Controlling wild oats

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

- Two years of full wild oat control did not exhaust the seedbank to a manageable level
- A selective post emergent herbicide or an early hay cut were the most effective strategies for reducing the wild oat seedbank

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 aimed to evaluate the effect of long term management strategies on the wild oat seedbank and measure the efficacy of various control techniques. Specifically, the trial will demonstrate the value of single year and back-to-back years of seed set control, pre-emergent and post emergent herbicides, hay cutting and chaff cart for driving down the wild oat seed bank.

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?

This trial was established in a grower paddock, north of Clare (White Hut) on an existing patch of wild oats in 2009. The majority of wild oat seed was within 2cm of the soil depth, some being on the soil surface, and the oats were 100% susceptible to group A post emergent selective herbicides. The trial was established as a randomised complete block design with 3 replicates.

The trial was sown to Catalina wheat (2009), Commander barley (2010) and TT canola (2011), and wild oat control treatments were applied to the same plots each year. The herbicides treatments were applied IBS (incorporated by sowing) prior to sowing with a commercial seeder (i.e. knife-point & press wheels).

Treatments:

1) nil
2) Trifluralin 1.5L/ha (incorporated by sowing - IBS)
3) Trifluralin 1.5L/ha and Avadex Xtra 2.0L/ha (IBS)
4) Trifluralin 1.5L/ha and Avadex Xtra 2.0L/ha (IBS) + Axial 200ml/ha (GS39)
5) Trifluralin 1.5L/ha (IBS) + early hay cut
6) Trifluralin 1.5L/ha (IBS) + chaff cart
7) Trifluralin 1.5L/ha (IBS – 2009 and 2010) + Axial 200ml/ha (GS39 2009 only)
8) Trifluralin 1.5L/ha (IBS – 2009 and 2010) + Axial 200ml/ha (GS39 2009 and 2010)
9) Trifluralin 1.5L/ha (IBS – 2009 and 2010) + Axial 200ml/ha (GS39 2009, 2010 and 2011)

In 2011 complete desiccation was applied to all the treatments excluding 5, 8 and 9, as the wild oat density was excessive.

The initial seedbank at the site in 2009 was 400 wild oat seeds per square metre to 10cm of soil depth and 150 plants per square metre emerged in the nil treatments after sowing.

The hay cut was performed at the beginning of the hay cutting season, and the chaff cart was simulated by removing wild oat heads at the beginning of harvest as determined by district practice in both cases.

Results

Clear differences in the wild oat seedbank have been shown for the different management strategies applied in 2009, 2010 and 2011 (Figure 1). With no control the wild oat seed density increased from 400 seeds per square metre in 2009 to 8092 seeds per square metre in 2011, a 20 fold increase. Similar increases in the wild oat seedbank were measured for trifluralin applied alone or when mixed with Avadex Xtra, which provided limited wild oat control.

When Axial was included as a late selective post emergent application the seedbank declined to less than 64% of the original 2009 level (400 seeds per square metre). This treatment may not be as effective on wild oats with resistance to group A herbicides.

One year of full wild oat control reduced the wild oat seedbank to 8 seeds per square metre in 2010. While the trial average was only 8 seeds per square metre, 19 wild oat plants per square metre was counted 4 weeks after sowing and without control meant the seedbank increased significantly in 2011. Two years of full control has reduced the seedbank down to about 500 seeds per square metre, which is unexplainably higher than the initial seedbank of 400 seeds per square metre.

Of the cultural control practices the early hay cut was an effective strategy for reducing the wild oat seedbank (30 seeds per square metre after 3 years) (Figure 1 & 2). The cut was done early and did not include raking or super conditioning, which might increase wild oat seed shed. The simulated chaff cart treatment was applied early in the harvesting window, but had limited success as many of the wild oats had already dropped seed by the time of harvest.

Three years of full control was needed to reduce the seedbank to 30 seeds per square metre (Figure 2). The early hay cut was also able to achieve this level of control. Only two years of full seed set control was not enough to prevent the seedbank increasing to 611 seeds per square metre. The variability of these results highlights the variable nature of wild oats and also the possibility that 3 years of full control may still not be enough.

