Wild oat control with pre-emergent herbicides in barley

This trial is funded by the GRDC and is part of a collaborative project. It was conducted with Sam Kleemann, University of Adelaide and Peter Boutsalis, Plant Science Consulting.

Key findings

- Sakura alone or in combination with Avadex Xtra provided the highest levels of wild oat control (75%).
- Although Sakura treatments provided the highest level of wild oat control the high weed density remaining (>50 plants per square metre) would still be expected to cause significant crop yield losses (50%).

Why do the trial?

The density of wild oats *(Avena fatua)* is increasing in the Mid North. This is due to an increase in cereal cropping intensity and the increase in herbicide resistance to Group A fop and dim herbicides. Also, traditional measures implemented for the control of annual ryegrass such as pre-emergent herbicides, export oaten hay, chaff carts and crop topping are generally less effective against wild oats.

This trial aims to evaluate the performance of new pre-emergent herbicides such as Boxer Gold, Sakura and Outlook for the control of wild oats.

Herbicide resistance and wild oats – Peter Boutsalis, Plant Science Consulting
Herbicide resistance in wild oats occurs in all cereal growing regions. A random survey conducted in 1995 detected 5% of wild oat samples collected from NE Victoria as resistant to Hoegrass. In 2006, the number had increased to only 8% in a similar survey. In the Mid-North 35% of paddocks contain wild oat and of these 9% were resistant to Topik or Wildcat (Table 1).

Often wild oats can be resistant to certain Group A Fop herbicides and not others eg. resistant to Wildcat but not Verdict. In addition some fop-resistant wild oats are cross-resistant to Mataven, although Mataven may have never been used previously. Dim/Den herbicides can be effective on fop-resistant wild oats although this can be variable. About 50% of wild oats resistant to Topik or Wildcat are also resistant to Axial and / or Mataven.

A small number of Group B resistant wild oats have been reported. No resistance to IMI (Group B) chemistry or to trifluralin (Group D) or triallate (Group J) has been detected.

*Table 1: Occurrence of herbicide resistance across South Australia and Victoria as detected by **random** sampling. Data is **% of paddocks** with herbicide resistant wild oats. Resistance is defined as samples where ≥ 20% survival was detected in a pot test. A dash indicates no test with that herbicide.*

Herbicide	Victoria Western (2005)	Victoria Northern (2006)	SA Mid North (2008)	SA Eyre Peninsula (2009)
Fields with wild oats	31%	81%	35%	36%
Hoegrass	17	8	>9	>2
Topik/Wildcat	-	-	9	2
Verdict	-	-	4	2
Axial/ Achieve	-	2	6	2
Mataven	-	-	14	0
Atlantis	-	-	0	0

How was it done?

Plot size	1.75m x 6m	**Fertiliser**	27:12 (MAP/Urea) @ 100 kg/ha 46:0 (Urea) @ 100 kg/ha
Seeding date	25th May 2010	**Variety**	Commander barley @ 80 kg/ha

This trial was established in a grower paddock, north of Clare (White Hut) on an existing patch of wild oats.

The trial was established as a randomised complete block design with 3 replicates and 8 herbicide treatments (Table 1). Active ingredients of the herbicides used in the trial are listed in Table 2.

Herbicides treatments were applied IBS (incorporated by sowing) prior to sowing of barley with a commercial seeder (i.e. knife-point & press wheels).

Crop emergence was assessed by counting the number of emerged barley seedlings along both sides of a 0.5 m rod at 3 random locations within each plot. Wild oats were counted 6 weeks after sowing using a 20 cm × 30 cm quadrat from 4 random locations within each plot.

Table 1. Pre-emergent herbicide treatments used at Clare in 2010.

	Treatments	Cost ($/ha)
1	Nil (untreated control)	
2	Trifluralin 480 1.5 L/ha	7.50
3	Avadex Xtra 3.0 L/ha	20.0
4	Boxer Gold 2.5 L/ha	34.0
5	Outlook 1.0 L/ha	Na
6	Sakura 118g/ha	Na
7	Trifluralin 480 1.5 L/ha + Avadex Xtra 2.0 L/ha	27.5
8	Sakura 118 g/ha + Avadex Xtra 2.0 L/ha	Na

Table 2. Pre-emergent herbicides & their active ingredients.

Herbicide	Active ingredients	Herbicide group
Trifluralin 480	trifluralin 480 g/L	D
Avadex Xtra	tri-allate 500 g/L	J
Boxer Gold	prosulfocarb 800 g/L + S-metolachlor 120 g/L	E + J
Outlook (Nul-1493)	dimethenamid-P	K
Sakura (BAY-191 850WG)	pyroxasulfone 850 g/kg	K

Results

There was no statistically significant effect of herbicide treatments on barley establishment. However Outlook (115 plants per square metre) reduced crop density by 18% compared with the untreated control (140 plants per square metre)(Table 3). Outlook is an experimental herbicide developed by Nufarm. It is highly soluble and will not be released for use in either barley or wheat due to the potential for crop damage.

The site had a high density of wild oats with 246 plants per square metre in the untreated plots. They were generally emerging from a soil depth of 2 to 3 cm. All herbicide treatments reduced wild oat emergence (Table 3).

Sakura alone or in combination with Avadex Xtra provided the highest levels of wild oat control (75%), and showed longer residual activity. The residual activity of Sakura also appears to retard root development of survivors, reducing crop competition and seed production. This result was also achieved in 2009. Sakura will not be available until 2012.

All other treatments provided much lower control with all wild oat densities remaining above 100 plants per square metre. Control ranged between 28 and 49% of the untreated (246 plants per square metre). Trifluralin provided the lowest levels of control (28%).

Although Sakura treatments provided the highest level of wild oat control the high weed density remaining (>50 plants per square metre) would still be expected to cause significant crop yield losses (50%) and increase the weed seedbank. Post emergent herbicides would be needed in addition to gain improved control.

Table 3. Effect of pre-emergent herbicide treatments on crop & wild oat density (plants/m^2). Values in brackets are percentage (%) reduction in barley density & wild oat control relative to the nil treatment (untreated control).

Herbicide treatment	Crop density		Wild oat density		
	plants per square metre				
Nil (untreated control)	140	(-)	246	a	(-)
Trifluralin 480 1.5 L/ha	139	(1)	178	b	(28)
Avadex Xtra 3.0 L/ha	130	(7)	125	bc	(49)
Boxer Gold 2.5 L/ha	136	(3)	143	bc	(42)
Outlook 1.0 L/ha	115	(18)	107	cd	(56)
Sakura 118g/ha	130	(7)	62	d	(75)
Trifluralin 480 1.5 L/ha + Avadex Xtra 2.0 L/ha	140	(0)	168	b	(32)
Sakura 118 g/ha + Avadex Xtra 2.0 L/ha	120	(14)	61	d	(75)
LSD (0.05)	NS		55		

Means in the same column followed by the same letters are not significantly different at LSD *P* = 0.05.

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