



# Biocontrol in a Swiss Canton: the case of Lucerne

Heinrich Hebeisen

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# Agriculture in the Canton of Lucerne <sup>3</sup>





**Hinterland**



**Luzerner Seetal**



**Entlebuch**

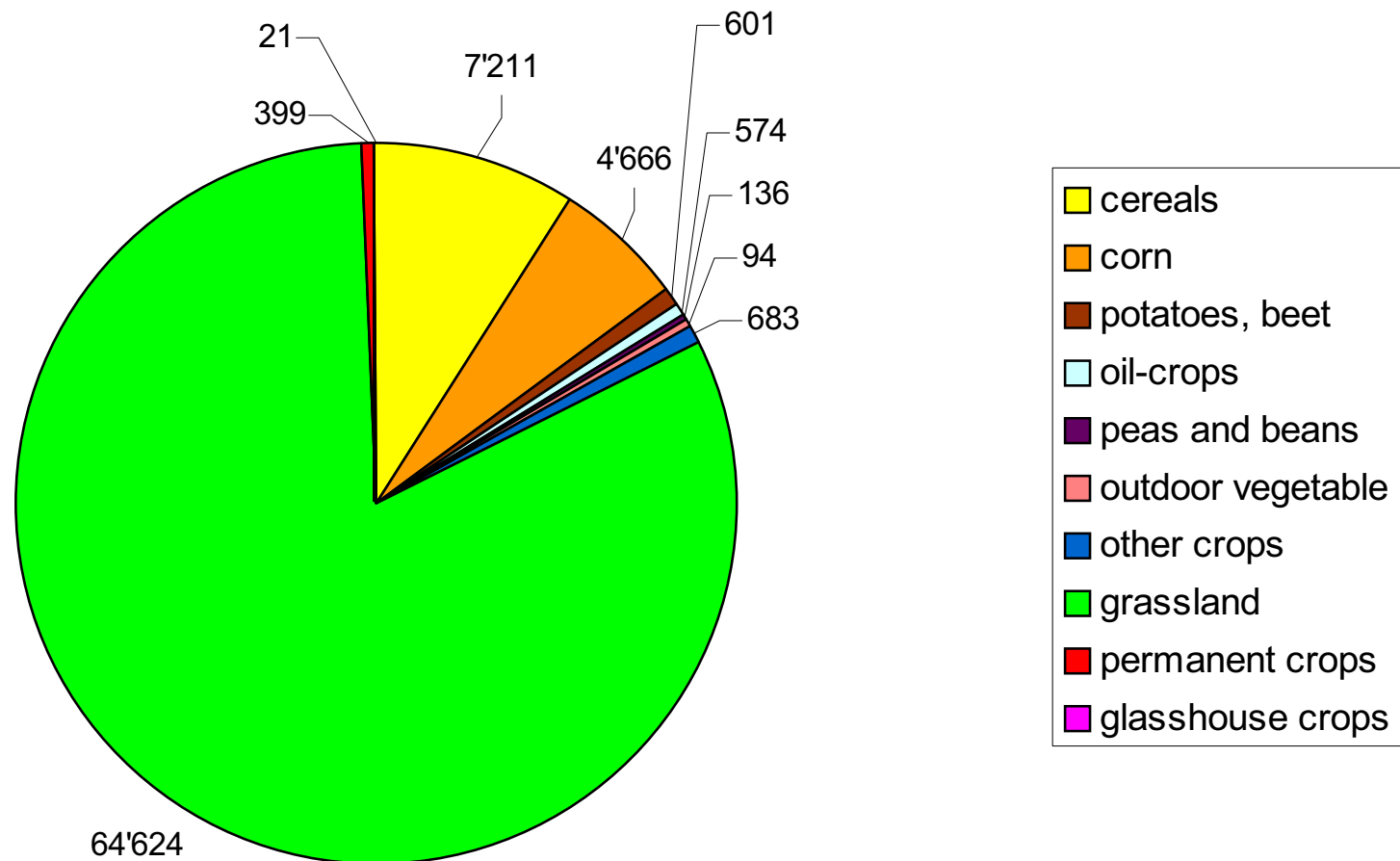


2350 m

**Brienzer Rothorn**

# Agriculture in the Canton of Lucerne

Agricultural utilized area in Canton of Lucerne (ha)



# Extension work: Plant Protection

- Office of agriculture and forest, section Plant protection and Special Crops (ca 230% manpower)
- Agricultural school and information centre LBBZ (ca 100% manpower)
- chemical industry and farmers' co-operatives



# Biocontrol in Canton of Lucerne

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Fruit cultures:



