

Control of annual ryegrass with pre-emergence herbicides

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Key findings

- Boxer Gold alone or in combination with trifluralin and / or Avadex Xtra provided consistent pre-emergence control of ryegrass, as did trifluralin & Avadex Xtra.
- Although ryegrass control with new pre-emergent herbicide Sakura was lower than in previous years, its tank mixture with Avadex Xtra provided excellent control (86%).
- Boxer Gold & Dual Gold applied PSPE appeared to provide some additional in-row control of ryegrass.

Why do the trial?

Given the importance placed on trifluralin for controlling annual ryegrass under current farming practices & growing incidence of ryegrass resistant to this Group D herbicide, there is an urgent need to identify alternate pre-emergent herbicide options. Consequently trials have been undertaken over several seasons (2003 to present) at the Hart field site to evaluate the efficacy & crop safety of alternate pre-emergent herbicides & their mixtures for the control of ryegrass in wheat.

How was it done?

Plot size 1.4 m x 10 m **Fertiliser** DAP Zn @ 90 kg/ha

Seeding date 30th May 2011 **Variety** Guardian wheat

The trial was established as a randomised complete block design with 3 replicates and 13 herbicide treatments (Table 2). Active ingredients of the herbicides used in the trial are listed in Table 1.

To ensure uniform ryegrass establishment across the trial site ryegrass seed was broadcast at 25 kg/ha ahead of seeding and tickled in with a shallow pass with the seeder prior to herbicide application. The ryegrass was from commercial paddocks with approximately 30% resistance to trifluralin.

A standard knife-point press wheel system was used to sow the trial on 22.5 cm (9") row spacings.

Pre-sowing herbicides were applied within an hour of sowing and incorporated by sowing (IBS) the post-sowing pre-emergence (PSPE) herbicides were applied within a few days of sowing.

Table 1: Pre-emergent herbicides & their active ingredients

Herbicide	Active ingredients
Trifluralin 480	trifluralin 480 g/L
Avadex Xtra	tri-allate 500 g/L
Boxer Gold	S-metolachlor 120 g/L + prosulfocarb 800 g/L
Sakura (BAY-191 850WG)	pyroxasulfone 850 g/kg
Outlook (Nul-1493)	dimethenamid-P
Dual Gold	S-metolachlor 960 g/L

Table 2: Pre-emergent herbicides, rates & timings

Treatments	
1	Nil (untreated control)
2	Trifluralin 480 1.5 L/ha (IBS)
3	Avadex Xtra 3.0 L/ha (IBS)
4	Sakura 118 g/ha (IBS)
5	Outlook 1.0 L/ha (IBS)
6	Boxer Gold 2.5 L/ha (IBS)
7	Syngenta Exp (IBS)
8	Trifluralin 480 1.5 L/ha + Avadex Xtra 2.0 L/ha (IBS)
9	Avadex Xtra 2.0 L/ha + Boxer Gold 2.5 L/ha (IBS)
10	Avadex Xtra 2.0 L/ha + Sakura 118 g/ha (IBS)
11	Trifluralin 480 1.5 L/ha + Avadex Xtra 2.0 L/ha (IBS) + Dual Gold 0.5 L/ha (PSPE)
12	Trifluralin 480 1.5 L/ha + Avadex Xtra 2.0 L/ha (IBS) + Boxer Gold 1.5 L/ha (PSPE)
13	Boxer Gold 2.0 L/ha (IBS) + Boxer Gold 1.5 L/ha (PSPE)

Results

All the herbicide treatments had good crop safety under the knife point press wheel system, however Outlook an experimental herbicide developed by Nufarm will not be released for use in wheat because of concerns of crop damage.

All herbicide treatments reduced ryegrass emergence with overall control ranging from 59% (Sakura) to 90% (trifluralin 1.5 L/ha, IBS + Avadex Xtra 2.0 L/ha, IBS + Boxer Gold 1.5 L/ha PSPE), respectively (Table 3). Although Sakura provided lower levels of ryegrass control this year, its overall performance over the past five years (2006 to 2010) has been excellent (Figure 1), particularly when applied as a tank mixture with Avadex Xtra.

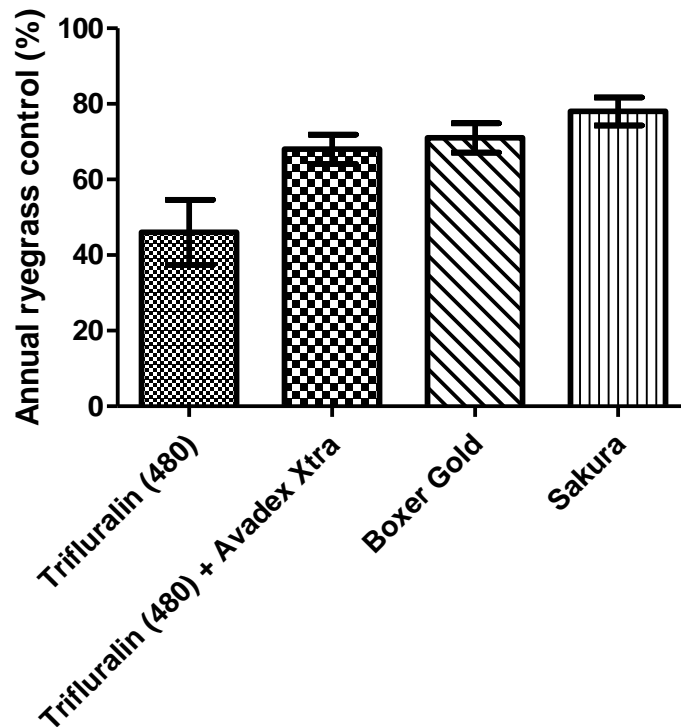


Figure 1: Annual ryegrass % control for pre-emergent herbicide treatments at Hart in the years from 2006 to 2010. Nb: Trifluralin (480) was applied at either 1.4 or 1.5 L/ha & Avadex Xtra at 1.5 L/ha from 2006 to 2009 & 2.0 L/ha in 2010. Bars represent standard error (SE) of mean.

