Investigating how aphid genetic diversity and endosymbionts impact plant virus epidemiology
OVERVIEW:

Aphid

Bacterial Endosymbiont(s)

BYDV Transmission

Aphids

- Myzus persicae
- Rhopalosiphum padi
- Sitobion avenae

Bacterial Endosymbionts

- Buchnera aphidicola
- Regiella insecticola
- Hamiltonella defensa
- Serratia symbiotica
- Rickettsia sp.
- Rickettsiella sp.
- Spiroplasma sp.

Barley Yellow Dwarf Virus

PAV

MAV
**SAMPLING:**

16 Suction Trap Sites run by the Rothamsted Insect Survey.

<table>
<thead>
<tr>
<th>Abbrev.</th>
<th>Location</th>
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<tbody>
<tr>
<td>Ay</td>
<td>Ayrshire</td>
</tr>
<tr>
<td>BB</td>
<td>Broom's Barn</td>
</tr>
<tr>
<td>D</td>
<td>Dundee</td>
</tr>
<tr>
<td>EM</td>
<td>East Malling</td>
</tr>
<tr>
<td>G</td>
<td>Gogarbank</td>
</tr>
<tr>
<td>H</td>
<td>Hereford</td>
</tr>
<tr>
<td>Iv</td>
<td>Inverness</td>
</tr>
<tr>
<td>K</td>
<td>Kirton</td>
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<td>N</td>
<td>Newcastle</td>
</tr>
<tr>
<td>P</td>
<td>Preston</td>
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<tr>
<td>RT</td>
<td>Rothamsted</td>
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<tr>
<td>SP</td>
<td>Silwood Park</td>
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<tr>
<td>SX</td>
<td>Starcross</td>
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<tr>
<td>We</td>
<td>Wellesbourne</td>
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<tr>
<td>Wr</td>
<td>Writtle</td>
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<tr>
<td>Y</td>
<td>York</td>
</tr>
</tbody>
</table>

**Abbreviations:**
- Ay: Ayrshire
- BB: Broom's Barn
- D: Dundee
- EM: East Malling
- G: Gogarbank
- H: Hereford
- Iv: Inverness
- K: Kirton
- N: Newcastle
- P: Preston
- RT: Rothamsted
- SP: Silwood Park
- SX: Starcross
- We: Wellesbourne
- Wr: Writtle
- Y: York

**Sample Acquisition:**
Collected from Rothamsted Research
~100 Aphids per site:
- M. persicae
- R. padi
- S. avenae

**16 Suction Trap Sites run by the Rothamsted Insect Survey.**

**Aphid Genotyping**
- Rhopalosiphum padi
- Buchnera aphidicola
- Regiella insecticola
- Serratia symbiotica
- Spiroplasma sp.
- MAV
- PAV

**Endosymbiont PCR**
- Rhopalosiphum padi
- Buchnera aphidicola
- Hamiltonella defensa
- Rickettsia sp.

**BYDV Reverse Transcriptase PCR**

**Map of UK showing sampling sites and Aphid distribution.**

**Wheat as percentage of total farmed area excluding rough grazing:**
- over 25%
- 10% to 25%
- 5% to 10%
- 2% to 5%
- less than 2%

**Land over 1000' built up areas**

**Legend:**
- Rothamsted Research
- Map of UK showing sampling sites and Aphid distribution.
Figure out what’s out there…

… and see how it changes with time…

… to begin to understand how this system works.
ANY QUESTIONS?
Thanks for your time!

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A diversity of endosymbionts across Australian aphids and their persistence in aphid cultures

Qiong Yang1 | Alex Gill1 | Katie L. Robinson1 | Paul A. Umina1,2 | Perran A. Ross1 | Dongwu Zhan1 | Courtney Brown1 | Nicholas Bell1 | Ashley MacMahon1 | Ary A. Hoffmann1
Barley Yellow Dwarf Virus Influences Its Vector’s Endosymbionts but Not Its Thermotolerance

Evatt Chirgwin 1,*,†, Qiong Yang 2,*,†, Paul A. Umina 1,*, Joshua A. Thia 2, Alex Gill 2, Wei Song 3, Xinyue Gu 2, Perran A. Ross 2,†, Shu-Jun Wei 3,† and Ary A. Hoffmann 2,†

Roles of Bacterial Symbionts in Transmission of Plant Virus by Hemipteran Vectors

Wei Wu, Hong-Wei Shan, Jun-Min Li, Chuan-Xi Zhang, Jian-Ping Chen* and Qianzhuo Mao*

Interactions between a luteovirus and the GroEL chaperonin protein of the symbiotic bacterium *Buchnera aphidicola* of aphids

Sophie Bouvaine, 1,2 Neil Boonham 3 and Angela E. Douglas 1,2

In Vitro Interactions of the Aphid Endosymbiotic SymL Chaperonin with Barley Yellow Dwarf Virus

S. A. Filichkin, S. Brumfield, T. P. Filichkin, and M. J. Young