Optimised spray application in oilseed rape
- effects on nectar and pollen contamination -

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FIT BEE Innovation Project

University Hohenheim
Lechler GmbH
Syngenta Agro
Bayer CropScience
Module 3

- objectives -

• Reduction of the contact of honeybee colonies to agriculture pesticides
• Prevention of residues in the hive storage (honey, bee bread)
Residues in bee bread and relation to treatments into blooming cultivations (DEBIMO)

30 of the most often detected substances (112 German apiaries) in red: pesticides used in blooming cultivations
30 of the most often detected substances (112 German apiaries) in red: pesticides used in blooming cultivations
Conventional application
consequences

Bees walk on contaminated surfaces and collect contaminated pollen and nectar

- cocktails of chemicals in the hive
- conflict between agriculture and apiculture
Alternative application technology

- Prolonged sprays
- Elastic rearwards and flexible sideways

„Dropleg“ prototype; Lechler GmbH
Comparison of the conventional and the optimised application

- Colonies placed near isolated 15 ha fields
- Colonies in tents (3 replicates)
- Application of a tank mixture (300 l/ha, 7 km/h)
  - Ortiva® (Azoxystrobin)
  - Mavrik® (Fluvalinate)

- Damage of plants
- Distribution of the spray solution in the crop
- Daily analysis of returning foragers (nectar/pollen)
- Daily analysis of pollen trap yields
- Analysis of stored bee bread and honey
Field trial
Tent trial at the BCS experimental station „Höfchen“

Three replicates for the conventional and optimised application
Conventional application

Vertical distribution in the oilseed rape field (micro litre spray solution per 2 cm height section)
Vertical distribution in the oilseed rape field
(micro litre spray solution per 2 cm height section)

Optimised application (Droplegs)
Oilseed rape - field trial 2011
Residues (mg/kg) in trapped pollen

Azoxystrobin in pollen collected in pollen traps

2 farms with each 15 ha oilseed rape, result of one pollen collecting colony
Sampling over a 7 day period after the application
SPE, GC-ECD, LoQ 0.015 mg/kg
## Field trial - bee bread

### Oilseed rape - field trial 2011

Residues (mg/kg) in bee bread of colonies

<table>
<thead>
<tr>
<th></th>
<th>Fluvalinate</th>
<th>Azoxystrobin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>colony 1</td>
<td>n.d.</td>
<td>0.32</td>
</tr>
<tr>
<td>colony 2</td>
<td>n.d.</td>
<td>0.12</td>
</tr>
<tr>
<td>colony 3</td>
<td>n.d.</td>
<td>0.20</td>
</tr>
<tr>
<td>control</td>
<td>n.d.</td>
<td>n.d.</td>
</tr>
<tr>
<td>Optimised</td>
<td></td>
<td></td>
</tr>
<tr>
<td>colonies 1-6</td>
<td>n.d.</td>
<td>n.d.</td>
</tr>
<tr>
<td>colony 7</td>
<td>n.d.</td>
<td>0.04</td>
</tr>
<tr>
<td>control</td>
<td>n.d.</td>
<td>n.d.</td>
</tr>
</tbody>
</table>

2 farms with each 15 ha oilseed rape, 2 groups of colonies

Sampling before application (control) and at the end of the blooming phase

Pooled samples from 2 combs per colony

SPE, GC-ECD, LoQ Azoxystrobin 0.015 mg/kg, Fluvalinate 0.1 mg/kg
Maximum pesticide levels (µg/kg) detected in the honey stomachs of returning foragers

Field trial - collected nectar

Field trial, 15 ha oilseed rape, 2 farms,
Sampling before and up to 4 days after the application
150 -350 prepared bees per series, pooled samples,
SPE, GC-ECD, LoQ 3 µg/kg
## Oilseed rape - tent trial 2011

**Residues (µg/kg) in honey**

<table>
<thead>
<tr>
<th></th>
<th>Fluvalinate</th>
<th>Azoxystrobin</th>
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</thead>
<tbody>
<tr>
<td>colony 1</td>
<td>&lt; 3</td>
<td>9,2</td>
</tr>
<tr>
<td>colony 2</td>
<td>11,3</td>
<td>27,8</td>
</tr>
<tr>
<td>colony 3</td>
<td>16,6</td>
<td>39,9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Fluvalinate</th>
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<tbody>
<tr>
<td></td>
<td>n.d.</td>
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<td></td>
<td>n.d.</td>
<td>n.d.</td>
</tr>
</tbody>
</table>

Bayer CropScience experimental station “Höfchen”

3 tents for each application type, 1 colony per tent

Sampling at the end of the blooming phase

SPE, GC-ECD, LoQ 3 µg/kg

MRL Azoxystrobin: 10 µg/kg
Current knowledge

Optimised Dropleg technology
- no plant damage in oilseed rape
- favourable distribution of the pesticides below the flower level
- very low driftage risk
- Nectar: significant lower residue levels
- Honey: no or low detectable residues
- Pollen: low residue levels
- Bee bread: no or low residue levels
Perspectives

• reduced pesticide confrontation to flower visiting insects
• less residues in the collected goods
• improved bee product quality
• “No” conflict between agriculture and apiculture
Optimised Application (7km/h)
Thanks to…

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