Program control of brome grass in HT (Clearfield) Scope barley

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Purpose:	To demonstrate Scope barley and the performance of Clearfield herbicides on brome grass in a non-wetting scenario, and to investigate the benefit of soil wetter and pre-emergence herbicides in improving this performance.
Location:	Badgingarra (Andrew Kenny's property)
Soil Type:	Pale non-wetting sand
Rotation:	long-term pasture
GRS:	300mm

BACKGROUND

The control of brome is under significant threat in our cereal belt due to excessive dependence upon Group B herbicides (Midas, Intervix, Raptor, Monza, Atlantis and Crusader). While the imidazolinone, Clearfield herbicides provide strongest control they are presently restricted in cereals to use in CL STL wheat.

Scope barley is a new AWB Seeds variety that is soon to be available to Australian grain growers. It has Buloke parentage and has been bred to tolerate imidazolinone, Clearfield herbicides. As barley also has a greater tolerance of metribuzin than wheat, this new variety may allow program use of metribuzin (Group C) and imidazolinone herbicides.

This trial tests the value of using pre-emergence herbicides in front of imidazolinone products, while investigating the use a soil wetter to improve early weed and crop emergence (potentially allowing more effective knockdown of brome prior to sowing and a more solid, early crop canopy to aid herbicide activity).

TRIAL DESIGN

The trial was laid out in a multi-factorial design consisting of two main plots (the presence or absence of soil wetter) and thirteen subplots (herbicide regime).

Sub-subplot: Eight rows x 10 metres

Machinery: Small plot seeder, knife point and press wheel

Repetitions: 3

Crop details: Scope Barley (AWB Seeds) at 75 kg/ha on 21st May 2010

Fertilizer: **At seeding:** 100 kg/ha Urea (top dressed IBS); 100 kg/ha Vigour Atlas (banded below seed)

Post (7/8/10)**:** 80 kg/ha Urea

Herbicide: **Pre-seeding** (20/5/10)**:** 2.5 L/ha Roundup PowerMAX; 1 L/ha Chlorpyrifos. In April an earlier knockdown treatment was also applied.

Soil Wetter: Half the trial (treatments 1-13) was treated with soil wetter on 7th May and again on 21st May immediately after sowing. The other half was untreated (treatments 14-26)

Soil Wetter and post-seeding herbicide treatments:

Treatments	1 + 14	2 + 15	3 + 16	4 + 17	5 + 18	6 + 19	7 + 20	8 + 21	9 + 22	10 + 23	11 + 24	12 + 25	13 + 26
Treatments applied 21/5/10 (IBS)													
100 g/ha Sencor 750WG; 1 L/ha TriflurX					X	X		X					
150 g/ha Sencor 750WG; 1 L/ha TriflurX							X		X	X	X	X	
Treatments applied 22/6/10 (3-4 leaf)*													
500 mL/ha Intervix; 500 mL/ha Polo LVE (Clearfield)			X			X	X						
750 mL/ha Intervix; 500 mL/ha Polo LVE (Clearfield)				X				X	X				
900 mL/ ha Midas (Clearfield)		X			X								
25 g/ha Monza; 500 mL/ha Polo LVE										X			
500 mL/ha Crusader; 500 mL/ha Polo LVE											X		
330 mL/ha Atlantis; 500 mL/ha Polo LVE												X	

- **At this spray date the crop was Z14 – Z22 but weeds were newly emerging, Brome and Silver grass were Z11 and Capeweed the cotyledon stage.*
- *Untreated plots were Trts 1 and 14.*
- *All post-emergence treatments were applied with an adjuvant. Water volume was 60 L/ha.*

RESULTS

Brome control

The application of soil wetter two weeks before seeding and immediately after seeding appeared to have no visual impact on the level of weed germination and growth across the trial. As a result, and as a cost saving measure, plots that were not sprayed with soil wetter (Treatments 14 – 26) were excluded from weed control assessment.

By the final assessment (1st October) Untreated Check plots were found to average 500 brome panicles per sqm, demonstrating that a significant brome population existed on the site.

