Fungicide Performance Results (2015)
Note: These slides contain curves up to 100% label dose.

Therefore, curves are different to those which are shown at the AHDB Cereals & Oilseeds Agronomists’ Conference (8 December 2015), which showed results up to 200% label dose, but the data used to produce the curves is the same.

**Wheat:** Start Slide = 3

**Barley:** Start Slide = 29

**Oilseed rape:** Start Slide 44
Using fungicides effectively in wheat

Results of AHDB Fungicide Performance 2015
Product choice, timings and frequency

...depend on:

• The likely impact of the disease on:
  – Yield
  – Quality
• Varietal resistance and other agronomic effects
• Product efficacy
• Maximising the effective life of active ingredients
  – Sustainable product use
  – Early detection and/or prediction
Wheat – the main causes of yield loss

Data extracted from the AHDB Recommended List trials
# Wheat trials: summary 2015

<table>
<thead>
<tr>
<th>Target Disease</th>
<th>Site (Variety)</th>
<th>Organisation</th>
<th>Disease data</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Septoria tritici</em> (T1 and T2 trials)</td>
<td>Fife, Scotland (Consort)</td>
<td>SRUC</td>
<td><em>Septoria tritici</em></td>
</tr>
<tr>
<td><em>Septoria tritici</em> (T1 and T2 trials)</td>
<td>Sutton Scotney, Hants (KWS Cashel)</td>
<td>NIAB</td>
<td><em>Septoria tritici</em></td>
</tr>
<tr>
<td><em>Septoria tritici</em> (Leaf 2, timing trial)</td>
<td>Rosemaund, Hereford (Consort)</td>
<td>ADAS</td>
<td><em>Septoria tritici</em></td>
</tr>
<tr>
<td><em>Septoria tritici</em> (Leaf 2 trial)</td>
<td>Carlow, Ireland (KWS Lumos)</td>
<td>TEAGASC</td>
<td><em>Septoria tritici</em></td>
</tr>
<tr>
<td>Yellow rust (T1 trial)</td>
<td>Kings Lynn, Norfolk (Oakley)</td>
<td>ADAS</td>
<td>Yellow rust</td>
</tr>
<tr>
<td>Brown rust (T2 trial, inoculated)</td>
<td>Cambridge (Crusoe)</td>
<td>NIAB</td>
<td>Brown rust</td>
</tr>
</tbody>
</table>
# Wheat septoria: trial treatments

<table>
<thead>
<tr>
<th>Product</th>
<th>Active(s)</th>
<th>Full Dose (l/ha)</th>
<th>S Scotney and Fife</th>
<th>Rosemaund</th>
<th>Carlow*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Ignite / Opus Max*</td>
<td>epoxiconazole</td>
<td>1.5</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Proline 275 / 250*</td>
<td>prothioconazole</td>
<td>0.72 / 0.8*</td>
<td>+</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Bravo</td>
<td>chlorothalonil</td>
<td>1.0 l/ha (half dose) only</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Imtrex</td>
<td>fluxapyroxad</td>
<td>2.0</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Vertisan</td>
<td>pentythiopyrad</td>
<td>1.5</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Aviator 235 / 225*</td>
<td>bixafen + prothioconazole</td>
<td>1.25</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Aviator Xpro</td>
<td>epoxiconazole + fluxapyroxad</td>
<td>2.0</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Adexar</td>
<td>epoxiconazole + fluxapyroxad</td>
<td>2.0</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Librax</td>
<td>Fluxapyroxad + metconazole</td>
<td>2.0</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Vertisan + Ignite</td>
<td>pentythiopyrad + epoxiconazole</td>
<td>1.5 + 1.5</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
</tbody>
</table>
Septoria tritici (2015)

- The main cause of yield loss in wheat
- Still not fully controlled on farm in 2015

Defra: Cereal Disease Survey 2015
Use Imtrex and Vertisan only in mixture with at least one fungicide with an alternative mode of action and that has efficacy against the target pathogen.
Use Imtrex and Vertisan only in mixture with at least one fungicide with an alternative mode of action and that has efficacy against the target pathogen.
Use Imtrex and Vertisan only in mixture with at least one fungicide with an alternative mode of action and that has efficacy against the target.
Use Imtrex and Vertisan only in mixture with at least one fungicide with an alternative mode of action and that has efficacy against the target pathogen.
Changes in protectant activity (epoxiconazole)

Solid line = mean response, Dotted lines = highest and lowest responses observed
Changes in protectant activity (prothioconazole)

