

Controlling Annual Ryegrass on Fencelines to Reduce Glyphosate Resistance Development

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Key Messages

- A two spray or double knock strategy (including cultivation or another non-herbicide treatment) is often required for complete control in fencelines with the first application early in the season followed by another one later in the season (after the seeding and post-harvest operations are over).
- Tank mixes of residual herbicides plus a knockdown give the best control for the first application.
- A single application of a mixture of Uragan® (bromacil) and paraquat early in the season gives excellent weed control on fencelines.
- The addition of Alliance® (mixture of amitrole and paraquat) as the knockdown gives good broadleaf control.
- Glyphosate can still be used but intensive monitoring and complete seed set control is required to prevent resistance from developing.

Aim/Background

The aim of this work was to explore herbicide and application timing alternatives to control annual ryegrass and other weeds on fencelines and prevent the onset of resistance. Fence lines can be a 'breeding' ground for glyphosate resistance evolution due to a lack of crop competition, its repeated usage and the often late applications when weeds are large and harder to manage. Controlling weeds that grow on fencelines is important to prevent their resistance status moving into the paddock.

For the past three years, the Northern and Esperance Advisor Groups (set up as part of the GRDC-funded herbicide resistance project) have looked at annual ryegrass and other weed control on fencelines for resistance management.

In 2012, the two Groups compared 13 herbicide treatments (applied as either single herbicides (glyphosate, paraquat, Amitrole T®, glufosinate or Alliance® or as a mixture of a residual herbicide with paraquat) with glyphosate at two trial sites (Esperance and Dalwallinu).

- Tank mixes of residual herbicides plus paraquat or Alliance® gave the best control of annual ryegrass, wild radish, other grasses and broadleaf weeds.
- Applications of bromacil offered the best control at both locations but it was unregistered in 2012.
- The herbicide treatments were applied in August which tends to be a common time for many growers. In Western Australia in August however, the weeds are large and often harder to control at this time of year in Western Australia.

In 2013, two earlier (but single) application times (May and early July) of a further range of herbicides were explored in four locations: Miling, Dandaragan, Geraldton and South Stirlings.

- Similarly, tank mixes of residual herbicides plus a knockdown gave the best control.
- None of the treatments gave complete control.

In 2014, the groups decided that two control timings were needed, once early in the year with a good residual and a knockdown, followed by another one later in the season (after the seeding and post-harvest operations are over). That way you set up the fencelines early in the season then kill them off later rather than having to spray big weeds in one pass. As Uragan® (bromacil) was now registered for fencelines (the only bromacil product registered for this use), it was included as a single application mixed with paraquat in the early timing. Cultivation and slashing were also included in some of the treatments. There were six trial sites: Northampton (NAG group), Buntine (Liebe Group), Doodlakine (Kellerberrin Grower Group), east Wagin (East Wagin Top Crop

Group), Woogenellup (Stirlings to Coast Grower Group) and Esperance Downs Research Station, Gibson (SEPWA).

Buntine Trial Details

Property	Fitzsimons Property, east Buntine
Soil Type	Sand
Plot size & replication	10m x 5m x 3 replications
Herbicide applications	Various: Timing 1 - 27/05/2014 , Timing 2 - 03/07/2014, Timing 3 - 06/08/2014, Timing 4 - 20/08/2014
Water rate	130 L/ha using 360kpa pressure
Ground speed	12 km/h
Nozzle type	Teejet AIXR11004 nozzles
Weeds	Annual ryegrass, wild radish, brome grass, capeweed
Growing season rainfall	180mm

Table 1: Treatment, application rates and timing at east Buntine.

Treatment No	First application	Timing	Second application	Timing
1	simazine granules@ 4 kg/ha + Alliance® @ 4L/ha	T1	atrazine granules@ 2.2 kg/ha + paraquat 250@ 3.6 L/ha	T4
2	simazine granules@ 4 kg/ha + Alliance® @ 4L/ha	T1	cultivate	T4
3	simazine granules@ 4 kg/ha + Alliance® @ 4L/ha	T1	Nil	T4
4	simazine granules@ 4 kg/ha+ 2,4-D @ 700 mL/ha + paraquat 250@ 3.6 L/ha	T1	atrazine granules@ 2.2 kg/ha + paraquat 250@ 3.6 L/ha	T4
5	simazine granules @ 4 kg/ha+ 2,4-D @ 700 mL/ha + paraquat 250@ 3.6 L/ha	T1	cultivate	T4
6	simazine granules@ 4 kg/ha + 2,4-D @ 700 mL/ha + paraquat 250@ 3.6 L/ha	T1	Nil	T4
7	Uragan® (bromacil) @ 3.5 kg/ha + paraquat 250@ 3.6 L/ha	T1	Nil	T4
8	Uragan® (bromacil) @ 5 kg/ha + paraquat 250@ 3.6 L/ha	T1	Nil	Nil
9	Cavalier® (oxyflurofen) @ 4 L/ha + paraquat 250@ 3.6 L/ha	T1	atrazine granules@ 2.2 kg/ha + paraquat 250@ 3.6 L/ha	T4
10	Slash	T3	atrazine granules@ 2.2 kg/ha + paraquat 250@ 3.6 L/ha	T4
11	simazine granules @ 4 kg/ha + 2,4-D @ 700 mL/ha + paraquat 250@ 3.6 L/ha (July timing)	T2	Nil	Nil
12	Cultivate	T2	atrazine granules@ 2.2 kg/ha + paraquat 250@ 3.6 L/ha	T4
13	Control	Nil	Nil	Nil

Results (for Buntine and other sites)

