Fungicide Performance in Wheat 2011 - 2012
New fungicide approved

**Adexar**
62.5g/l fluxapyroxad (Xemium) + 62.5g/l epoxiconazole
Approved for use in wheat, barley, oats, rye and triticale.

**Adexar** has been tested in HGCA wheat and barley trials since 2009.

Full label rate of 2.0l/ha

**Succinate Dehydrogenase Inhibitors (SDHI’s)**
- isopyrazam, bixafen and fluxapyroxad are a new generation of SDHIs.
A new mode of action for foliar disease control

Succinate Dehydrogenase Inhibitors (SDHI’s)
- Single site mode of action.
- Rated moderate to high risk of resistance by FRAC.
- Should only be used in mixtures with active partners such as azoles.

<table>
<thead>
<tr>
<th>Active</th>
<th>mixed with:</th>
<th>Product name</th>
<th>Registered</th>
</tr>
</thead>
<tbody>
<tr>
<td>boscalid</td>
<td>epoxiconazole</td>
<td>Tracker, Enterprise</td>
<td>2003</td>
</tr>
<tr>
<td>bixafen</td>
<td>prothioconazole</td>
<td>Aviator (Xpro range)</td>
<td>2010</td>
</tr>
<tr>
<td>isopyrazam</td>
<td>epoxiconazole</td>
<td>Seguris</td>
<td>Feb 2011</td>
</tr>
<tr>
<td>fluxapyroxad</td>
<td>epoxiconazole</td>
<td>Adexar</td>
<td>Oct 2011</td>
</tr>
<tr>
<td></td>
<td>Site Name</td>
<td>Disease Name</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>------------------------------</td>
<td>-------------------------------</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>ADAS (Rosemaund)</td>
<td><em>Septoria tritici</em> (5 spray timings)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>NIABTAG (Andover)</td>
<td><em>Septoria tritici</em> (double trial)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>SAC (Fife)</td>
<td><em>Septoria tritici</em> (double trial)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>ADAS (Terrington)</td>
<td>Yellow rust</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>NIABTAG (Cambridge)</td>
<td>Brown rust</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>SAC (Fife)</td>
<td>Mildew</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Teagasc (Carlow)</td>
<td><em>Septoria tritici</em></td>
<td></td>
</tr>
</tbody>
</table>
HGCA Fungicide Performance - *Septoria tritici*

A severe test of product efficacy
- Single application (at either T1 or T2)
- High risk sites.
- Disease susceptible varieties
- 4 application rates (0.25, 0.5, 1.0 and 2.0 x full label rate)

Each leaf layer was assessed and categorised as
- Eradicant,
- Protectant,

Septoria data is the mean of 4 sites (6 trials)
## Dose rate response data from 2011

<table>
<thead>
<tr>
<th>Location</th>
<th>Application timing (dose rate)</th>
<th>S. tritici Eradicant</th>
<th>S. tritici Protectant</th>
<th>Yellow Rust</th>
<th>Brown Rust</th>
<th>Powdery Mildew</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rosemaund</td>
<td>GS 39</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Andover T1</td>
<td>22 Apr – GS32</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Andover T2</td>
<td>13 May – GS39</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fife T1</td>
<td>25 May – GS36-39</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fife T2</td>
<td>30 May – GS39</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teagasc</td>
<td>6 May – GS32</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terrington</td>
<td>GS 39</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fife (mildew)</td>
<td>GS 32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cambridge</td>
<td>GS39</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Eradicant data 2011 - Over trials analysis n=5 (Aviator Xpro 225 and 235 combined)

% S. tritici vs Dose (proportion of label rate) for various products:
- Opus
- Brutus
- Proline
- Ignite
- Adexar
- Seguris
- IZM*
- Aviator Xpro

*Only available in mixtures
Protectant data 2011 - Over trials analysis (n=5)

*Only available in mixtures*
Eradicant data 2009-2011 - Over seasons analysis (n=13)

- Opus
- Brutus
- Proline

- Opus
- Adexar
- Seguris
- IZM*
- Aviator Xpro

*Only available in mixtures
Protectant data 2009-2011 - Over seasons analysis (n=17)

Dose (proportion of label rate) vs % S. tritici for different protectant products:
- Opus
- Brutus
- Proline
- Adexar
- Seguris
- IZM*
- Aviator Xpro

*Only available in mixtures
Yield data 2011 - Over trials analysis (n=6)

![Graph showing yield data for different crops and doses](image)

- **Opus**
- **Brutus**
- **Proline**
- **Ignite**
- **Aviator Xpro**
- **Adexar**
- **Seguris**
- **IZM**

*Only available in mixtures*
Yield data 2009-2011 - Over trials analysis (n=17)  
(Aviator Xpro 225 and 235 combined)