# Biocontrol in Canton of Lucerne

- Regulation of Pear psyllids (*Caposylla pyri*) with earwig



Anthocorid bugs



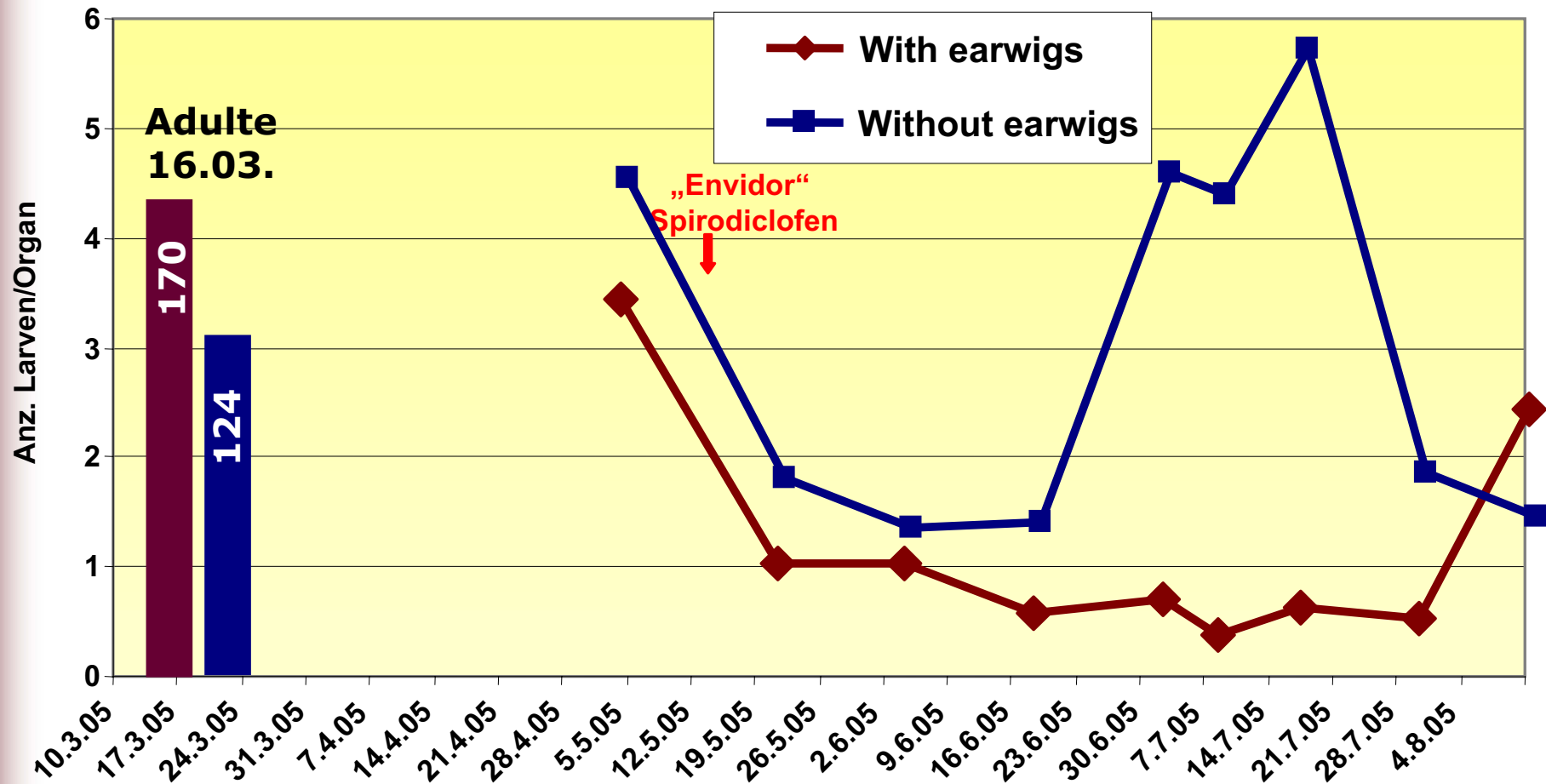


# Pear psyllids (*Caposylla pyri*)

- Mounting of the pots from May in the orchard, in every row, each 8-10 m!



# Pear psyllids and earwigs 2005 (FAW 5010)



# Confusion technique

- Apple-worm (*Carpocapsa pomonella*)
- Summer fruit tortrix moth (*Adoxophyes reticulana*)
- *Grapholitha lobarzewskii*



Reduction of the resistance problems

# Further biological insect control<sup>12</sup>

- **Granulose virus** against apple-worm
- **Spinosad** (Audienz) against
  - Apple blossom weevil (*Anthonomus pomorum*)
  - apple-worm (*Carpocapsa pomonella*)
  - *grapholita lobarzewskii*
  - Colorado beetle (*Leptinotarsa decemlineata*)
  - Thrips and other pests in berrys and vegetable
- **Trichogramma brassicae** against
  - European corn borer (*Ostrinia nubilalis*)
- **Bac. Thuringiensis** against
  - Colorado beetle (*Leptinotarsa decemlineata*)
- **Heterorabditis megidis** against Otiorhynchid
- **Beauveria brogniartii** against
  - May beetles (*Melolontha melolontha*)



