Ecology and management of barnyard grass

Today’s presenters are

Michael Widderick (DAFF Qld)
Tony Cook (NSW DPI)

Facilitated by Mark Congreve and Erica McKay (ICAN)

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 9 AM (NSW/VIC/TAS)
 8 AM (QLD)
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- On your screen on the top right you will see a small red arrow pointing to the left. If you click on this, this will open up a chat box to ask questions & audio etc.
- We are using chat box for questions, audio questions are muted to maximise sound quality. Questions will be relayed by the moderator.
- Questions (except for clarification) will be left until the end of the presentation and repeated by the moderator.
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- If you're on Twitter, you can share webinar learnings and chat with other webinar participants using #GRDCwebinar. We'll also be sharing key resources, the recording of this webinar and promoting upcoming webinars using the same hashtag. If you have a question of the presenter during the webinar, please respond through the webinar chat box, however, if you think of something you want to ask later, you can get in touch via the hashtag.
Ecology and management of barnyard grass

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Michael Widderick (QDAFF)
Tony Cook (NSW DPI)
Today’s Agenda

• Barnyard grass ecology
  – Why it has become a weed of zero till?
  – Understanding ecology & agronomy to manage it?

• Resistance to glyphosate

• Management
  – Weed size and herbicide timing
  – Fallow management
  – Optical spray technologies
  – In-crop management
Barnyard grass

• Two species
  – Barnyard grass (*Echinochloa crus-galli*)
  – Awnless barnyard grass (*Echinochloa colona*)

NGA Survey – 2013
Frequency of ABYG in Fallow Paddocks

- No answer
- <10% of paddocks
- 10-25% of paddocks
- 26 to 50% of paddocks
- >50% of paddocks
Prolific seeder

- > 40 000 seeds per plant
- 12 month seed dormancy
- Spread by flood water / channels & surface irrigation

![Graph showing crop competition for sorghum]

- Solid 1m
- Single skip
- Double skip

Seeds production per m²

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Your GRDC working with you
Germination and establishment

- Wide range of soil types, particularly heavy soils
- Multiple cohorts per season
  - Ideally 24-26°C soil temperature, following >10mm rainfall
  - First germination in spring typically the largest

<table>
<thead>
<tr>
<th>Seed depth</th>
<th>% Germination</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2cm</td>
<td>27%</td>
</tr>
<tr>
<td>5cm</td>
<td>5%</td>
</tr>
<tr>
<td>10cm</td>
<td>0.9%</td>
</tr>
</tbody>
</table>
Persistence

- Seed short lived on soil surface
- Burying seed increases dormancy

<table>
<thead>
<tr>
<th>Depth</th>
<th>Persistence (% of seed sown)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12 months</td>
</tr>
<tr>
<td>0-2cm</td>
<td>13</td>
</tr>
<tr>
<td>10cm</td>
<td>40</td>
</tr>
</tbody>
</table>
Glyphosate resistance

• Awnless barnyard grass
  – Confirmed resistant populations
    • 2004 – Group C
    • 2007 – Group M (glyphosate). ~ 100 populations confirmed. Up to 7-fold resistance

• Send samples to Greg Brooke (NSW DPI)
Glyphosate resistance - 2012

- IWM GRDC project
  40 agro’s from Dalby to Liverpool Plains (NGA network)

![Map showing distribution of resistant and susceptible samples across targeted and random paddocks. The map highlights the number of samples in each category across different locations, with a bar graph illustrating the percentage of samples that died before testing, were susceptible, or resistant.]

![Bar graph showing the percentage of samples in targeted paddocks (survivors), random paddocks, and the total samples. The graph indicates the distribution of resistant and susceptible samples across these categories.]

Died before testing | Susceptible | Resistant
---|---|---

Targeted paddocks (survivors) | Random paddocks | Total
---|---|---

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Target Young Weeds

- Target small, pre-tiller weeds
- ABYG stresses quickly on a drying soil. Be especially aware of patches of lighter soil in the paddock
- Requires a double knock for 100% control

![Control of glyphosate susceptible ABYG](image)
Glyphosate efficacy

- Early Glyphosate susceptible: 158 g ai/ha
- Early Glyphosate resistant: 315 g ai/ha

Control (%)
Fallow Management

• Spring germinations in winter crop
  – Double knock after harvest

• In-fallow germinations
  – Glyphosate followed by paraquat @ 5-7 days normally effective if targeting very small weeds.
    • Don’t wait for secondary germinations
  – Group A herbicides
    • Very high risk of resistance development
    • Under permit by WeedSeeker® application (PER11163)
Double knock applications

• For best (and cheapest) control,
  – Ensure the boom is set up correctly
  – Treat young weeds
  – Avoid stressed weeds
  – 70 to 100L/ha spray volume
    • Coarse and above for the glyphosate
    • Medium to Coarse (not very coarse) for the Group L double knock
  – 5 to 7 day interval
    • Enough spray capacity to cover farm in 7 days
  – Consider adding a residual to the 2nd knock
Optical (camera) sprayers

- Optical spot spray herbicide registrations

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Rate per 100L spray mix. Calibrate sprayers to apply 100L/ha.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuquat® 250</td>
<td>3 - 9 L</td>
</tr>
<tr>
<td>Weedmaster® DST</td>
<td>3.5 - 7 L</td>
</tr>
<tr>
<td>Alliance®</td>
<td>7 - 10 L</td>
</tr>
</tbody>
</table>

- PER11163 for WeedSeeker® (N.B. expires 28/02/2015)