The pre-emergence treatment of Sencor 750WG @ 150 g/ha plus TriflurX @ 1 L/ha (Treatment 13, the herbicide standard for brome in barley in the trial) achieved just 40 – 50 percent visual control of brome and reduced panicles numbers by about 60 percent.

Monza, Crusader or Atlantis, applied post-emergence to plots already treated with the pre-emergence tank mix, variably achieved 50 – 80 percent visual control of brome but reduced panicles numbers by only 40 – 55 percent.

Stand out treatments were those containing Midas or Intervix. The former, with or without the benefit of a pre-emergence treatment, achieved 80 – 90 percent visual control of brome and reduced panicles numbers by 80 – 85 percent.

Intervix at both 500 mL/ha and 750 mL/ha, without a pre-emergence treatment, achieved 93 – 95 percent visual control of brome and reduced panicles numbers by 99 – 100 percent, and with a pre-emergence treatment reached 98 – 99 percent visual control and 99 – 100 percent panicle reduction.

The value of a pre-emergence Sencor and Trifluralin treatment is best seen at the 17th August assessment where the performance of Midas was visually improved from 80 percent to 96 percent, and the Intervix treatments from 91 – 93 percent to 98 – 100 percent.

Control of Silver grass and Capeweed

Intervix based treatments provided excellent control of silver grass with and without a pre-emergent treatment. Midas on the other hand required the pre-emergent treatment to achieve the same degree of activity. Capeweed was strongly suppressed both by Midas and by Intervix plus Polo and required the pre-emergent treatment to achieve high levels of control.

Plots treated with Intervix at 750 mL/ha following a pre-emergent treatment were essentially all weed free.

Crop Tolerance

Scope barley showed good tolerance of Sencor 750WG plus TriflurX as well as all post-emergence treatments except Monza. The latter treatment was damaging throughout the life of the crop and was demonstrated by an obvious yield penalty. This probably indicates that the mutation in Scope barley does not confer complete tolerance to other Group B sub-groups and that Monza is a lot more active on barley (and therefore volunteer barley) than Atlantis and Crusader.

Yields

Untreated control plots averaged just on a ton per hectare. While not statistically significant the majority of plots treated with soil wetter yielded better than those that did not. Only three of the thirteen treatments yielded higher average yields when soil wetter was not used. Wetted treated plots had an 87 percent average yield increase over wetted Check plots, while unwetted treated plots had just a 32 percent average yield increase over unwetted Check plots. It appears likely that the soil wetter treatments may have marginally improved the performance of the crop on the basis of this result.

Monza yielded less than the Untreated Check plots clearly demonstrating crop injury.

The five outstanding yield results in the trial were achieved by the five Clearfield treatments that following a pre-emergence regime on wetted ground. These five treatments all more than doubled the yield and were the only treatments to do so. In the absence of soil wetter these same treatments were still among the best treatments achieving a 50 – 70 percent yield increase.

Results and Analysis of Variance Brome Control (0-100) and Panicle Counts (#/m2): SOIL WETTER PLOTS ONLY

No.	Treatment	17th August Control 0-100		1st October Control 0-100		Panicles #/m^2		Abbotts 1-%UTC	
1	Untreated Check	-		-		506	a	0	d
2	Midas @ 900 mL/ha + Supercharge @ 0.5% v/v	80	c	83	ab	107	cd	81	ab
3	Intervix @ 500 mL/ha + Polo LVE @ 500 mL/ha + Supercharge @ 0.5% v/v	93	ab	93	ab	2	d	100	a
4	Intervix @ 750 mL/ha + Polo LVE @ 500 mL/ha + Supercharge @ 0.5% v/v	91	b	94	ab	4	d	99	a
5	TRT 13** fb Midas @ 900 mL/ha + Supercharge @ 0.5% v/v	96	ab	93	ab	74	cd	85	ab
6	TRT 13** fb Intervix @ 500 mL/ha + Polo LVE @ 500 mL/ha + Supercharge @ 0.5% v/v	98	ab	98	a	2	d	99	a
7	TRT 13 fb Intervix @ 500 mL/ha + Polo LVE @ 500 mL/ha + Supercharge @ 0.5% v/v	98	ab	98	a	6	d	99	a
8	TRT 13** fb Intervix @ 750 mL/ha + Polo LVE @ 500 mL/ha + Supercharge @ 0.5% v/v	100	a	99	a	0	d	100	a
9	TRT 13 fb Intervix @ 750 mL/ha + Polo LVE @ 500 mL/ha + Supercharge @ 0.5% v/v	100	a	99	a	0	d	100	a
10	TRT 13 fb Monza @ 25 g/ha + Polo LVE @ 500 mL/ha + Bonza @ 0.5% v/v	70	d	50	de	293	b	43	c
11	TRT 13 fb Crusader @ 500 mL/ha + Polo LVE @ 500 mL/ha + BS1000 @ 0.25% v/v	70	d	80	bc	212	bc	56	c
12	TRT 13 fb Atlantis @ 330 mL/ha + Polo LVE @ 500 mL/ha + Hasten @ 1% v/v	72	cd	65	cd	222	bc	55	c
13	Sencor 750WG @ 150 g/ha + TriflurX @ 1 L/ha (IBS) - standard	40	e	47	e	180	bc	63	bc
LSD (P=.05)		8.9		15.7		106.5		18.7	
CV		6.2		11.1		51.0		14.7	