# Fungicides and Bactericides

- **Bac. Subtilis** (Bio Pro) against
  - Fire blight (*Erwinia amylophora*)
- **Bac. Subtilis FZB24** against
  - black scurf (*Rhizoctonia solani*) in potatoes and salad
- **Myco-San (diatomaceous earth, sulphuric basalt, silicic acid, Equisetum (horsetail) extracts and 41% elemental sulphur)** against
  - Apple powdery mildew (*Podosphaera leucotricha*)
  - Apple scab (*Venturia inaequalis*)
  - Powdery mildew of grapevine (*Erysiphe necator*)
  - Downy mildew of grape (*Plasmopara viticola*)
  - Brenner disease (*Pseudopeziza tracheiphila*)
- **Myco-Sin (diatomaceous earth, sulphuric basalt, silicic acid, Equisetum (horsetail) extracts )** against
  - like Myco-San, additional
  - Fire blight (*Erwinia amylophora*)
  - *Pseudomonas syringae*

# Auxiliary in glasshouse crops

- **bumble bee** (*bombus terrestris*) to improve the pollination
- **Ambliseius cucumeris** ag. Thrips and spider mite
- **Aphidius colemani** ag. plant louses
- **Aphidius ervi** ag. glasshouse-potato aphid
- **Aphidoletes aphidimyza** ag. plant louses
- **Encarsia formosa** ag. Whitefly
- **Macrolophus caliginosus** ag. Whitefly

# water vole and common vole

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# water vole and common vole



**Grassland or fruit trees**

**Fallow land**





# Conclusion

- Biocontrol is applied increasingly
  - Not only by Organic Farmers, but also by IP-Farmers
  - Especially in fruit- and glasshouse crops
  - In combination with pesticides
- A great palette of biological methods is applied and accepted by the farmers
- Bio Control presents both economic and ecological advantages
- Biocontrol enables a reduced quantity of pesticides to be used and to manage Resistance-problems of pests against pesticides
- The extension work supports and promotes biological pest management and helps to increase the acceptance of biological control.



**Fences to prevent voles,  
CD's to prevent birds ...**

**Biological and integrated pest management  
ist music for mankind and nature!**






**Thank you for your contribution and for your  
attention!**

- Zusatzfolien

# Side-effect of plant protection product

| <i>plant protectant</i>      | earwig | Anthocorid bugs | predatory mite |
|------------------------------|--------|-----------------|----------------|
| <b>Pheromon-Confusion</b>    | Green  | Green           | Green          |
| <b>Granuloseviren</b>        | Green  | Green           | Green          |
| <b>Pirimicarb</b>            | Green  | Green           | Green          |
| <b>Häutungsbeschleuniger</b> | Green  | Green           | Green          |
| <b>Fenoxycarb</b>            | Green  | Orange          | Green          |
| <b>Diflubenzuron</b>         | Orange | Green           | Green          |
| <b>Spirodiclofen</b>         | Green  | Yellow          | Yellow         |
| <b>Amitraz</b>               | Green  | Orange          | Red            |
| <b>Neonicotinoide</b>        | Red    | Orange          | Green          |
| <b>Abamectin</b>             | Orange | Red             | Red            |
| <b>Phosphorsäureester</b>    | Red    | Red             | Orange         |
| <b>Pyrethroide</b>           | Red    | Red             | Red            |

# Integrated pest-management in pears

|   | April   | Blüte                           | Mai  | Juni  | July  | Aug.                     | Postharvest |
|---|---|---------------------------------|--|---|---|--------------------------|-------------|
| <b>Pear psyllids</b>                                |  |                                 |  | <b>Envidor/Acarac</b>   |  | <b>Auxiliaries</b>       |             |
| <b>aphid</b>  |   |                                 | <b>Carbamate</b>   |   |   |                          |             |
| <b>Spanner/Eulen/<br/>Summer fruit tortrix moth</b> |   |                                 | <b>Häutungsbeschleuniger</b>   |   |   |                          |             |
| <b>apple-worm</b>                                   |   |                                 |  |  | <b>Pheromon-Confusion (kombined)</b>  |                          |             |
| <b>Summer fruit tortrix moth</b>                    |   |                                 |  |  |   |                          |             |
| <b>Spider mites</b>                                 |   |                                 |  | <b>(Envidor/Acarac)</b>   |   |                          |             |
| <b>Rost-mites</b>                                   |   | <b>3-4 x Sulfur</b> (3-4 kg/ha) |  |   |   |                          |             |
| <b>Gall-mites</b>                                   |   |                                 |  |   |   | <b>Sulfur</b> (32 kg/ha) |             |

# Auxiliary against the Pear psyllids

**Earwigs** are very effectively, if present and protected!

Settlement very often, but not always, successful, slow dispersion

**Anthocorid bugs** are very effective, if present and protected,

Settlement rarely successful, natural settlement frequently, large radius of action

**Other auxiliary** lady beetle, syrphidae, green lacewing are partly quite useful, but unreliable