Biocontrol in a Swiss Canton: the case of Lucerne

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Content

- Welcome to Lucerne
- Agriculture in the Canton of Lucerne
- Extension work in Plant Protection
- Biocontrol in the Canton of Lucerne
- Conclusion
Agriculture in the Canton of Lucerne

- 360,000 inhabitants
- 1,500 km²
- 5,355 farms
  - IP farms: 5,040
  - BIO farms: 315
- Surface: 15 ha

Areas:
- Wiggertal
- Suhrental
- Seetal
- Hinterland
- Entlebuch
- Luzerner Seetal
- Pilatus
- Rigi
- Brienzer Rothorn

2,350 m
Hinterland

Luzerner Seetal

Entlebuch

Brienzer Rothorn

2350 m
Agriculture in the Canton of Lucerne

Agricultural utilized area in Canton of Lucerne (ha)

- cereals
- corn
- potatoes, beet
- oil-crops
- peas and beans
- outdoor vegetable
- other crops
- grassland
- permanent crops
- glasshouse crops
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

Fruit cultures:
Biocontrol in Canton of Lucerne

- Regulation of Pear psyllids (Capopsylla pyri) with earwig

Anthocorid bugs
Pear psyllids (Capopsylla pyri)

- Mounting of the pots from May in the orchard, in every row, each 8-10 m!
Pear psyllids and earwigs 2005 (FAW 5010)

Anzahl Larven/Organe

Adulte 16.03.

With earwigs

Without earwigs

„Envidor“ Spirodiclofen

With earwigs:
- 10.3.05: 10
- 17.3.05: 170
- 24.3.05: 124
- 31.3.05: 170
- 7.4.05: 124
- 14.4.05: 1
- 21.4.05: 2
- 28.4.05: 3
- 5.5.05: 4
- 12.5.05: 5
- 19.5.05: 6
- 26.5.05: 7
- 2.6.05: 8
- 9.6.05: 9
- 16.6.05: 10
- 23.6.05: 11
- 30.6.05: 12
- 7.7.05: 13
- 14.7.05: 14
- 21.7.05: 15
- 28.7.05: 16
- 4.8.05: 17

Without earwigs:
- 10.3.05: 10
- 17.3.05: 170
- 24.3.05: 124
- 31.3.05: 170
- 7.4.05: 124
- 14.4.05: 1
- 21.4.05: 2
- 28.4.05: 3
- 5.5.05: 4
- 12.5.05: 5
- 19.5.05: 6
- 26.5.05: 7
- 2.6.05: 8
- 9.6.05: 9
- 16.6.05: 10
- 23.6.05: 11
- 30.6.05: 12
- 7.7.05: 13
- 14.7.05: 14
- 21.7.05: 15
- 28.7.05: 16
- 4.8.05: 17
Confusion technique

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

Reduction of the resistance problems
Further biological insect control

- **Granulose virus** against apple-worm
- **Spinosad** (Audienz) against
  - Apple blossom weevil (*Anthonomus pomorum*)
  - apple-worm (*Carpocapsa pomonella*)
  - grapholitha lobarzewskii
  - Colorado beetle (*Leptinotarsa decemlineata*)
  - Thrips and other pests in berries and vegetable
- **Trichogramma brassicae** against
  - European corn borer (*Ostrinia nubilalis*)
- **Bac. Thuringiensis** against
  - Colorado beetle (*Leptinotarsa decemlineata*)
- **Heterorabditis megridis** 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
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.
Biological and integrated pest management is music for mankind and nature!

Thank you for your contribution and for your attention!

Fences to prevent voles, CD’s to prevent birds …
- Zusatzfolien
### Side-effect of plant protection product

<table>
<thead>
<tr>
<th>plant protectant</th>
<th>earwig</th>
<th>Anthocorid bugs</th>
<th>predatory mite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pheromon-Confusion</td>
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<tr>
<td>Granuloseviren</td>
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<tr>
<td>Pirimicarb</td>
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<tr>
<td>Häutungsbeschleuniger</td>
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<tr>
<td>Fenoxycarb</td>
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<tr>
<td>Diflubenzuron</td>
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<td>Spirodiclofen</td>
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<td>Amitraz</td>
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<td>Phosphorsäureester</td>
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<td>Pyrethroide</td>
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</table>
# Integrated pest-management in pears

<table>
<thead>
<tr>
<th>Pest</th>
<th>April</th>
<th>Mai</th>
<th>Juni</th>
<th>July</th>
<th>Aug.</th>
<th>Postharvest</th>
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<tbody>
<tr>
<td>Pear psyllids</td>
<td></td>
<td></td>
<td>Envidor/Acarac</td>
<td></td>
<td></td>
<td>Auxiliaries</td>
</tr>
<tr>
<td>aphid</td>
<td></td>
<td></td>
<td>Carbamate</td>
<td></td>
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<tr>
<td>Spanner/Eulen/Summer fruit tortrix moth</td>
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<td></td>
<td>Häutungsbeschleuniger</td>
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<tr>
<td>apple-worm</td>
<td></td>
<td></td>
<td>Pheromon-Confusion (kombined)</td>
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<tr>
<td>Summer fruit tortrix moth</td>
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<tr>
<td>Spider mites</td>
<td></td>
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<td>(Envidor/Acarac)</td>
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<tr>
<td>Rost-mites</td>
<td></td>
<td>3-4 x Sulfur</td>
<td>3-4 kg/ha</td>
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<tr>
<td>Gall-mites</td>
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<td>Sulfur (32 kg/ha)</td>
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</tbody>
</table>

Auxiliaries: Sulfur (32 kg/ha)

Pheromon-Confusion (kombined)
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 effektiv, if present and protected,
   Settlement rarely successful, natural settlement frequently, large radius of action

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