*Only available in mixtures*
Yields 2011 - Septoria sites
T1 and T2 applications - 0.5 rate (n=3)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yield (tonnes/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td>6</td>
</tr>
<tr>
<td>Bravo 1.0</td>
<td>6.5</td>
</tr>
<tr>
<td>Opus 0.5</td>
<td>7.0</td>
</tr>
<tr>
<td>Ignite 0.75</td>
<td>7.5</td>
</tr>
<tr>
<td>Proline 0.36**</td>
<td>8.0</td>
</tr>
<tr>
<td>Brutus 1.5</td>
<td>8.5</td>
</tr>
<tr>
<td>IZM* 0.5</td>
<td>9.0</td>
</tr>
<tr>
<td>Seguris 0.5</td>
<td>9.5</td>
</tr>
<tr>
<td>Aviator Xpro 0.625</td>
<td>10.0</td>
</tr>
<tr>
<td>Adexar 1.0</td>
<td></td>
</tr>
</tbody>
</table>

Error bars represent LSD’s @ 5%

Application rates in l/ha

*Only available in mixtures
** Proline275 @ 0.36 l/ha or Proline @ 0.4 l/ha
Late season control - SDHI / azole mixtures stood out
Herefordshire - 2 July 7 weeks after GS39 application

<table>
<thead>
<tr>
<th>Untreated</th>
<th>Ignite 1.5</th>
<th>Adexar 2.0</th>
</tr>
</thead>
</table>

HGCA
Differences between SDHI / azoles were smaller

Herefordshire - 2 July 7 weeks after GS39 application

Aviator Xpro 1.25  Seguris 1.0  Adexar 2.0
Yellow rust

Last season
- cold winter checked disease,
- significant epidemic still occurred

Optimal conditions 16 degrees C.
  Foci in some crops this autumn

Susceptible varieties include:
  Gallant,   Solstice,
  Ketchum,   Torch,
  Santiago,  Duxford,
  Oakley,    Robigus,
Yellow Rust – Terrington 2011

- Comet
- Brutus
- Proline275
- Ignite

Adexar
Seguris
Ignite
IZM*
Aviator Xpro

*Dose (proportion of full label rate)
% Yellow rust

Dose (proportion of full label rate)
% Yellow rust

*Only available in mixtures
Yellow Rust – yield (t/ha) – Terrington 2011

Dose (proportion of full label rate)
Yield t/ha

Comet 
Brutus 
Proline 
Ignite

Adexar
Seguris
Ignite
IZM*
Aviator Xpro

*Only available in mixtures
Yellow Rust – Terrington 2011

% Y. rust

Yield (tonnes/ha)

Application rates in l/ha

Untreated
Brutus 1.5
Comet 0.625
Adexar 1.0
Seguris 0.5
Proline 0.36
Ignite 0.75
IZM* 0.5
Aviator Xpro 0.625

*Only available in mixtures
Brown rust 2012 – high risk season?

2007/08 - Last a major outbreak due to mild winter / spring

2011 - Already present in some crops
   Oct – 2 degrees above average
   Nov – 2 – 2.5 degrees above average

Over 45% of RL varieties are susceptible (rated 5 or less) including:

- Cordiale
- Grafton
- JB Diego
- Gallant
- Alchemy
- Panorama
- Solstice
- Duxford
- Santiago
- Beluga
- Denman
- Einstein
Brown rust 2009 - application at leaf 1 emerged

% Brown rust

Dose (proportion of full label rate)

*Only available in mixtures
SDHI’s may add to powdery mildew control 2009
Half label rates at T1 and T2 timings

% Mildew

Application rates in l/ha

*Only available in mixtures
Field performance of azoles over time - protectant situations at 0.25 of label rates

Significance $P=0.006$

$R^2 = 0.252$

% control of S. tritici

- **Proline**
- **Opus**
Field performance of azoles over time - protectant situations at 0.5 of label rates

% control of S. tritici

Significance $P=0.005$

$R^2 = 0.261$
Field performance of azoles over time - protectant situations at 1.0 of label rates

% control of S. tritici

- Proline
- Opus

Significance $P=0.055$

$R^2 = 0.114$
Conclusions on wheat

2011 Season
Good Septoria tritici eradicant and protectant activity
Some additional yellow rust data

Over 3 seasons
All SDHI’s tested added good S. tritici protectant activity to their azoles partners.
Adexar and Aviator Xpro showed excellent curative activity, compared to theirazole partners alone.
New SDHI / azole mixtures all contribute to the control of yellow and brown rust

Since 1995
Field performance of azoles has gradually slipped
Level of control achieved by 0.5 dose of azole in 2001, would require ~ 1.0 dose of azole in 2011.
Fungicide Performance in barley 2011 - 2012
## Dose response data from 2011

