Towards a system of non-chemical flower *Thrips* control in strawberry production

Gijs van Kruistum, Applied Plant Research Wageningen UR

Seminar WG2, Bioforsk Stjoerdal Norway, Sept. 24, 2013
Current practice in flower *Thrips* control NL

- Zero tolerance

- Application pyrethroid deltamethrin (Decis) during blossoming

- Up to 3 sprayings a week; from 2013 limitation in # sprayings

- Negative effect on natural enemies

- Developing biological alternatives highly recommended
Thrips control

World wide many harmfull thrips species

- In leek and cabbage only 1 species: *Thrips tabaci*
- In strawberry also other species:
  - *Frankliniella intonsa*
  - *F. occidentalis*
  - *Thrips fuscipennis*
  - *T. major*
Thrips species in strawberry
Thrips attack in cage trial on 29 june 2009

Assessment of thrips attack:

- 0 = none
- 1 = very low
- 2 = moderate
- 3 = heavy

- *F. intonsa*: 2,3 bc
- *F. occidentalis*: 2,5 c
- *T. fuscipennis*: 1,5 bc
- *T. major*: 1,4 ab
- *T. tabaci*: 0,4 a
Field experiments 2011, 2012 & 2013

- 3-4 planting dates: April 10 to July 6, cv. Elsanta
- Spraying deltamethrin according practice
- Applying predatory mites or *Orius* bugs before first blossoming
- Mulching with white plastic film
- Lure & retain natural enemies with catch plant Alyssum and attractant
Observations

- Monitoring thrips by blue sticky traps and attractant Lurem
- Counting and determination thrips in flowers
- Classify thrips damage in white fruit stage
- Detection and determination natural enemies
**Thrips spp. on sticky traps**

**Location Vredepeel 2011**

- **Aeolothrips intermedius**
- **Chirothrips manicatus**
- **Frankliniella intonsa**
- **Thrips tabaci**
- **Thrips fuscipennis**
- **Thrips major**

### Graph Details:

- **Y-axis:** % thrips on sticky trap
- **X-axis:** Week number
- **Legend:**
  - Blue: **Aeolothrips intermedius**
  - Red: **Chirothrips manicatus**
  - Green: **Frankliniella intonsa**
  - Orange: **Thrips tabaci**
  - Red: **Thrips fuscipennis**
  - Blue: **Thrips major**

- **Weeks:** 24, 28, 31, 34
Thrips spp. in flowers

Location Vredepeel 2011

% thrips in flowers (control plots)

week 24 | week 28 | week 31 | week 34

- Aeolothrips intermedius
- Frankliniella intonsa
- Thrips tabaci
- Thrips fuscipennis
- Thrips major

WAGENINGEN UR
For quality of life
Thrips spp. in flowers

Location HEERLE 2010

Percentage thrips

Weeknr.

Frankliniella intonsa
Thrips tabaci
Thrips fuscipennis
Thrips major
Classification *Thrips* attack white fruits planting 1 on 25 July 2011

<table>
<thead>
<tr>
<th>Object</th>
<th>% none</th>
<th>% moderate</th>
<th>% not marketable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td>33</td>
<td>36</td>
<td>31</td>
</tr>
<tr>
<td>Deltamethrin</td>
<td>83</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td><em>N. alpinus</em></td>
<td>37</td>
<td>26</td>
<td>37</td>
</tr>
<tr>
<td><em>N. reductus</em></td>
<td>36</td>
<td>30</td>
<td>34</td>
</tr>
</tbody>
</table>
Classification *Thrips* attack white fruits planting 3 on 22 August 2011

<table>
<thead>
<tr>
<th>Object</th>
<th>% none</th>
<th>% moderate</th>
<th>% not marketable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td>68</td>
<td>26</td>
<td>6</td>
</tr>
<tr>
<td>Deltamethrin</td>
<td>76</td>
<td>17</td>
<td>7</td>
</tr>
<tr>
<td><em>N. alpinus</em></td>
<td>66</td>
<td>24</td>
<td>10</td>
</tr>
<tr>
<td><em>N. reductus</em></td>
<td>75</td>
<td>21</td>
<td>4</td>
</tr>
</tbody>
</table>
Classification *Thrips* attack white fruits planting 3 on 14 August 2012

<table>
<thead>
<tr>
<th>Object</th>
<th>% none</th>
<th>% moderate</th>
<th>% not marketable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td>78</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td>Deltamethrin</td>
<td>98</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td><em>Orius sp.</em></td>
<td>95</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Mulching</td>
<td>94</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>
Effect of mulching on # thrips larvae in 20 flowers

<table>
<thead>
<tr>
<th>Date (2012)</th>
<th>Plantation</th>
<th># larvae Mulch</th>
<th># larvae Untreated</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 12</td>
<td>1</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>July 31</td>
<td>2</td>
<td>35</td>
<td>107</td>
</tr>
<tr>
<td>August 6</td>
<td>3</td>
<td>120</td>
<td>206</td>
</tr>
</tbody>
</table>
Detection and determination of natural enemies

- From plantation 2 or 3 *Orius majusculus* and *O. niger* are abundant in the flowers. Also *Orius* nymphs are detected.
- After applying, the predatory mite *Neoseiulus reductus* was retrieved on strawberry leaves.
- The *thrips* predatory fly *Platypalpus sp.* was detected during 2011.

Photo: Anton van der Linden
Discussion & conclusions

- Only at the first plantation an effective thrips control by Deltamethrin was realized compared to biological control: It needs time to establish natural enemies.

- Later in the season from plantation 2 or 3 fully biological control could be realized at presence of natural enemies: *Orius sp.*, predatory mites and predatory flies.

- Mulching with plastic film is also a possibility to reduce significantly the number of thrips larvae and damage.

- Development of effective monitoring methods, lure and retain predatory bugs and other natural enemies can sharply reduce the use of chemicals against thrips.
Future outlook

- Further development of application methods predatory bugs, mites or flies
- Improvement of systems for ‘lure & retain’ *Orius spp.*
- Construct and design of alternative cultivation systems with mulching in combination with natural enemies
Gratitude to the project team

- Hilfred Huiting, Applied Plant Research
- Anton van der Linden, Wageningen UR Greenhouse Horticulture
- Willem Jan de Kogel, Gerrie Wiegers, Eefje den Belder, Bert Meurs & Willem de Visser, Plant Research International
Thanks for your attention

- Research funded by:
  - EUBerry
  - Ministry of Economic Affairs
  - Productschap Tuinbouw