In general, the success of wild oat control techniques might also be influenced by the competitiveness of the crop, soil type, growing season rainfall and finish to the season. So, in seasons with a mild finish or in later districts it is likely that more wild oat seed will be set.

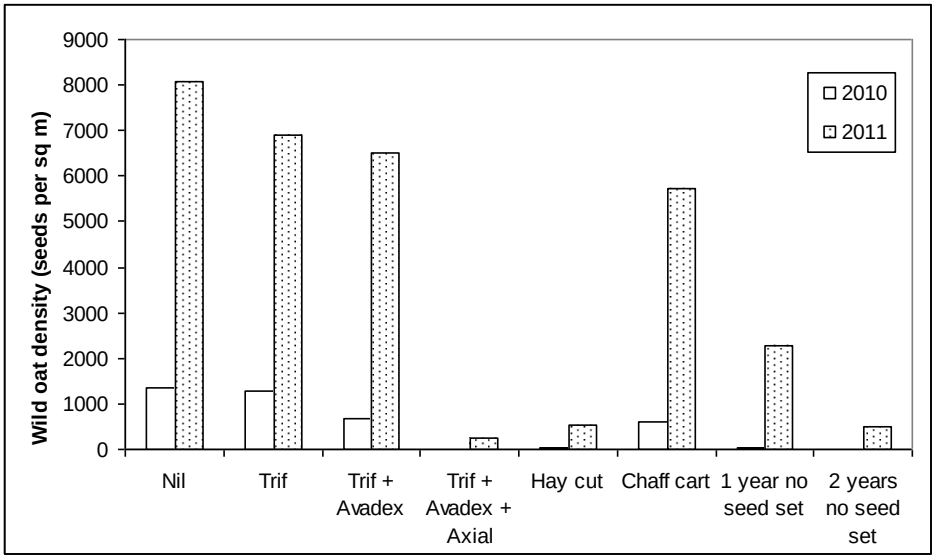

Figure 1: The effect of different management strategies on pre-sowing (March) wild oat seed density at Clare from 2010 to 2012.

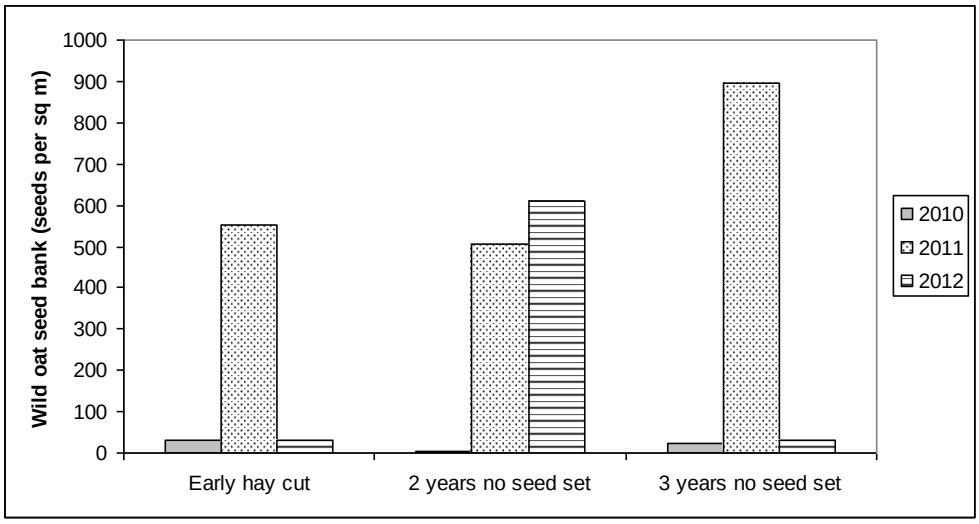

Figure 2: The effect of an early hay cut each year and 2 or 3 years of full seed set control on pre-sowing (March) wild oat seed density at Clare in 2012 only.

Acknowledgments

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Early hay cut


Thick wild oats in canola