Melocont®-Pilzgerste for control of *Melolontha melolontha*

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What is presented?

• Is Europe endangered by cockchafers?

• History of *Melolontha* spp. control

• *Beauveria brongniartii* fulfils the key criteria as BCAs by effectiveness

• Basic Information

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Actually more than 160,000 ha arable land is endangered by cockchafers in Europe.
Damages caused by the European cockchafer
(Survey: 1997 to 2001)

50,000 ha Christmas trees plantations endangered

10,000 to 15,000 ha in forests

15,000 ha in forests

13,000 ha in alpine meadows and vineyards

7,300 ha in vineyards and tree nurseries

5,000 ha in pastures and alpine meadows

4,500 ha in orchards and pastures

9,000 ha in pastures and vineyards

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Estimated importance of *M. melolontha* and *M. hippocastani* in various European countries

<table>
<thead>
<tr>
<th>Pest</th>
<th>Country</th>
<th>Size of area infested (ha)</th>
<th>with Economic damage (ha)</th>
<th>Estimated amount of damage (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>M. melolontha</em></td>
<td>Austria</td>
<td>&gt; 30,000</td>
<td>30,000</td>
<td>20,000</td>
</tr>
<tr>
<td><em>M. melolontha</em></td>
<td>Czech Rep.</td>
<td>500</td>
<td>5</td>
<td>16,000</td>
</tr>
<tr>
<td><em>M. melolontha</em></td>
<td>Poland</td>
<td>1,012</td>
<td>1,012</td>
<td>No data</td>
</tr>
<tr>
<td><em>M. melolontha</em></td>
<td>Germany</td>
<td>3,000</td>
<td>&gt; 100</td>
<td>No data</td>
</tr>
<tr>
<td><em>M. hippocastani</em></td>
<td>Czech Rep.</td>
<td>12,000</td>
<td>250</td>
<td>880,000</td>
</tr>
<tr>
<td><em>M. hippocastani</em></td>
<td>Germany</td>
<td>31,000</td>
<td>5,000</td>
<td>No data</td>
</tr>
</tbody>
</table>

Estimated importance of *M. melolontha* and *M. hippocastani* in various European countries

<table>
<thead>
<tr>
<th>Pest</th>
<th>Country</th>
<th>Tendency of population development</th>
<th>Control strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>M. melolontha</em></td>
<td>Austria</td>
<td>slightly increasing</td>
<td><em>B. brongniartii</em></td>
</tr>
<tr>
<td><em>M. melolontha</em></td>
<td>Czech Rep.</td>
<td>increasing</td>
<td>Insecticides</td>
</tr>
<tr>
<td><em>M. melolontha</em></td>
<td>Poland</td>
<td>No data</td>
<td>Insecticides, mechanical</td>
</tr>
<tr>
<td><em>M. melolontha</em></td>
<td>Germany</td>
<td>3,000</td>
<td>Insecticides, mechanical, <em>B. brongniartii</em></td>
</tr>
<tr>
<td><em>M. hippocastani</em></td>
<td>Czech Rep.</td>
<td>strongly increasing</td>
<td>Insecticides, <em>B. bassiana</em></td>
</tr>
<tr>
<td><em>M. hippocastani</em></td>
<td>Germany</td>
<td>increasing</td>
<td>Insecticides, <em>B. brongniartii</em></td>
</tr>
</tbody>
</table>
History of *Melolontha* control
Difficulties to control *Melolontha*

Major problem is their hidden niche!!

Inherent difficulties of penetrating their habitat with appropriate control agents

Use of chemical insecticides is undesirable or impossible
Benefits in using Fungi

Fungal pathogens are endemic in pest populations

Fulfil the key criteria of BCAs by effectiveness

Autodissemination

Their excellent persistence

Fungi are relatively easy to be mass produced

Fungal BCAs formulated with increased shelf life and field efficacy
Beauveria brongniartii fulfils the key criteria as BCAs by effectiveness
Infection processes

How do fungi infect their host and what barriers do they have to overcome?
Infection processes

Fungi secrete proteases and chitinases to digest host cuticle

Fungi generates mechanical force to penetrate the host cuticle

Note the circular bore holes in the insect cuticle

© T. Butt

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Mode of Action

Fungal conidia are the effective propagules

Conidia penetrates the host and kills the larvae

Cadaver is mumified

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© T.M. Butt
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© T. Butt
Melocont®-Pilzgerste grassland application
Soil application

Soil depth: 3 to 10 cm
Melocont®-Pilzgerste
„The happy farmer“
**M. melolontha** infestation in Tyrol (Austria) : without Melocont® treatments (●): Ø 128 per m² (2002)


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Beauveria controls Melolontha

B. brongniartii density (2002): after two Melocont® applications (●)

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Application rate per hectare

In grassland:
2 x > 25 kg Melocont; 2 years

In arable land:
> 20 kg Melocont per year

Application without restrictions!
Melocont®-Pilzgerste is effective!

Melocont®-Pilzgerste. *Melolontha* insecticide

The product

- Is host specific
- Is established and formulated
- Can be produced economically
- Have a great future

Provided – regulatory issues can be addressed

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Story of success

Application for authorization in case of emergency situations in plant protection (Article 53 of Regulation (EC) No 1107/2009) in many European member state countries since 2008!

First effective propagule against *Melolontha* in an EEC-member state

The research work (field studies and laboratory work) could be finalised with assistance from the EU-research projects.
Successful *Melolontha* spp. control!

Ecological and traditional prophylaxis

Mechanical treatments

and !! Melocont®-Pilzgerste !!

Advice and expert monitoring are essential!

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Basic Information
Development stages of Melolontha
**Schema of a four years life cycle**

<table>
<thead>
<tr>
<th>Year</th>
<th>Life Cycle Stages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. year</td>
<td>K, Ei, L1, L1, L1, L1/L2, L2, L2/L3, L3, L3, L3, P, P/K</td>
</tr>
<tr>
<td>2. and 3. year</td>
<td>K, K, K, K, Ei</td>
</tr>
<tr>
<td>4. year</td>
<td>Feeding damages on roots</td>
</tr>
<tr>
<td>5. year</td>
<td></td>
</tr>
</tbody>
</table>

Life cycle of one Melolontha generation (K .... chafer, Ei .... egg, L .... larva, P.... pupae)
# Mechanical Control

<table>
<thead>
<tr>
<th>Implemented Actions</th>
<th>Efficacy (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harrow</td>
<td>63</td>
</tr>
<tr>
<td>Milling/rotovate</td>
<td>78</td>
</tr>
<tr>
<td>Furrow: Larvae</td>
<td>40 – 90</td>
</tr>
<tr>
<td>Combination: Furrowing + Harrowing</td>
<td>67 – 90</td>
</tr>
<tr>
<td>Rotary-harrow: one treatment</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>95</td>
</tr>
</tbody>
</table>

Pötsch, Strasser, Berger in ÖAG INFO 2/97; modified

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BIPESCO Team

BIPESCO team Innsbruck is developing products and dossiers

Provide expert judgement and literature for risk assessment.

Develop appropriate studies for MO’s.

Test metabolites when relevant, using RAFBCA as a model.

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