<table>
<thead>
<tr>
<th>HGCA FUNDED</th>
<th>Rhyncho</th>
<th>Net blotch</th>
<th>Brown rust</th>
<th>P. mildew</th>
<th>Ramularia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lanark</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Midlothian</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Malton, N. Yorkshire</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bleddfa, Powys</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morley, Norfolk</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caythorpe, Lincs</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Midlothian</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

| TEAGASC FUNDED       |         |            |            |           |           |
| Carlow, Ireland      | ✓       |            |            |           |           |
# Barley treatments 2011

<table>
<thead>
<tr>
<th>Product</th>
<th>Active substances</th>
<th>Rhyncho</th>
<th>Mildew</th>
<th>Brown Rust</th>
<th>Ramularia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proline</td>
<td>prothioconazole</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Comet</td>
<td>pyraclostrobin</td>
<td>✓</td>
<td>X</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Ignite</td>
<td>epoxiconazole</td>
<td>✓</td>
<td>X</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Bontima</td>
<td>IZM + cyprodinil</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>IZM*</td>
<td>isopyrazam</td>
<td>✓</td>
<td>X</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Siltra</td>
<td>bixafen + prothio</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Adexar</td>
<td>epoxi + fluxapyroxad</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Flexity</td>
<td>metrafenone</td>
<td>X</td>
<td>✓</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Talius</td>
<td>proquinazid</td>
<td>X</td>
<td>✓</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Torch Extra</td>
<td>spiroxamine</td>
<td>X</td>
<td>✓</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Cyflamid</td>
<td>cyflufenamid</td>
<td>X</td>
<td>✓</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
Barley 2011
Rhyncho eradicant (n=3)
Barley 2011
Rhyncho protectant (n=2)

% Rhynchosporium vs. Dose (proportion of full label rate)

- Comet
- Proline
- Ignite
- Adexar
- Bontima
- Proline
- Siltra Xpro
Barley 2009-2011
Rhyncho eradicant (n=7)

Dose (proportion of full label rate)
% Rhynchosporium

Comet
Fandango*
Proline
Ignite

Adexar
Bontima
Proline
Siltra Xpro

(* 2009-10 only)
Barley 2009-2011
Rhyncho protectant (n=6)

(* 2009-10 only)
Rhynchosporium trial yields 2009-2011

(* 2009-10 only)
Barley 2009-11
Net Blotch eradicant

![Graph showing the effectiveness of different products against net blotch]

- Comet
- Adexar
- Bontima
- Proline
- Siltra Xpro

Dose (proportion of full label rate)
% Net blotch
Barley 2011
Mildew protectant

Dose (proportion of full label rate)
% Mildew
Cyflamid
Proline
Torch
Talius
Adexar
Bontima
Proline
Siltra Xpro
Barley 2009-11
Mildew eradicant

Dose (proportion of full label rate)
% Mildew
Ignite
Adexar
Bontima
Proline
Siltra Xpro
Barley 2009-11
Ramularia protectant

% Ramularia vs Dose (proportion of full label rate)
Conclusions on barley

• SDHIs add useful efficacy on barley diseases;
• Siltra Xpro and Adexar are closely matched all-rounders, both more effective than their azole component alone;
• Bontima (IZM + cyprodinil) also very active on net blotch, ramularia, and brown rust;
• Strobilurins still active on rhynchosporium and rusts in particular.
Fungicide performance in Oilseed Rape – 2011 - 2012

- Products tested at two rates: half and full label
- Light Leaf Spot – Good levels of disease at one site in N. Yorkshire
- Phoma – Moderate levels of disease at one site, high levels at second site
- Sclerotinia – no disease at one site, very little disease at second site, no new data from 2011
Light Leaf spot control

North Yorkshire 2011 – Assessed 6 weeks after T2 spray

- Untreated
- Half label dose
- Full label dose

LSD = 0.47

% leaf area affected

Proso, Proline, Sanction, Poraz
Light leaf spot treatment – yield response N Yorkshire 2011

Treated yield 4.97 v untreated 4.39 P<0.001

- Prosaro
- Proline
- Sanction
- Poraz

Yield (t/ha)

Untreated
Half label rate
Full label rate
Sclerotina control

Hereford 2010

% plants affected

- Amistar
- Compass
- Filan
- Galileo
- Proline
- Prosaro
- Topsin

LSD = 5.3
Sclerorinia treatments - yield responses Hereford 2010

LSD = 0.32
Phoma canker control - 2011

Average of two sites - Products used in a curative situation

![Graph showing canker index for different products with LSD 9.48]

LSD 9.48
Phoma canker treatments – yield responses 2011

Average of two sites - Products used in a curative situation

![Graph showing yield responses for different treatments with LSD 0.329]