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Rate per 100L spray mix. Calibrate sprayers to apply 100L/ha.</th>
</tr>
</thead>
<tbody>
<tr>
<td>other glyphosate formulations</td>
<td>3 - 4 L (450g/L formulation)</td>
</tr>
<tr>
<td>other paraquat formulations</td>
<td>3 - 4 L (250g/L formulation)</td>
</tr>
<tr>
<td>paraquat + diquat</td>
<td>3 -4 L (135+115g/L formulation)</td>
</tr>
<tr>
<td>quizalofop -P-ethyl</td>
<td>0.35 – 0.5 L (200g/L formulation)</td>
</tr>
<tr>
<td>haloxyfop-R-methyl</td>
<td>0.15 – 0.3 L (520g/L formulation)</td>
</tr>
<tr>
<td>sethoxydim</td>
<td>1 L (186g/L formulation)</td>
</tr>
<tr>
<td>clethodim</td>
<td>0.5 L (240g/L formulation)</td>
</tr>
<tr>
<td>butroxydim</td>
<td>0.1 – 0.2 kg (250g/kg formulation)</td>
</tr>
<tr>
<td>fluazifop-P-butyl</td>
<td>1 – 2 L (212g/L formulation)</td>
</tr>
</tbody>
</table>
Residuals after harvest

- Imazapic (e.g. Flame®) if going to winter crop (watch plantbacks)
- S-metolachlor (e.g. Dual® Gold) before sorghum or summer pulses
- Trifluralin (e.g. Treflan®), pendimethalin (e.g. Stomp®) before pulses - with incorporation
- Isoxaflutole (e.g. Balance®) if going to winter crop, especially where fleabane, sowthistle, FTR are present (suppression of BYG only)
Sorghum

• High risk in paddocks with a large seedback
• S-metolachlor (e.g. Dual® Gold) split application pre-sorghum
  – After winter harvest (before weed germination) & again pre-plant
  – Adding atrazine may increase levels of control
• Inter-row cultivation / shielded sprayers
  – Control escapes / stop blow-outs
Soybean / mungbean / peanut

- Best option for paddocks with a glyphosate resistant seedbank
- Aim for competitive crop (narrow rows, high plant stand)
- Apply residual (+ paraquat) before planting
  - Group D – trifluralin, pendimethalin
  - Group K – s-metolachlor
  - Group B – imazethapyr
- Ensure all escapes are controlled in the crop
  - Inter-row cultivation / shielded sprayers
  - Group A herbicide
Roundup Ready Cotton

- **Very high** risk in paddocks with a glyphosate resistant seedbank
- Aim for competitive crop (high plant stand)
- Apply residual (+ paraquat) before planting
  - Group D – trifluralin, pendimethalin
  - Group C – diuron, fluometuron, prometryn
  - Group K – metolachlor
- Post-em / Layby
  - Group C – diuron, fluometuron, prometryn
  - Group K – Nufarm Bouncer® is now registered
- Glyphosate may not be effective.
  - Ensure all escapes are controlled in the crop
  - Inter-row cultivation
  - Group A herbicide
# Herbicide Solutions

Registered herbicide options for control of barnyard grass – as at November 2014

* Registered trademark

<table>
<thead>
<tr>
<th>Group</th>
<th>Herbicide</th>
<th>Post-em</th>
<th>Pre-em</th>
<th>Use pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>butroxydim, clethodim, fluazifop, haloxyfop,</td>
<td>✓</td>
<td>✓</td>
<td>Broadleaf crops (see individual labels).</td>
</tr>
<tr>
<td></td>
<td>propaquizafop, quizalofop</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>atrazine, diuron, fluometuron, linuron, prometryn</td>
<td>✓</td>
<td>✓</td>
<td>Fallow. Pulses. Cotton (see individual labels)</td>
</tr>
<tr>
<td>D</td>
<td>pendimethalin, trifluralin</td>
<td>✓</td>
<td></td>
<td>Broadleaf crops (see individual labels)</td>
</tr>
<tr>
<td>G</td>
<td>oxyflurofen</td>
<td>✓</td>
<td></td>
<td>Fallow (when mixed with glyphosate)</td>
</tr>
<tr>
<td>H</td>
<td>isoxaflutole</td>
<td>✓</td>
<td></td>
<td>Fallow (suppression only)</td>
</tr>
<tr>
<td>K</td>
<td>metolachlor</td>
<td>✓</td>
<td></td>
<td>Sorghum. Maize. Pulses. Cotton (see individual labels)</td>
</tr>
<tr>
<td>L</td>
<td>paraquat, paraquat + diquat</td>
<td>✓</td>
<td></td>
<td>Fallow</td>
</tr>
<tr>
<td>L + Q</td>
<td>paraquat + amitrole</td>
<td>✓</td>
<td></td>
<td>Fallow</td>
</tr>
<tr>
<td>M</td>
<td>glyphosate</td>
<td>✓</td>
<td></td>
<td>Fallow. Roundup® Ready cotton.</td>
</tr>
</tbody>
</table>
Barnyard Grass Best Management

1. Resistance testing
2. Farm hygiene – keep roads & channels clean
3. Aim for 100% elimination of seed set for 2-3 years
4. Crop rotation based on seedbank pressure
5. Crop competition with close row spacing & no gaps
6. Double knock if weeds are present at winter crop harvest
7. Apply residuals early in spring
8. If relying on knockdowns in fallow:
   • Treat small weeds (or use WeedSeeker at high rates)
   • Plan to double knock
9. Avoid cultivation where possible (prolongs seed life in soil)
Thanks to the many advisers that made their data available to assist ICAN in delivering Integrated Weed Management extension training and workshops sponsored by GRDC.

In particular DAFF Qld, NSW DPI and the Northern Grower Alliance.
### Further resources

#### GRDC Fact Sheets

<table>
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#### DAFF Qld Fact Sheets

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