Solid line = mean response, Dotted lines = highest and lowest responses observed
Changes in eradicant activity (epoxiconazole)

Solid line = mean response, Dotted lines = highest and lowest responses observed
Changes in eradicant activity (prothioconazole)

Solid line = mean response, Dotted lines = highest and lowest responses observed
Fungicide sensitivity monitoring
Rothamsted populations

FRG group
The effect of latent period on % control

% Control Septoria

Latent period (days)

% Control Septoria

Latent period (days)
Preliminary information:
Reduced sensitivity to SDHIs found in septoria

- Isolates detected in Ireland 2015 (Teagasc)
  - Some have C-H152R mutation
  - Insensitivity outside the normal range
  - Cross resistance for SDHIs expected
  - Currently at low frequency in Ireland
  - Fitness unknown

- SDHI stewardship paramount
Septoria control: Maximise use of other methods

- Use different Modes of Actions in programmes
  - Multisites, azoles, (strobilurins)
- Use varietal differences in disease resistance
Septoria control: Minimise use of SDHIs to slow evolution

2010 (3.1 treatments)

- Septoria leaf 2 (%)
  - Leaf 1
  - Leaf 2

Number of fungicide applications


Septoria (%)

0 2 4 6 8 10 12 14 16
Yellow rust (2015)

- 2015 epidemics delayed compared to 2014
- Most susceptible varieties: KWS Kielder, Solstice, Gallant, Cordiale and Horatio
- High levels in AHDB fungicide performance trial

Oakley 27 April 2015 Nr Kings Lynn
Use Imtrex and Vertisan only in mixture with at least one fungicide with an alternative mode of action and that has efficacy against the target pathogen.
Yellow rust (2015) – Yield

Use Imtrex and Vertisan only in mixture with at least one fungicide with an alternative mode of action and that has efficacy against the target pathogen.
Brown rust (2015)

- Epidemics on susceptible varieties at the end of the season in 2015
- Gator, Grafton and Crusoe particularly susceptible
- Inoculated fungicide performance trials in 2015 provided a good test

2016?

Above average winter temperatures may trigger early epidemics
Use Imtrex and Vertisan only in mixture with at least one fungicide with an alternative mode of action and that has efficacy against the target pathogen.
Wheat summary

- Septoria tritici
  - SDHIs are the most active chemistry
  - Librax at least as effective as other SDHI / azoles (only 1 year in trials)
  - Activity of azoles has declined but they still support SDHIs in curative situations
  - Multi-sites add valuable protectant activity to programmes
  - Both azoles and multisite actives are required to protect SDHIs

- Rusts
  - Epoxiconazole highly effective in curative situations
  - Strobilurins more active than SDHIs (esp on yellow rust)
Using fungicides effectively in barley

Results of AHDB Fungicide Performance 2015
Barley – the main causes of yield loss
UK Winter barley – Yield and benefits of disease control

Data extracted from the AHDB Recommended List trials

Average = 1.5 t/ha
# Barley: Trials Summary 2015

<table>
<thead>
<tr>
<th>Target Disease</th>
<th>Site (Variety)</th>
<th>Organisation</th>
<th>Disease data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhynchosporium (Winter Barley)</td>
<td>Lanark, Scotland (Saffron)</td>
<td>SRUC</td>
<td>Rhynchosporium + Mildew</td>
</tr>
<tr>
<td>Rhynchosporium (Winter Barley)</td>
<td>Cardigan, Wales (Saffron)</td>
<td>ADAS</td>
<td>Rhynchosporium</td>
</tr>
<tr>
<td>Rhynchosporium (Winter Barley)</td>
<td>Carlow, Ireland (Saffron)</td>
<td>TEAGASC</td>
<td>Mildew</td>
</tr>
<tr>
<td>Net Blotch (Winter Barley)</td>
<td>High Mowthorpe, N Yorks (Cassata)</td>
<td>ADAS</td>
<td>No disease</td>
</tr>
<tr>
<td>Net Blotch (Winter Barley)</td>
<td>Morley, Norfolk (Cassata)</td>
<td>NIAB</td>
<td>Net blotch</td>
</tr>
<tr>
<td>Powdery mildew (Winter Barley)</td>
<td>Midlothian, Scotland (Cassia)</td>
<td>SRUC</td>
<td>Rhynchosporium</td>
</tr>
<tr>
<td>Ramularia (Spring Barley)</td>
<td>Midlothian, Scotland (Prestige)</td>
<td>SRUC</td>
<td>Ramularia</td>
</tr>
</tbody>
</table>
# Barley Trial: Treatments 2015

