Wild oats: Could we manage without selective post-emergents?

In the 1980s and 90s, all grain growing regions of Australia were generally dependent on selective post-emergent herbicides to treat grass weeds like annual ryegrass and wild oats in cereal crops. Little thought was given to other control tactics.

Wild oats and annual ryegrass are frequently found in the same paddock and therefore are exposed to the same herbicide treatments. Ryegrass rapidly evolved herbicide resistance while wild oats has been slower to develop resistance, due mainly to differences in plant physiology. Wild oats is self-pollinating while ryegrass is a cross-pollinating species and although this difference has slowed the evolution of resistance, there are now wild oats populations that are resistant to all post-emergent herbicides registered for its control.

Wild oats is considered the second most important grass weed worldwide and is present in all Australian temperate cropping zones. Once resistance has established in a population of wild oats there are less non-herbicide control options available and the available herbicide groups are rapidly running out due to their over-use, particularly in winter-only cropping systems.

Surveys and observations in the northern and western cropping region indicate that multiple resistance to Group A, B and Z (all the available post emergent chemistry) is increasing.

To date there has been no resistance to glyphosate or paraquat identified in wild oats.

Harvest weed seed control tactics are less effective on wild oats than on other species because it begins to drop seed before the crop is ready for harvest – but crop competition is an effective non-herbicide tactic.

In a long-term Agriculture and Agri-Food Canada trial from 2001 to 2009, crop competition, crop rotation and full herbicide rate combined to drive the wild oats seedbank to zero. The wild oats in the trial plots had only low level herbicide resistance. But another trial in the US indicated that multi-resistant wild oats and herbicide susceptible wild oats both decrease in response to crop competition from wheat, with no difference in the growth rate and biomass production of the plants that survive in the absence of herbicide.

These trials indicate that non-herbicide treatments such as crop competition are effective against both resistant and susceptible wild oats populations and should be considered as part of the management strategy for this weed.

Wild oats decline attributed to pre-emergents

AHRI leader of communication, Peter Newman, believes that the decline in the presence and severity of wild oats populations in Western Australia is due to growers’ use of pre-emergent herbicides from Groups D and J.

“Western Australian growers have less problems with wild oats now than they did ten years ago,” said Peter. “I believe that
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“Suppressing germination and early growth of wild oats with pre-emergent herbicides will help because 85 to 90 per cent of the wild oats seed from the previous season will germinate with the sown crop,” said Tony.

In chickpea crops the use of inter-row cultivation or wiping the wild oats plants that stand above the chickpea crop with glyphosate before seeding could also be considered.

It is imperative to ensure that herbicide resistance testing of wild oats plants is a high priority, particularly those plants that appear to have survived a herbicide treatment. It is important to identify the herbicides that the plants are still susceptible to.

Herbicide resistance is a trait perpetuated by seed. Stopping seed set and controlling survivors of all weed control measures are core tactics in the battle against herbicide resistance.

For more information on managing the risk of herbicide resistance, visit www.weedsmart.org.au

<table>
<thead>
<tr>
<th>Herbicide rate</th>
<th>Barley seeding rate</th>
<th>Crop rotation</th>
<th>Wild oat seedbank in 2009 (seeds/m²)</th>
<th>Barley yield in 2009 (kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 low</td>
<td>continuous barley</td>
<td>3640</td>
<td>2310</td>
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<tr>
<td>25 high</td>
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<td>100 high</td>
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<td>0</td>
<td>5020</td>
<td></td>
</tr>
</tbody>
</table>

1 low=200 seeds/m² (normal) high=400 seeds/m²  
2 diverse rotation=barley-canola-barley-field pea

TABLE 1: Summary of key research findings of Canadian researchers John O’Donovan and Neil Harker from Agriculture and Agri-food Canada from the Beaverlodge site. Wild oat seed bank was measured by taking soil core samples and sieving in 2009.

DIVERSITY CAN’T WAIT

Bayer CropScience is helping growers manage herbicide resistance with the launch of their new Diversity Can’t Wait website. Designed to educate growers on the importance of weed management diversity in broadacre cropping systems, the website will detail how growers can utilise different strategies to manage herbicide resistant weeds or delay the onset of resistance all together.

Lisa Mayer, Project Manager WeedSmart, said the site is an easily accessible tool that will help guide farmers.

“Herbicide resistance can have a significant effect on a grower’s yield and the unique value of this database is that it gives users access to information in one convenient location,” said Lisa.

Although the development of resistance cannot be totally prevented or reversed in a herbicide based weed management system, a good balance of chemical, cultural and mechanical management practices can slow and manage its impact.

“The benefit of this particular site is that it doesn’t focus exclusively on managing resistant weed populations through herbicides, it offers a broad range of tactics,” said AHRI Communications Team Member, Peter Newman.

Resistance to herbicides continues to grow in Australia with 68 confirmed resistant biotypes identified in 2014 – up from 28 in 2008.

Stuart McLaverty, Portfolio Manager Broadacre Rice & SeedGrowth at Bayer CropScience, said by introducing a diverse weed management system now, growers could potentially limit or delay resistance to their existing herbicide options.

“By incorporating herbicides with different modes of action into their weed management program – along with a number of cultural practices – growers will be able maintain the effectiveness of the older chemistry for a longer period of time,” said Stuart.

Growers can also learn more about the status of herbicide resistance on their farm by collecting and testing weeds seeds prior to crop harvest. To encourage this Bayer will be offering a limited number of free herbicide resistance tests later this year.

To learn more about the herbicide resistance tests, the development and extent of herbicide resistance and the strategies you can employ to delay its onset, visit www.diversycantwait.com.au

the use of pre-emergent herbicides as a standard practice every year has helped drive down the weed seed bank.”

DPI NSW weeds technical specialist, Tony Cook, agrees that pre-emergent herbicides need to be used more to help reduce the impact of this difficult-to-control weed. “This does raise the risk of other species being exposed to pre-emergent chemistry and the associated risk of developing resistance,” he said.

“In the northern region the most reliable way to reduce wild oats populations is through two consecutive weed-free winter fallows.”

“This is most easily achieved where summer cropping is an option. In winter-only cropping areas this might be difficult for growers to implement across their whole farm but could be considered as a patch management tactic where densely populated areas could be taken out of production and kept weed-free.”

Prolific seed producer

Wild oats is a prolific seed producer, with over 300 seeds usually produced per plant, but the seed does not remain viable in the soil for very long so implementing consecutive fallow treatments is known to reduce the seed bank to very low levels.

In the drier western regions of NSW and Queensland Tony suggests growers consider the option of taking badly affected paddocks out of production to allow winter fallow treatment with knock-down herbicides and non-herbicide tactics, including cultivation.

“Another option would be to grow silage or hay crops or establish a pasture to allow the use of other herbicides or the harvesting of the crop before the wild oats produce viable seed,” he said. “The continued use of boom spray applications of post-emergent herbicides strongly favours herbicide resistant wild oats populations and this will have significant impacts on crop yields.”
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