Means followed by same letter do not significantly differ (P=.05, LSD)

** Treatment 13 less 50 g/ha Sencor i.e. Sencor 750WG @ 100 g/ha + TriflurX @ 1 L/ha

Results and Analysis of Variance for Capeweed and Silver grass Counts: SOIL WETTER PLOTS ONLY

No.	Treatment	1st October Capeweed #/m^2		1-%UTC		Silver grass #/m^2		1-%UTC	
1	Untreated Check	193	a	0	e	108	a	0	e
2	Midas @ 900 mL/ha + Supercharge @ 0.5% v/v	27	bcd	85	ab	13	b	75	bc
3	Intervix @ 500 mL/ha + Polo LVE @ 500 mL/ha + Supercharge @ 0.5% v/v	48	bc	74	bcd	2	b	99	a
4	Intervix @ 750 mL/ha + Polo LVE @ 500 mL/ha + Supercharge @ 0.5% v/v	30	bcd	79	bcd	12	b	95	a
5	TRT 13** fb Midas @ 900 mL/ha + Supercharge @ 0.5% v/v	2	d	99	a	0	b	100	a
6	TRT 13** fb Intervix @ 500 mL/ha + Polo LVE @ 500 mL/ha + Supercharge @ 0.5% v/v	20	bcd	90	a-d	2	b	96	a
7	TRT 13 fb Intervix @ 500 mL/ha + Polo LVE @ 500 mL/ha + Supercharge @ 0.5% v/v	1	d	99.5	a	2	b	96	a
8	TRT 13** fb Intervix @ 750 mL/ha + Polo LVE @ 500 mL/ha + Supercharge @ 0.5% v/v	2	d	99	a	0	b	100	a
9	TRT 13 fb Intervix @ 750 mL/ha + Polo LVE @ 500 mL/ha + Supercharge @ 0.5% v/v	3	d	98	abc	0	b	100	a
10	TRT 13 fb Monza @ 25 g/ha + Polo LVE @ 500 mL/ha + Bonza @ 0.5% v/v	1	d	99	a	59	ab	62	d
11	TRT 13 fb Crusader @ 500 mL/ha + Polo LVE @ 500 mL/ha + BS1000 @ 0.25% v/v	0	d	100	a	4	b	92	a
12	TRT 13 fb Atlantis @ 330 mL/ha + Polo LVE @ 500 mL/ha + Hasten @ 1% v/v	14	cd	90	abc	6	b	98	a
13	Sencor 750WG @ 150 g/ha + TriflurX @ 1 L/ha (IBS) - standard	57	b	71	d	17	b	77	c
LSD (P=.05)		39.5		18.9		62.3		13.9	
CV		76.5		13.4		213.1		10.7	

