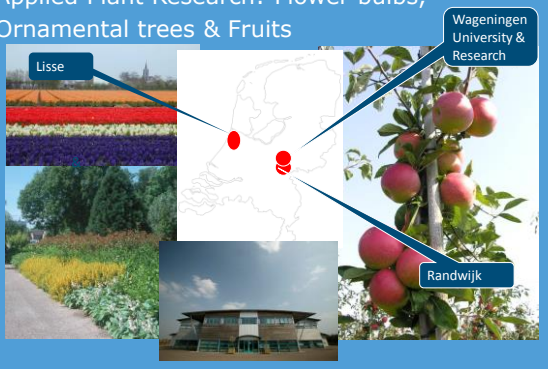
Integrate control of pear psylla

How to find the balance?

Herman Helsen

SmartFruit Barcelona 2014

Applied Plant Research: Flower bulbs, Ornamental trees & Fruits



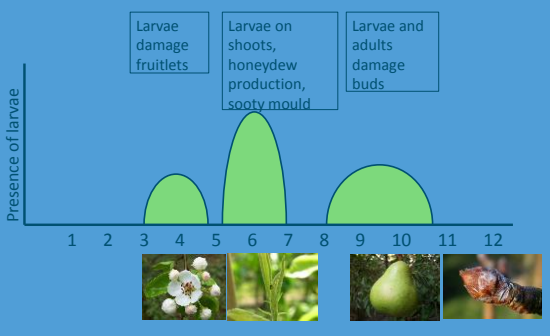
Pear psylla: how to find the balance?

- Introduction of the pest
- A look at the system
  - Some natural enemies and the constraints
  - Other control measures
- Implementing the integrated system

Pear psylla

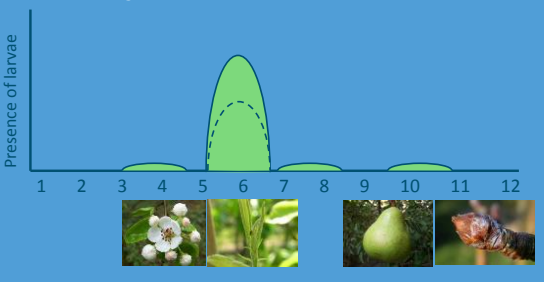
- Phloem feeder, main arthropod pest in European pear orchards
  - Growers have stopped pear growing because of this pest!
- Vector of pear decline *Candidatus* Phytoplasma pyri
- Rapid development of pesticide resistance
- Multiple generations, continuous suppression required.

Pear psylla in conventional orchards

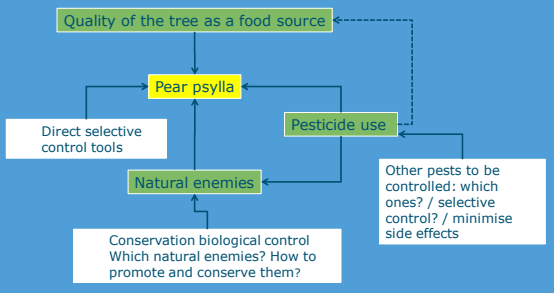


What we aim at....

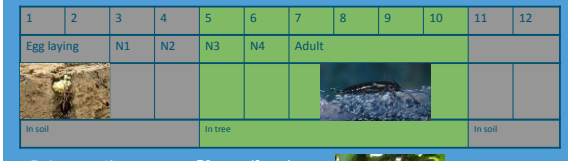
A long term regulation of pear psylla applying available knowledge at farm level



Systems approach: possibilities for manipulation of pear psylla in different domains

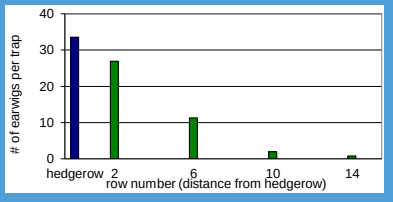


Life cycle of the earwig



- 1 generation per year, 50 eggs/female
  - -> slow recovery after calamities
  - -> hardly any numerical response
- Omnivorous
- Night active
- Easy to trap in cardboard rolls
- Orchards with high earwig densities less Psylla

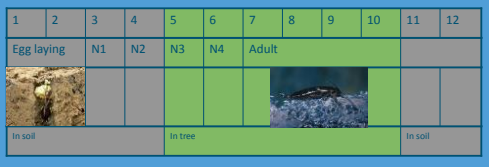
Lower earwig numbers away from orchard border[1]

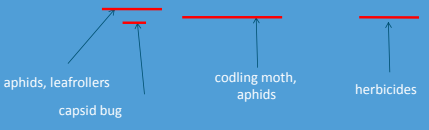


- Some factors that may limit survival and/or reproduction in the orchard
  - Poor drainage
  - Food availability?
  - Pesticide use

[1] *Survey pear orchards PPO Randwijk, 2006*

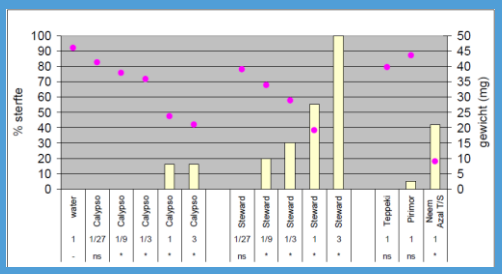
Exposure of earwigs to pesticides





Side effects of pesticides

Effect of pesticide exposure to N2 nymphs



Mortality (bars, left axis) and fresh weight (dots, right axis) at the end of 28 days observation period