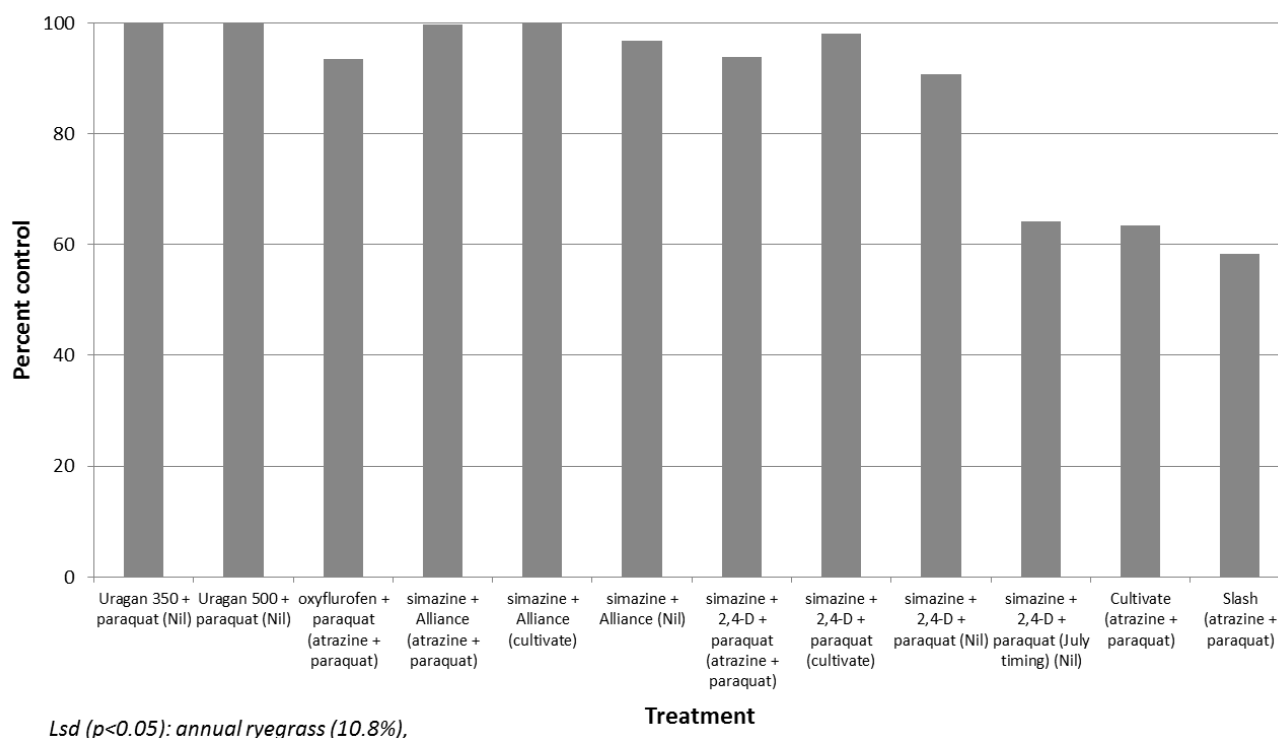


Figure 1: Percentage control (compared to untreated) of annual ryegrass after application of 12 herbicide treatments at Buntine (Liebe Group Main Trial Site 2014). (Note: second application in brackets).

Comments

- A single application of Uragan® (bromacil) plus paraquat in May (or June in Esperance) gave complete control of all weeds at all sites over both rates (350 and 500 kg/ha).
- Uragan is expensive (see Table 2) but only one application is needed to control all weeds (including summer weeds) for at least one year. There is a risk of soil erosion, as bromacil is highly residual. It is toxic to trees so can only be used where there is no remnant vegetation. Adama™ are continuing trials in 2015 to investigate weed control at lower rates which will reduce the cost and the potential environmental hazards.
- At most locations, an application of either simazine + Alliance® or simazine, 2, 4-D and paraquat in May followed by a second application of atrazine and paraquat in August gave better than 95% control. The addition of Alliance gave slightly better control especially where there were broadleaf weeds (three years results). At Northampton however, the level of control for annual ryegrass was lower than expected. It is possible that there is developing triazine resistance in annual ryegrass on this site as most of the other weed species were controlled (this has not yet been tested). Another possibility is that the soil microorganisms are breaking down the triazines quickly and reducing their residual activity. This is the subject of a study at UWA, particularly for the northern wheatbelt soils.
- Delaying the application of the first spray reduced the control by 10 to 30% across all sites.
- Slashing later in the season then spraying with atrazine and paraquat showed promise in the southern areas (80-98% control) where the season was later and there had been more rain. There was poor control (56-59%) in the northern trial sites.
- The use of cultivation as a control option did not generally work well in this series of trials except when used as the second knockdown in August at Buntine.

Table 2: The cost of the herbicide treatments (\$/km based on a 3m wide fenceline).

First treatment	Active ingredient	Cost (\$/km)
simazine @ 4 kg/ha	simazine	8
paraquat 250@ 3.6 L/ha	paraquat	5
Alliance® @ 4 L/ha	amitrole and paraquat	20
atrazine granules@ 2.2 kg/ha	atrazine	8
2,4-D @ 700 mL/ha	2,4-D	1.20
Uragan @ 3.5 kg/ha+ paraquat (3.6 L/ha)	bromacil and paraquat	73
Uragan @ 5 kg/ha+ paraquat (3.6 L/ha)	bromacil and paraquat	103
simazine @ 4 kg/ha + 2,4-D @ 700 mL/ha	simazine and paraquat	14
paraquat (3.6 L/ha)		
simazine @ 4 kg/ha + Alliance® @ 4 L/ha	simazine, amitrole and paraquat	28
Second treatment		
atrazine granules@ 2.2 kg/ha + paraquat 250@ 3.6 L/ha	atrazine and paraquat	13

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