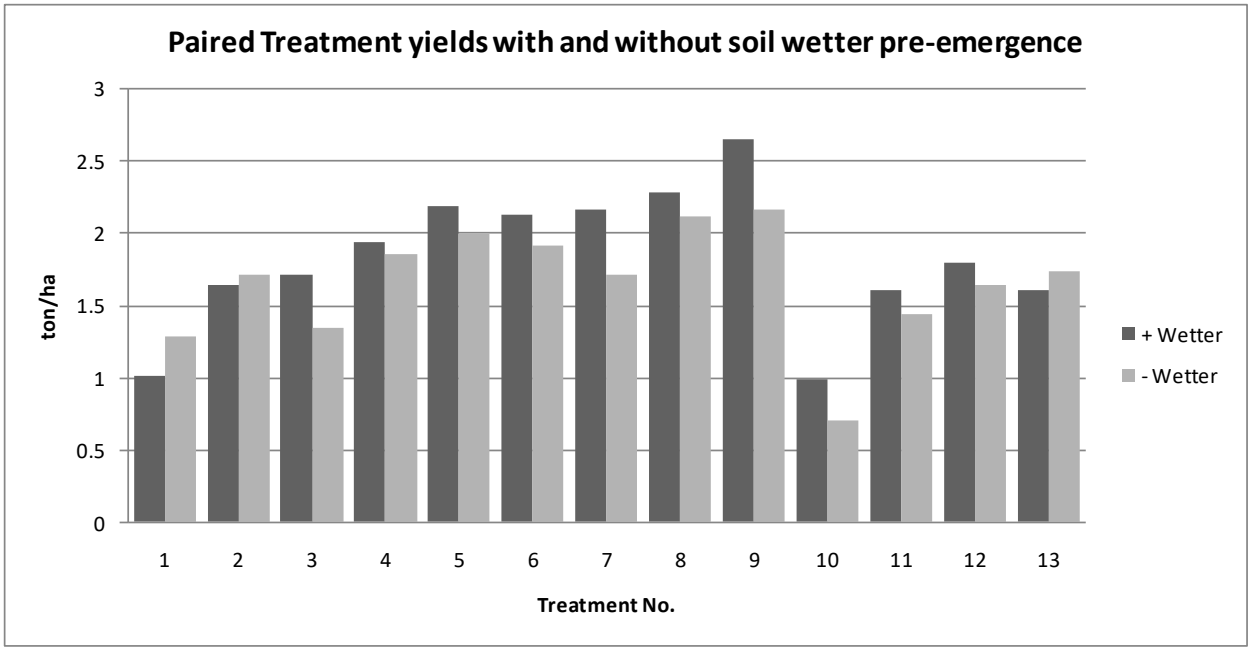
Means followed by same letter do not significantly differ (P=.05, LSD)

** Treatment 13 less 50 g/ha Sencor i.e. Sencor 750WG @ 100 g/ha + TriflurX @ 1 L/ha

Crop biomass (wetted treatments only) and yield

Treatment		1st October Crop biomass (0-100)	Soil wetter			
			With		Without	
1	Untreated Check	58	1.013	fg	1.288	efg
2	Midas only	77	1.648	b-f	1.714	b-e
3	Intervix 500 mL/ha + Polo only	80	1.714	b-e	1.345	d-g
4	Intervix 750 mL/ha + Polo only	81	1.941	b-e	1.856	b-e
5	Pre-em** fb Midas	82	2.188	abc	1.998	a-d
6	Pre-em** fb Intervix 500 mL/ha + Polo	83	2.131	abc	1.913	b-e
7	Pre-em fb Intervix 500 mL/ha + Polo	85	2.159	abc	1.714	b-e
8	Pre-em** fb Intervix 750 mL/ha + Polo	86	2.282	ab	2.121	abc
9	Pre-em fb Intervix 750 mL/ha + Polo	92	2.652	a	2.169	abc
10	Pre-em fb Monza	50	0.994	fg	0.701	g
11	Pre-em fb Crusader	73	1.61	c-f	1.439	def
12	Pre-em fb Atlantis	78	1.799	b-e	1.638	b-f
13	Pre-em only - standard	77	1.61	c-f	1.733	b-e
LSD (P=.05)			0.670			
CV			23.260			