PRAKTIJKONDERZOEK PLANT & OMGEVING WAGENINGEN UR

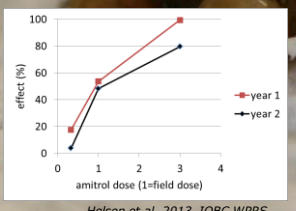
Exposure to amitrole in the field

- 90 % of the Dutch fruit growers apply amitrole as a herbicide, after harvest (Oct.-Nov.)
- This coincides with migration of earwigs to the soil = potential exposure
- Test: exposure of adults in the lab – overwintering – # eggs, larvae

PRAKTIJKONDERZOEK PLANT & OMGEVING WAGENINGEN UR

Egg hatch in control treatment

Reduction of egg hatch after exposure of females to residue of amitrole



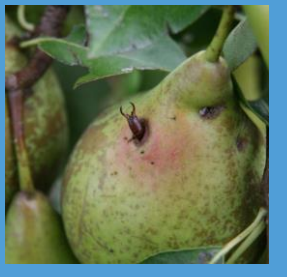
Helsen et al. 2013. IOBC WPRS

Summary: earwigs and pesticides

- Earwigs play an important role in the control of key pests in apple and pear orchards.
- Earwigs have 1 generation: relatively small effects can have significant effect on long term population development. Populations recover slowly.
- Pesticides may cause direct mortality, but also can affect on food uptake, larval weight, behaviour, reproduction of the earwig. When new pesticides are introduced, their sublethal and delayed effects on earwigs should be tested.
- Field test results are extremely variable.
- In certain occasions earwigs *may* become a secondary pest

PRAKTIJKONDERZOEK PLANT & OMGEVING WAGENINGEN UR

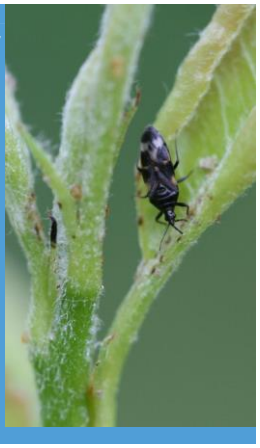
Earwigs can cause 'secondary' damage on apple and pear



PRAKTIJKONDERZOEK PLANT & OMGEVING WAGENINGEN UR

Predatory bug *A. nemoralis*

- Opportunist, coming in from surrounding landscape
- Numerical response
- Often too little, too late
  - Lack of sources?
  - Or is orchard not attractive?
- How can we get *A.n.* into the orchard?



A. nemoralis wants psyllids! Best sources?

- Some psyllid hosts
  - Crateagus
  - Salix
  - Alnus incana
  - Buxus
  - Cytisus
  - Urtica dioica
- The questions:
  - Can we lure *A.n* to lay eggs in the orchard?
  - Alternative food sources inside the orchard?
  - Sources: landscape effects?

An example: psyllids (and *A. nemoralis*) on willow

- Growers keep their windbreaks pruned narrow
- But: psyllids live in female catkins, that is where you find the *A.n*emoralis
- Advice to growers:
  - adapt pruning of hedgerows in a way that willow can flower
  - plant female willow

Quality of the tree as a food source

- Fertiliser (nitrogen) levels have strongly increased in modern pear growing.
- Lab research: high *N* favours phloem feeders
  - *N* level differences used in those lab tests are not relevant for modern fruit growing
- Field tests, can we:
  - Reduce N input
  - Reduce psylla infestation
  - Get the same crop quantity and quality

Quality of the tree as a food source

- field test 2013 indicate that N levels can be reduced affecting psylla infestation without affecting crop
- -> **optimum** N-level may lay below N-levels used in practice if the pest is considered as well
- Increased P levels may compensate for lower N regarding fruit quality

Selective control of other orchard pests

- Natural control of psyllids requires minimum side effects of pesticides
- Codling moth mating disruption: costs may be an obstacle
- Extra costs made for the selective control of other pests should be attributed not only to that pest, but should be considered as a part of the IPM system

PRAKTIJKONDERZOEK PLANT & OMGEVING WAGENINGEN UR

Conclusion

- Many factors regulate psyllids, there is no golden bullet, a combination of control measures and natural enemies is needed, but each of the control measures has its costs.
- The challenges:
  - We have to know the ever changing system and the impact of individual factors and the interactions between these factors in the orchard ecosystem
  - It has to work in practice: design, testing and implementation of an integrated control strategy require a close cooperation between researchers, extension workers and growers.

"If pear psylla is the number one problem in pear growing, it deserves a central place in the orchard (pest) management."

PRAKTIJKONDERZOEK PLANT & OMGEVING WAGENINGEN UR

Thank you for your attention

PRAKTIJKONDERZOEK PLANT & OMGEVING WAGENINGEN UR

Ministerie van Economische Zaken, Landbouw en Innovatie

Productschap Tuinbouw