Progress in pest management in organic strawberry production

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InsectTrap (2016): Testing insect funnel traps baited with a mixture of an attractive plant volatile and pheromones for the strawberry blossom weevil (*Anthonomus rubi*) in a mass trapping study.

- 0.5 L water with soap in the bucket to kill the insects
- Funnel leading into the bucket
- A mesh on the top of the funnel to prevent bi catches of other species
Test field:
- Conventional two year old strawberry field (type Korona)
- Insect damage observed previous year
- Surrounded by other strawberry fields
- Both test field and control field were treated with insecticides

- 200 insect traps, 20 rows each 10 traps
- 4 m between each trap
- All traps checked every four weeks
- Six test and six control points of 1 m
- Volatile baits changed once during the season
<table>
<thead>
<tr>
<th>Week 25</th>
<th>Blossom/green berries</th>
<th>Healthy buds</th>
<th>Cut buds</th>
<th>Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1</td>
<td>208</td>
<td>200</td>
<td>50</td>
<td>10,9%</td>
</tr>
<tr>
<td>Test 2</td>
<td>246</td>
<td>168</td>
<td>54</td>
<td>11,5%</td>
</tr>
<tr>
<td>Test 3</td>
<td>298</td>
<td>252</td>
<td>223</td>
<td>28,9%</td>
</tr>
<tr>
<td>Test 4</td>
<td>318</td>
<td>464</td>
<td>75</td>
<td>08,8%</td>
</tr>
<tr>
<td>Test 5</td>
<td>280</td>
<td>205</td>
<td>97</td>
<td>16,7%</td>
</tr>
<tr>
<td>Test 6</td>
<td>155</td>
<td>185</td>
<td>77</td>
<td>18,5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1505</strong></td>
<td><strong>1474</strong></td>
<td><strong>576</strong></td>
<td><strong>16,2%</strong></td>
</tr>
</tbody>
</table>

| Control 1  | 192                   | 128          | 61       | 16,0%  |
| Control 2  | 251                   | 181          | 42       | 08,9%  |
| Control 3  | 322                   | 287          | 116      | 16,0%  |
| Control 4  | 258                   | 349          | 207      | 25,4%  |
| Control 5  | 245                   | 135          | 50       | 11,6%  |
| Control 6  | 190                   | 65           | 42       | 14,1%  |
| **Total**  | **1458**              | **1145**     | **518**  | **16,6%** |
Discussion

• In the treated area no reduced pest damage or increased strawberry yields (not shown) were recorded.

• Although high catch rate of the new generation of the weevils, only 159 weevils were caught during the first four weeks. This was too few weevils compared to the whole population to reduce the pest damage.

• Ineffective traps or/and volatile bait?

Conclusion

• In this two year old strawberry field, infested by strawberry blossom weevils, it was not possible to reduce pest damage using insect funnel traps baited with plant volatile and pheromones.
2017

**FenceTrap** - Combined use of insect fencing and trapping to manage the strawberry blossom weevil

**O₃Berries** – Use of ozone (O₃) dissolved in water for treatment of strawberry plants to manage fungi infected diseases as Botrytis
FenceTrap

230 cm

Mesh 0.8 x 0.8 mm²
Gates for tractors and strawberry pickers

Overhang on the outside to prevent insects to crawl over the fence
Insect traps on both inside and outside of the fence
The whole field 0.42 ha

The field ready to be planted

36 m

116 m
The field surrounded by cereals.
Other strawberry fields near by.

If successful, the fence will be maintained for three years.

The field surrounded by cereals. Other strawberry fields near by.
Botrytis infested strawberries
Ozone dissolved in water for fungi pest control

- Used in vineyards at some places in USA and New Zealand. Also tested in Europa.
- Good results on mildew and botrytis compared to fungicides and control.
- Effect of ozone in post-harvest products well documented (in USA approved for use in food processing and storages)
- In Europa ozone frequently used in disinfection of water, at dairies, slaughterers, fish farms, health care centres, restaurants ....
- Lack of research on the effect of this treatment in the field.
Why OZONE?

- Ozone is generated on-site at low concentrations and pressures, and then immediately used in the treatment process. Hence, there are no concerns about safe storage and handling.
- Ozone dissolved in water has a short life span (halftime 20-30 min.) so any accidental release of ozone is not harmful.
- The ozone molecule (O₃) breaks down into stable oxygen (O₂), thus NO residues are left behind.
- Because of ozone’s effective mechanism, pests cannot develop resistance to ozone.
- Ozone is not a carcinogen and dissolved in water not harmful for human health

From: Rumela Bhadra  
Resource July 2015
Ozone in the vinyard, New Zealand

From:
Tessa Nicholson
NZ Wingrower Feb/Mar 2016
Aim of pre-test:
• To see if water with ozone has negative effect on strawberry plant performance

Treatment:
• Water
• Water with 5 ppm ozone
• Water with 10 ppm ozone
31. March 2017
Right after first treatment

5. April 2017
Just before second treatment
7. April 2017
Seven days after first treatment and two days after second treatment
Strawberry field with double rows. First treatment in June. Thereafter, treatments every week throughout the season.
Partners

- NORSØK Norwegian Centre for Organic Agriculture
- NLR Norwegain Agriculture Extention Service
- REDOX AS
- Arne Moxness (host for field trials)