Graph showing paired yield responses with and without soil wetter



Costing

Based on the input and application cost estimates (shown below) and a feed barley price of $240 per ton, the use of soil wetter put a significant strain on return on investment, with only the five standout Clearfield treatments giving a positive return (a gain of $45 - $150 per hectare). Nine of the twelve herbicide treatments without soil wetter were in positive territory, including the five Clearfield treatments

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Treatment		With Soil wetter applications			Without Soil wetter applications		
		Overall trt costs ($/ha)	Yield increase over UTC (ton/ha)	Return on costs	Overall trt costs ($/ha)	Yield increase over UTC (ton/ha)	Return on costs
1	Untreated Check	158.38	0	-158.38	0	0	0
2	Midas only	203.94	0.635	-51.54	45.56	0.426	56.68
3	Intervix 500 mL/ha + Polo only	209.94	0.701	-41.7	51.56	0.057	-37.88
4	Intervix 750 mL/ha + Polo only	228.69	0.928	-5.97	70.31	0.568	66.01
5	Pre-em** fb Midas	218.24	1.175	63.76	59.86	0.71	110.54
6	Pre-em** fb Intervix 500 mL/ha + Polo	224.24	1.118	44.08	65.86	0.625	84.14
7	Pre-em fb Intervix 500 mL/ha + Polo	225.02	1.146	50.02	66.64	0.426	35.6
8	Pre-em** fb Intervix 750 mL/ha + Polo	242.99	1.269	61.57	84.61	0.833	115.31
9	Pre-em fb Intervix 750 mL/ha + Polo	243.77	1.639	149.59	85.39	0.881	126.05
10	Pre-em fb Monza	206.76	-0.019	-211.32	48.38	-0.587	-189.26
11	Pre-em fb Crusader	208.86	0.597	-65.58	50.48	0.151	-14.24
12	Pre-em fb Atlantis	208.42	0.786	-19.78	50.04	0.35	33.96
13	Pre-em only - standard	173.46	0.597	-30.18	15.08	0.445	91.72

Costs used in these calculations:

- *Feed barley: $240 per ton (Malting barley: $312 per ton)*
- *Application cost: $7.00 per application*
- *Sencor 750WG: $24 per kg*
- *TriflurX: $5.75 per litre*
- *Intervix: $75 per litre*
- *Midas: $40 per litre*
- *Polo LVE: $9 per litre*
- *Crusader: $55 per litre*
- *Monza: $970 per kg*
- *Atlantis: $72 per litre*
- *Adjuvants: Supercharge: $8.53/L, Bonza: $6.85/L, Hasten: $7/L, BS1000: $6/L*
- *Soil wetter: $385/20L (includes cost of two applications)*

DISCUSSION

- The standard treatment in this trial, namely Sencor (metribuzin) 750WG plus TriflurX, provided no more that weak suppression of brome allowing substantial seed set.
- The trial demonstrates a new option for brome control in barley crops now available to growers, namely growing Scope barley and using Clearfield herbicides such as Intervix or Midas. Both products provided excellent to absolute control of brome, as well as silver grass.

- The trial also demonstrates that while the pre-emergence treatments alone provide only modest control of brome, their use in combination with Clearfield herbicides has the potential to improve the overall Clearfield performance. Their use is recommended for resistance management purposes and as a means of securing yield by reducing early weed competition.
- Achieving absolute control of brome grass by treatments that pay for themselves and deliver a surplus to users (of $45 – $150 per hectare) should make most Clearfield treatments highly attractive. Atlantis, Crusader and Monza each only provided strong suppression that in the long run cannot be expected to overcome brome. Regardless of their return on investment, they failed to deliver satisfactory brome control (i.e.. >90% so that the seed bank is not dramatically reduced) and are useful only in terms of managing brome within the current crop at best.
- When one considers these aspects (excellent weed control and a significant positive return on investment) it becomes immediately obvious that Clearfield technology is not overly expensive and in fact provides very good value for money.
- No benefit from the soil wetter treatment was detected in terms of weed control though some benefit to crop performance may have been realised. It is the aim of Nufarm to continue the investigation of soil wetters as weed control aides by applying these treatments earlier in the autumn.
- Should Scope barley be re-classified from feed to malt these figures become more impressive.

ACKNOWLEDGEMENTS/ THANKS

WMG for including this trial in their trial program.

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