In the 2011 Hart trial, treatments giving better than 80% overall control of ryegrass were:

- Trifluralin (480) 1.5 L/ha + Avadex Xtra 2.0 L/ha (IBS)
- Avadex Xtra 2.0 L/ha + Boxer Gold 2.5 L/ha (IBS)
- Avadex Xtra 2.0 L/ha + Sakura 118 g/ha (IBS)
- Trifluralin (480) 1.5 L/ha + Avadex Xtra 2.0 L/ha (IBS) + Dual Gold 0.5 L/ha (PSPE)
- Trifluralin (480) 1.5 L/ha + Avadex Xtra 2.0 L/ha (IBS) + Boxer Gold 1.5 L/ha (PSPE)
- Boxer Gold 2.0 L/ha (IBS) + Boxer Gold 1.5 L/ha (PSPE).

Not surprisingly trifluralin (480) alone provided only 65% overall control of ryegrass, which is to be expected given the ryegrass sown was 30% resistant to the herbicide. Furthermore, trifluralin & Avadex Xtra alone provided only 53% to 57% control of ryegrass in the crop row. Ryegrass control in the crop row was always poorer (67%) than in between rows (83%) where herbicide is concentrated from soil thrown from the crop row zone at sowing.

However, all PSPE treatments (averaging 82% control) were significantly better compared to IBS treatments alone (averaging 60% control) at controlling ryegrass in the crop row. This is consistent with the results from last season which also showed there was some benefit to in-row ryegrass control from split herbicide applications. Of the IBS treatments, mixtures of Avadex Xtra with either Boxer Gold or Sakura provided the highest levels of in-row ryegrass control (75 to 79%).

Final ryegrass head numbers were significantly lower (less than 50 heads/sq m) for treatments combining two herbicides at sowing (not including trifluralin) or for those including a post sowing pre emergence treatment. (Table 3).

The final grain yield of wheat decreased proportionally with increase in ryegrass density as is to be expected (Table 3).

In summary, the trial has again shown there are a number of effective pre-emergent herbicide options available for the effective control of Group D resistant ryegrass. PSPE herbicide options improved ryegrass control in the crop row. However, these present a higher risk to crop safety, depending on soil type & rainfall after application. Furthermore, although both Boxer Gold & Sakura (to be released next year) provide alternative modes of action to trifluralin, they should be used in conjunction with robust management strategies that use a diverse rotation of crops, herbicides and non-chemical strategies (eg. chaff carts) so as to prolong the life of existing and new chemical groups against ryegrass.

Acknowledgements

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Table 3: Pre-emergent herbicide treatments, ryegrass plant density (plants/sq m) & % control at Hart in 2011. Density values are expressed as the number of ryegrass plants in a square m in the crop row (In-row) or between the crop rows (Between rows). Values in brackets are % control relative to unsprayed NIL.

Herbicide treatments	July		August		September Ryegrass heads/sq m	Grain yield (t/ha)
	In-row	Between rows	Average	Average		
	----- Annual ryegrass plants/sq m & (% control) -----					
1 NIL	208	492	350	531	364	1.89
2 Tri 480 1.5 L/ha (IBS)	97	128	74	183	231	2.19
3 Ava 3.0 L/ha (IBS)	125	106	79	183	114	2.44
4 Sak 118 g/ha (IBS)	156	250	49	218	160	2.28
5 Out 1.0 L/ha (IBS)	83	100	80	171	80	2.36
6 BG 2.5 L/ha (IBS)	97	64	87	143	66	2.43
7 Syn Exp (IBS)	94	55	92	121	148	2.25
8 Tri 480 1.5 L/ha + Ava 2.0 L/ha (IBS)	42	80	64	104	86	2.48
9 Ava 2.0 L/ha + BG 2.5 L/ha (IBS)	69	67	33	64	34	2.67
10 Ava 2.0 L/ha + Sak 118 g/ha (IBS)	67	68	50	74	50	2.68
11 Tri 480 1.5 L/ha + Ava 2.0 L/ha (IBS) + DG 0.5 L/ha (PSPE)	33	84	58	108	44	2.60
12 Tri 480 1.5 L/ha + Ava 2.0 L/ha (IBS) + BG 1.5 L/ha (PSPE)	28	87	19	51	24	2.79
13 BG 2.0 L/ha (IBS) + BG 1.5 L/ha (PSPE)	36	83	89	85	42	2.61
LSD (0.05)	54	68	47	59	63	0.28

Annual ryegrass assessment was performed on 1st of Jul & 12th of Aug, 5 & 11 weeks after sowing