Early or delayed sowing for improved ryegrass control?

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Key findings

- The early break to the 2014 season meant soil moisture and rainfall conditions were similar between ToS 1 and 2 and there was little variation in annual ryegrass control among pre-emergent herbicides tested.
- Grain yield and quality were not affected by pre-emergent herbicide however, there was a 1.22 t/ha yield penalty for the later ToS.

Why do the trial?

A ryegrass control trial at Hart in 2008 showed that the best additional management strategy to herbicide application was delaying sowing by 7 days. Delayed sowing reduced ryegrass numbers by 55% for all herbicide treatments. However, this often results in lower crop yield and reduced subsequent crop weed competition.

Since then, the introduction of new residual herbicides has reduced the reliance on post emergent selective grass sprays and provided an improved option for dry sowing. Anecdotal grower evidence would suggest that dry or early sown crops, using adequate rates of residual pre-emergent herbicide provide similar levels of ryegrass control. The aim of this trial was to investigate the effect of early or delayed sowing on reduction of ryegrass numbers in combination with different pre-emergent herbicides.

How was it done?

Plot size	1.75 m x 10.0 m	**Fertiliser**	DAP (18:20) + 2% Zn @ 80 kg/ha
Seeding date	TOS 1: 4th May 2014		UAN (42:0) @ 95 L/ha on 8th July
	TOS 2: 2nd June		UAN (42:0) @ 100 L/ha on 15th Aug
Crop	Scout wheat @ 80 kg/ha		

To ensure even annual ryegrass establishment across the trial site annual ryegrass seed was broadcast at 25 kg/ha in 2013, prior to seeding. Again prior to seeding in 2014 an additional 5 kg/ha annual ryegrass seed was spread ahead of seeding & tickled in with a shallow pass with the seeder prior to herbicide application. The ryegrass used was previously harvested from commercial paddocks and has medium resistance to trifluralin. A standard knife-point press wheel system was used to sow the trial on 22.5cm (9") row spacings.

The trial was a split block design with one wheat variety, two times of sowing and six pre-emergent herbicides:

1. Nil
2. IBS Boxer Gold 2.5L/ha
3. IBS Sakura 118g/ha
4. IBS Boxer Gold 2.0L/ha + IBS triallate 2.0 L/ha
5. IBS Sakura 118 g + IBS triallate 2.0 L/ha
6. IBS Boxer Gold 2.0 L/ha + PS (crop 2-3 leaf) Boxer Gold 1.5 L/ha

Pre-sowing herbicides were applied within an hour of sowing & incorporated by sowing (IBS). The post-sowing herbicides were applied on the 2nd June (ToS 1) and 7th July (ToS 2) at the 2-3 crop leaf growth stage. Assessment of annual ryegrass plant number per square metre was made for 8th August and head number per square metre on 10th October for both ToS.

Five days prior to seeding ToS 1 the site received 40 mm of rainfall followed by 7.2 mm in the week after sowing (Figure 1). Conditions prior to the second ToS were 16 mm seven days prior and 4.6 mm in the week after sowing. The ToS 2 post herbicide treatment received 20 mm after the application.

Results and discussion

Grain yield was higher for the early ToS by 1.22 t/ha. Protein was 1.2% higher in the later time of sowing which can be attributed to yield dilution effects (lower yield=higher protein). Pre-emergent herbicide treatments did not affect final grain yield or any grain quality parameters.

Table 1. Summary of wheat grain yield, protein, test weight and screening for 4th May and 2nd June time of sowing.

Time of sowing	Grain yield	Protein	Test weight	Screenings
	t/ha	%	kg/hL	%
4th May	4.15	10.2	81.6	3.0
2nd June	2.93	11.4	81.5	3.0
LSD (P≤0.05)	0.35	0.9	ns	ns

The moist conditions in late April meant a good germination of ryegrass had occurred prior to ToS 1, the knockdown herbicide controlled the initial germination and the plots were sown into good moisture (Figure 1). The early ryegrass control and optimum sowing conditions were not those initially anticipated (ie. dry sowing), however by early August there were still more than 59 ryegrass plants per square metre (Table 2).