<table>
<thead>
<tr>
<th>Product</th>
<th>Active(s)</th>
<th>Full Dose (l/ha)</th>
<th>Rhyncho Trials</th>
<th>Net Blotch Trials</th>
<th>Ramularia Trial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Proline 275/250*</td>
<td>prothioconazole</td>
<td>0.72/0.80</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Comet 200</td>
<td>pyraclostrobin</td>
<td>1.25</td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Kayak</td>
<td>cyprodinil</td>
<td>1.5</td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Imtrex</td>
<td>fluxapyroxad</td>
<td>2.0</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Zulu</td>
<td>isopyrazam</td>
<td>1.0</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Vertisan</td>
<td>pentyhiopyrad</td>
<td>1.5</td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Siltra Xpro</td>
<td>bixafen + prothioconazole</td>
<td>1.0</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Adexar</td>
<td>epoxiconazole + fluxapyroxad</td>
<td>2.0</td>
<td>+</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Bravo 500</td>
<td>chlorothalonil</td>
<td>2.0</td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Treoris</td>
<td>Pentyhiopyrad + Chlorothalinil</td>
<td>2.5</td>
<td></td>
<td></td>
<td>+</td>
</tr>
</tbody>
</table>

* Teagasc trial
Rhynchosporium 2015
Protectant activity

Use Zulu, Imtrex and Vertisan only in mixture with at least one fungicide with an alternative mode of action and that has efficacy against the target pathogen.
Rhynchosporium 2013–15
Protectant activity

Use Zulu, Imtrex and Vertisan only in mixture with at least one fungicide with an alternative mode of action and that has efficacy against the target pathogen.
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Powdery mildew 2013–15

Use Zulu, Vertisan and Imtrex only in mixture with at least one fungicide with an alternative mode of action and that has efficacy against the target pathogen.
Powdery mildew 2011-2014
Mildewicides + Proline

\[
\text{Dose (% of full label dose)} \quad 0\% \quad 25\% \quad 50\% \quad 75\% \quad 100\%
\]

\[
\% \text{ Mildew} \quad 6 \quad 5 \quad 4 \quad 3 \quad 2 \quad 1 \quad 0
\]

- Flexity
- Cyflamid
- Torch
- Talius
- Proline
Barley summary

- Siltra Xpro – good broad spectrum activity
- Adexar/Imtrex or Vertisan + Proline similar on rhyncho and net blotch
- Proline consistent efficacy (as seen previously)

- SDHIs showed good net blotch activity
- Ramularia was controlled by the SDHIs, Proline or Bravo
- Avoid over-reliance on SDHI + azole – other mixtures are available
Using fungicides effectively in Oilseed rape

Results of AHDB Fungicide Performance 2015
Causes of yield loss in oilseed rape
UK oilseed rape – yields and benefits of disease control

Data extracted from the AHDB Recommended List trials
Phoma: canker index and yield (average across 8 sites 2011–14)

Average LSD between products/rates 6.3 (canker), 0.20 t/ha (yield)

*Orius 20EW based on two years of data only
Phoma: canker index 2015 (curative situation)
Light leaf spot: severity and yield (5 sites 2014–15)

Note: label restrictions for Refinzar and Pictor
Sclerotinia: disease and yield (Kent and Herefordshire 2006–08)

![Graph showing the relationship between Sclerotinia Index and Dose, and Seed yield and Dose for different fungicides.]

- Filan
- Folicur
- Compass
- Pictor
- Priori Xtra
- Proline
- Amistar

Dose (% of full label rate) vs. Sclerotinia Index (0-100)

Dose (% of full label rate) vs. Seed yield (t/ha)
Sclerotinia: disease and yield 2015 (one site)

Sclerotinia incidence = 19%
OSR summary

- Phoma control can generally be achieved using half rates in a two spray programme
- Treatment timing is key for good light leaf spot control – monitor on field-by-field basis
- Spray timing critical for sclerotinia control – benefits from using higher doses
- Non-azole options available for phoma and light leaf spot control – note restrictions
- More information available on AHDB website
Developments for 2016

Year 1 of 3 for a new project
  – (part-funded by AHDB)

Combines agronomy, variety and chemistry to maintain control of septoria tritici in wheat
  – Variety
  – Sowing date
  – Seed rate
  – Fungicide programmes
Thank you

Acknowledgements