Harvest weed seed control

Michael Walsh
Australian Herbicide Resistance Initiative
University of Western Australia
www.ahri.uwa.edu.au
## Why HWSC works

<table>
<thead>
<tr>
<th>Weed species</th>
<th>Retained seed* (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Lolium rigidum</em></td>
<td>88</td>
</tr>
<tr>
<td><em>Raphanus raphanistrum</em></td>
<td>99</td>
</tr>
<tr>
<td><em>Bromus spp.</em></td>
<td>73</td>
</tr>
<tr>
<td><em>Avena spp.</em></td>
<td>85</td>
</tr>
</tbody>
</table>

* Seed above harvester cutting height (15cm)
HWSC systems

Chaff lining

Harrington Seed Destructor

Chaff cart

Bale Direct

Narrow windrow burning
Comparison of HWSC systems

Narrow Windrow Burning, Chaff Carts and HSD at 25 sites across Australia
# Lolium emergence in autumn

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Reduction in <em>Lolium</em> emergence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSD</td>
<td>57</td>
</tr>
<tr>
<td>Chaff cart</td>
<td>56</td>
</tr>
<tr>
<td>Narrow windrow burn</td>
<td>57</td>
</tr>
<tr>
<td>LSD (P=0.05)</td>
<td>9</td>
</tr>
</tbody>
</table>
HWSC is an accepted practice
Adopted by approx. a third of crop producers
An Australian innovation

Cumulative adoption curves for narrow windrow burning by agro-ecological zones

- NSW Central
- NSW NW/Qld SW
- Qld Central
- SA Vic Bordertown - Wimmera
- Vic high rainfall and Tas grain
- WA Eastern
- WA Northern
- NSW NE/Qld SE
- NSW Vic Slopes
- SA Midnorth - Lower Yorke Eyre
- SA Vic Mallee
- WA Central
- WA Sandplain - Mallee
- WA Eastern
- WA Northern
More to be done yet

- Loliun rigidum
- Bromus spp.
- Raphanus raphanistrum
- Avena spp.
Increasing seed retention

<table>
<thead>
<tr>
<th>Year</th>
<th>Yield (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>4.0</td>
</tr>
<tr>
<td>2012</td>
<td>0.6</td>
</tr>
<tr>
<td>2013</td>
<td>3.0</td>
</tr>
</tbody>
</table>
Increasing seed retention

![Graph showing seed retention at different wheat densities for Annual ryegrass, Wild radish, Wild oats, and Brome grass.](image)
Increasing seed retention
Growth regulator effects on brome grass seed retention

![Graph showing the proportion of seed above 15cm (%) in relation to Trinexapac ethyl application rate (g ai/ha). The graph indicates an increase in seed retention with increasing application rates up to a peak at 75 g ai/ha, after which retention decreases.]
Increasing seed retention
Influence of crop competition on seed production

The graph illustrates the relationship between wheat density and total seed production for different weed species.

- **Annual ryegrass**
- **Wild radish**
- **Wild oats**
- **Brome grass**

As wheat density increases, total seed production for all species decreases. The graph shows a clear trend with decreasing seed production as wheat density increases from 0 to 400 plants/m².
Increasing seed retention

Annual ryegrass seed retention
Barley 3 weeks after swathing
95% in swath
62% on standing plants
The value of HWSC

Focus paddocks - surviving ryegrass in spring

The value of HWSC
The value of HWSC

Focus paddocks - Estimated ryegrass seed set

Annual ryegrass seedbank (seed/m²)
- plus HWSC
- minus HWSC
Value of very low weed numbers

- Low cost weed control
- Reduced potential for resistance
- Flexibility in crops and cropping systems
- Timeliness of operations
- Conservation of nutrients and moisture etc.
Targeted Tillage
Targeted Tillage

AHRI, QDAF, UQ

- Hydraulically activated tyne system that responds to information on mapped and identified weeds
  - Targeting low density weed populations
  - Collaboration between UWA, UQ and QDAF
    - Farmer and industry advisory group
Shearer
trash worker
retrofit
Targeted Tillage
Targeted Tillage
Agricultural Engineering

Andrew Guzzomi, Carlo Peressini
Faculty of Engineering, Computing and Mathematics

Research
- Targeted tillage project

Honours student research projects
- Swarm farming
- Electrocution of weeds
- Chaff refinement to reduce processing volume
- Static electricity for weed seed separation

Teaching
- Masters in Agricultural Engineering
Simulation (2): Path Planning

- Generate paths, dividing working distance equally
- Simulate job: turns, weed recognition/removal, refuelling, etc., with resulting statistics
Weed electrocution

Faraz Ahmed