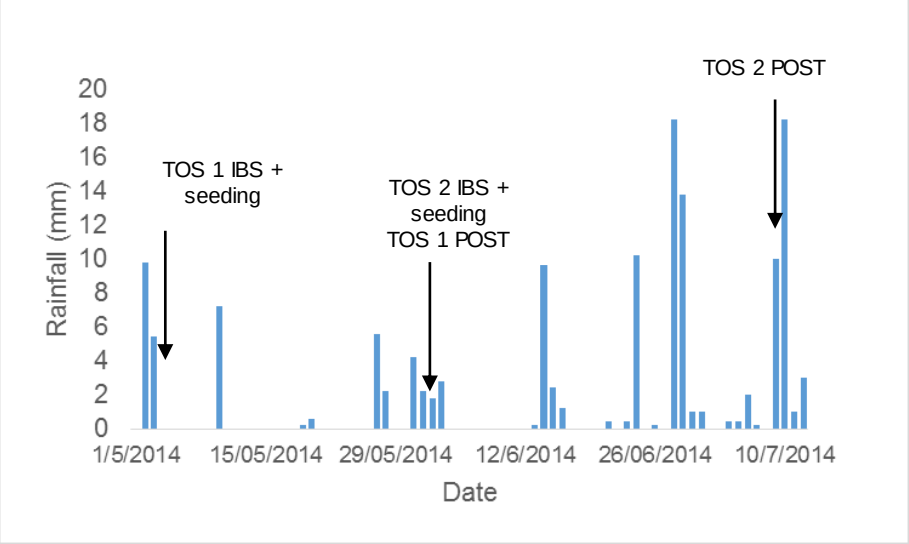

Figure 1. Rainfall from 1st May through 10th July at Hart with seeding and herbicide applications indicated.

The lack of difference in starting soil moisture and rainfall following the herbicide applications meant the pre-emergent herbicides behaved similarly across both ToS (Table 2). Early plant counts showed all pre-emergent herbicides reduced the annual ryegrass number compared to nil for both times of sowing (Table 2). The 2.5 L/ha Boxer Gold was the only treatment to have lower control compared to the other herbicides in ToS 1.

The final head count followed a similar trend to the early plant count. All treatments had reduced the number of heads to less than 25% compared to the nil. Overall, the head numbers were lower for the second ToS, highlighted by the lower head number in the nil.

Table 2. Effect of different pre-emergent herbicides on annual ryegrass plant (plants per square metre) and head density (heads per square metre) at Hart, 2014. Where a mean ryegrass count is appended by a different letter the pre-emergent herbicide had a significant effect (P≤0.05).

	Plant count (Aug 8) plant/m^2		**Head count (Oct 10) heads/m^2**	
Pre-emergent herbicide	*ToS 1*	*ToS 2*	*ToS 1*	*ToS 2*
Nil	59^{a}	77^{a}	350^{a}	164^{b}
IBS Boxer Gold	21 (36)^{b}	12 (16)^{b}	74 (21)^{c}	35 (21)^{c}
IBS Sakura	8 (13)^{c}	8 (10)^{b}	39 (11)^{c}	41 (25)^{c}
IBS Boxer Gold + triallate	6 (10)^{c}	12 (16)^{b}	20 (6)^{c}	36 (22)^{c}
IBS Sakura + triallate	3 (5)^{c}	3 (4)^{b}	32 (9)^{c}	9 (6)^{c}
IBS Boxer Gold + POST Boxer Gold	8 (13)^{c}	6 (8)^{b}	71 (20)^{c}	14 (8)^{c}
LSD Pre-emergent herbicide	10.5	11.7		
LSD Pre-emergent herbicide x ToS	ns		89	

As reflected by the grain yield, the second time of sowing produced a smaller and less competitive wheat crop. In the photos below we can see in the early ToS the ryegrass height is lower and not sitting in the crop canopy. In comparison the second ToS the ryegrass is much taller and sitting higher in the crop canopy as the wheat crop was less competitive.

Photos: Nil herbicide applied to (left) first time of sowing (right) second time of sowing, taken on 17th September. Source: C. Preston.

Summary/Implications

In year one of this research the strategy of early sowing in combination with residual pre-emergent herbicides has shown to have potential. Some caution needs to be used when interpreting the results as the conditions at both ToS were very good and so the situation of early 'dry' sowing was not simulated in 2014.

The results in 2014 suggest a strategy of delayed seeding into paddocks with higher weed numbers may not be the complete answer. Sowing early has a number of advantages:

- Early and vigorous crop growth in warm soil.
- Pre-emergent herbicides washed around the ryegrass seeds at germination, providing the best situation for control.
- Growing a high biomass and competitive crop to shade and out compete any weeds.
- Producing higher grain yields in paddocks normally limited by weed numbers or later ToS.
- An earlier maturing crop may be more suitable for crop topping.

There are certainly some possible disadvantages of sowing early (or dry) that also need to be taken into consideration:

- An early break and germination to the season, reducing the efficacy of pre-emergent herbicides.
- Increased herbicide damage from lack of tilth, shallow seeding or a cloddy paddock.
- A dry period following crop emergence could reduce the efficacy of some pre-emergent herbicides which rely on moisture to work well (i.e Boxer Gold and Sakura).

Future results will depend on a number of scenarios:

- Dry sowing, followed by wet conditions – is likely to provide the best results.
- Early season break and germination followed by dry conditions – may provide good results if the crop can emerge, but not the ryegrass. However, these conditions are less suited to herbicides like Sakura.
- Early season break and germination followed by moist conditions – the least likely to provide good results.

Acknowledgements

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