Aphid Control in Irish Cereals

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Presentation Overview

1) Aphid Resistance

2) Current Control Recommendations
Aphicide resistance and Integrated Management Strategies

**Sitobion avenae** (Grain Aphid)

- Important pest of cereal crops
- Reduces grain yield (Directly & Indirectly)
- Transmits BYDV (MAV)
- Traditionally well controlled with Pyrethroids
- What has changed?
The emergence of ‘Knock down resistance’ in the UK

Sodium channel mutations implicated in pyrethroid resistance

2011 *Sitobion avenae* sample contained kdr mutation, L1014F

S. Foster (2014)
‘Knock down resistance’ in Grain Aphids: Current knowledge

- Knock-down mechanism (kdr) confers pyrethroid resistance
- Reports of pyrethroid spray failures in 2011
- High frequency (>50%) of kdr in parts of the UK but only as heterozygotes (SRs)
Frequency of kdr-SR *Sitobion avenae* in three suction traps (2009-2013)

<table>
<thead>
<tr>
<th>Suction Trap Sites</th>
<th>Broom's Barn</th>
<th>Kirton</th>
<th>Rothamsted</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2010</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2011</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2012</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2013</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*No data for 2009 and 2010 at Rothamsted*

Foster (2014)
National Tillage Conference

The Irish Agriculture and Food Development Authority
‘Knock down resistance’ in Grain Aphids: Current Knowledge

- Knock-down mechanism (kdr) confers pyrethroid resistance
- Reports of pyrethroid spray failures in 2011
- High frequency (>50%) of kdr in parts of the UK but only as heterozygotes (SRs)
- Single kdr mutation identified in grain aphid - implications for BYDV control?
How does kdr affect aphid control?

Foster (2014) National Tillage Conference
‘Knock down resistance’ in Grain Aphids: Current Knowledge

- Knock-down mechanism (kdr) confers pyrethroid resistance
- Reports of pyrethroid spray failures in 2011
- High frequency (>50%) of kdr in parts of the UK but only as heterozygotes (SRs)
- Single kdr mutation identified in grain aphid - implications for BYDV control?
- To date, no kdr-RR has been identified (Super kdr)
- So far, kdr-RS only found in a single S. avenae clone (SA3)
Knock Down Resistance

Malloch et al., 2014
HGCA Report R480
Current Irish situation
Current Irish situation

2013:

- Teagasc Sampled 7 sites in East Cork
- Sites in Kilkenny & Tipperary were also sampled
- A single aphid from Cork tested positive for kdr gene
Current Irish situation

2014:
- Reported control problems at a site in Tipperary
- KDR gene frequency 90%+
Sites sampled for kdr-RS aphids - EPIC

EPIC 14/s/879

- Investigate the impact of KDR of practice

- Celbridge
- Carlow
- Athy
- Balylinan
- Clonmel
- Ardmore
- Middleton
- Carragaline

- BYDV / KDR Study
- Middleton
- Sites selected for BYDV
If you suspect a control failure?

(1) Identify the make up of your aphid population?
Aphid Identification

Step 1:
- Does the Aphid have long black Siphunculi?
  - Yes  Grain Aphid (*Sitobion avenae*) or Blackberry-Cereal Aphid (*S. fragariae*)
  - No (Go to Step 2)

Step 2:
Is the Aphid green with pale or clear coloured Siphunculi?
- Yes  Rose-Grain Aphid (*M. dirhodum*) or Wheat Aphid / Greenbug (*S. graminum*)
- No (Go to Step 3)

Step 3:
Is the Aphid brownish to olive green and round in shape (ovate) with short Siphunculi?
- Yes  Bird Cherry-Oat Aphid (*Rhopalosiphum padi*)
If you suspect a control failure?

(1) Identify the make up of your aphid population?

(2) Contact Advisor / Alternate ‘Mode of Action’

(3) Consider seed treatment for the following crop
Presentation Overview

1) Aphid Resistance

2) Current Control Recommendations
Nationally Winter Barley area is increasing. Area has increased by over 40,000 hectares in the period 2011 – 2015.

Reasons are:

- Higher margins compared to Spring crops
- Improvements in varieties, pesticides and general agronomy.
- Legislation, greening requirements i.e. two and three crop rule.

Increased area means more pressure at sowing time and this combined with other variables has led to higher incidence of BYDV.
BYDV CONTROL WINTER CROPS
Barley yellow dwarf virus is spread by aphids

RISK FACTORS

- Early Drilling Date
- Geographical Location (Coastal areas at higher risk)
- Mild autumns & Mild winters (Aphids migration period increased & overwintering risk)
EAST CORK OBSERVATIONS 2015

Autumn 2014  Mild Autumn/Winter led to higher levels of BYDV.

April 2015  Symptoms very evident
Sampled sites across the region. There was good variation in work practices i.e.
- Early vs late sown
- Seed treatment vs no seed treatment
- 1 spray vs 2 sprays

Harvest 2015  All sites bar one late sown site suffered some yield reduction.
Highest was on a continuous Winter Barley site sown in September.
### 2015 Winter Barley BYDV Cork Case Study

<table>
<thead>
<tr>
<th>Farm</th>
<th>Background of Site</th>
<th>Estimated Yield Reduction from BYDV</th>
<th>BYDV Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Early Sown (24&lt;sup&gt;th&lt;/sup&gt; Sept) on continuous sheltered site after Winter Barley with no seed treatment</td>
<td>3.0 T/Ha.</td>
<td>Very Evident</td>
</tr>
<tr>
<td>2</td>
<td>5&lt;sup&gt;th&lt;/sup&gt; October sown with one Aphicide</td>
<td>1.25 T/Ha</td>
<td>Very Evident</td>
</tr>
<tr>
<td>3</td>
<td>5&lt;sup&gt;th&lt;/sup&gt; October sown hybrid with seed treatment, one follow up Aphicide treatment in December (seeding rate 110kgs/ha)</td>
<td>0.6 T/Ha.</td>
<td>(Yield reduction not as big as farmer expected) Very Evident</td>
</tr>
<tr>
<td>4</td>
<td>25&lt;sup&gt;th&lt;/sup&gt; October sown site with one Aphicide</td>
<td>No Yield Reduction Above average yields</td>
<td>No Symptoms</td>
</tr>
</tbody>
</table>
Recommendations - Winter Cereals

Early Sown

- Seed treatment is needed due to potential loss, and this needs to be followed up with at least one well timed aphicide.

Late Sown

- Strongly consider seed treatment. May not need a follow up spray
- If no seed treatment, spray once with a contact aphicide in November.

Note: If Pyrethroid fails - consider Chlopyrifos
Thank You