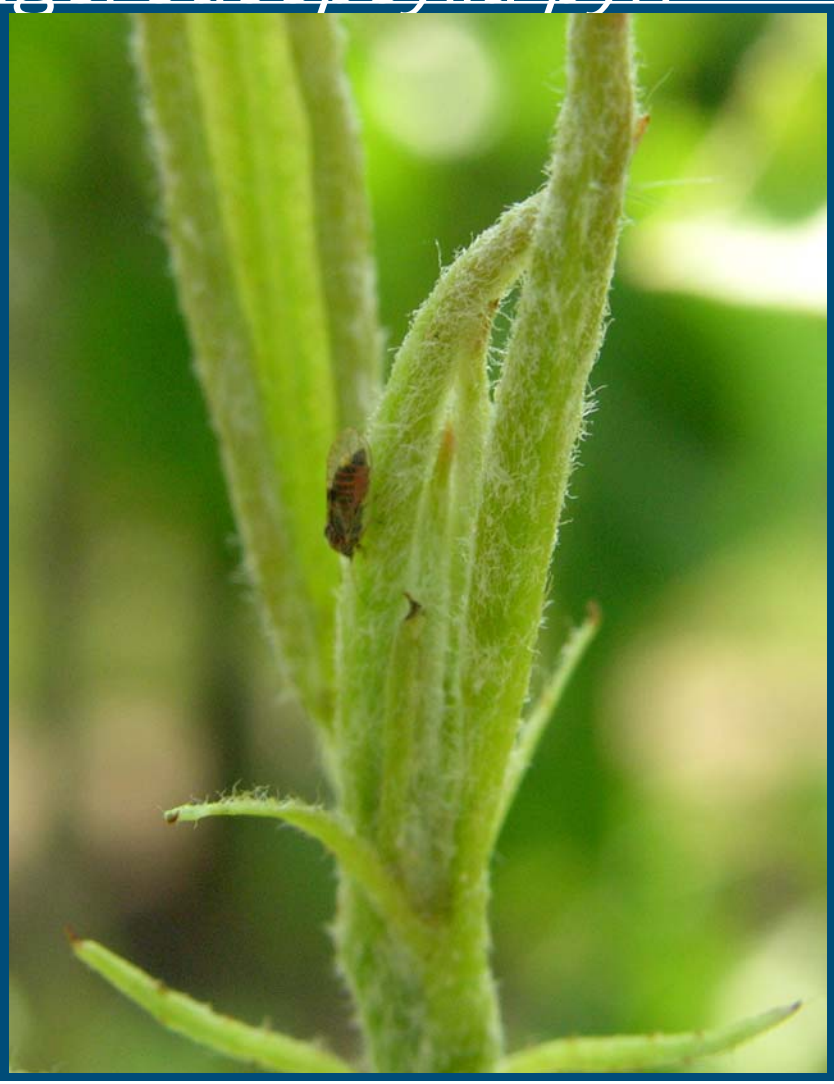
→ Timing of application strongly influences efficacy

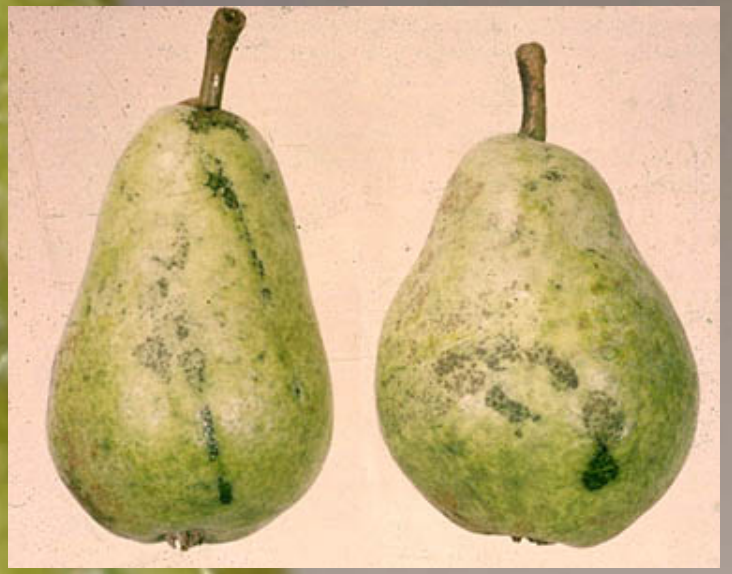
The next step…

- Translation to practice: very few selective insecticides are registered. Advisors and growers are very much willing to adopt this technique.
- When to apply?
  - During adult flight, 1st, 2nd generation? (PM avoid flowering time)
  - Use of coloured traps to monitor flight

Pear psylla / Birnenblattsauger *Cacopsylla pyri*

- Main pest on pear in NL
- Rapid build up of resistance against pesticides
- Natural enemies
  - Selective control methods





Control of pear psylla with foliar fertilizers

- In practice: bitter salt (up to 15 kg/ha), potassium nitrate
- Some growers have been using it succesfully for years
- No good experimental data available for both efficacy and mode of action
- Mode of action?
  - Higher osmotic value around larvae, dessication of eggs and young larvae???
  - Other direct effects
  - Or via undisturbed natural enemies?

Potential effects on other (fruit) pests?

- Appel sawfly / Apfelsägewespe and many other saw flies
- Codling moth /Apfelwickler

Effects on beneficials?

- Tests will be done on common earwig / Ohrwürmer

Summary

- Strong effect of bitter salt on gooseberry sawfly
- Timing of the application influences the efficacy
- There is a potential for further use of the insecticidal effects of foliar fertilizers
- Mechanisms have to be unraveled

- Questions?
- My question: does the audience have experiences with effects of foliar fertilizers on insect pests?

Thank you for your attention