Herbicides for Barley grass management

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RESEARCH

Location
Minnipa - John and Clint Oswald
Rainfall
Av. Annual: 325 mm
Av. GSR: 241 mm
2018 Total: 268 mm
2018 GSR: 208 mm
Paddock History
2017: Wheat
2016: Peas
2015: Wheat
Yield
Potential: 1.9 t/ha (W)
Soil Type
Red loam
Plot Size
2 m x 12 m x 3 reps
Yield Limiting Factors
Barley grass and dry start to season

Key messages

- **Infrequent rainfall events, poor weed germination early and dry conditions at seeding resulted in challenging conditions for early weed control and crop establishment in 2018.**
- **In a high Barley grass weed situation herbicide mixes containing Sakura provided good weed control.**
- **Trifluralin (1.5 L/ha) IBS followed by Lexone (metribuzin) (180 g) post emergent caused significant crop damage due to rainfall events following the metribuzin application.**
- **Use as many options as possible to lower grass weed seed banks including two-year breaks.**
- **Regularly test grass populations for herbicide resistance.**
- **Aim to prevent 100% of seed from setting in all phases of the rotation.**

Why do the trial?

Barley grass continues to be a persistent grass weed in low rainfall farming systems and current farming practices have selected for increased seed dormancy. This change in seed dormancy has resulted in Barley grass germinating later, and being much harder to control with knockdown and pre-emergent herbicides. In 2018 a range of herbicide strategies was tested for their effectiveness on a high density population of Barley grass.

The 2018 site was located opposite Tcharkuldu Rock near Minnipa and a replicated small plot trial (randomised complete block design with 3 reps x 12 m plots) was sown into the standing cereal stubble.

Herbicide treatments were applied using a 2 m shielded sprayer at 2 bar pressure with medium-coarse droplets (T11002 nozzles) and 80 L/ha water rate on 12 June for the pre-emergent herbicides. Scepter wheat was sown @ 65 kg/ha with DAP @ 60 kg/ha on 12 June into adequate moisture conditions with 2 mm of rainfall after sowing. The post emergent herbicide treatments were applied on 6 July with 6 mm of rainfall after application, and a total of 30 mm for the month of July.

Measurements taken were stubble load pre-seeding and crop and weed emergence counts. Dry matter production, late grass weed counts, panicle number and size, plus grain yield and grain quality of the crop were also taken during the season.

Data was analysed using Analysis of Variance (and was also compared to a REML spatial analysis to provide confidence in results) in GENSTAT version 19. The least significant differences are based on F prob=0.05. The data for Barley grass (plants/m^2) were analysed using a square root transformation.

What happened?

Weeds and herbicide treatments

Wheat establishment in the control was 178 plants/m^2, with Trifluralin (1.5 L/ha) + Avadex (1.6 L/ha), and Boxer Gold (2.5 L/ha) (pre-emergent) + Sakura (118 g) (pre-emergent) having lower wheat establishment than the control (Table 1). The treatment with Trifluralin (1.5 L/ha) IBS, followed by Lexone (180 g/ha) post-emergent, had rainfall following the application and resulted in significant crop damage.

Barley grass plant numbers on 24 July in the control was 711 Barley grass/m^2. All treatments with Sakura and Avadex resulted in reduced Barley grass weed numbers in a high pressure weed situation and increased yields substantially, by an average of 0.7 t/ha over the untreated control (Table 1 and Figure 1). Poor Barley grass control in a high grass weed situation resulted in significant wheat yield loss.

Table 1 Effect of herbicide options on wheat performance, Barley grass and cost ($/ha)

Herbicide treatment	Group	Chemical cost ($/ha)	Crop establishment (plants/m^2)	Barley grass (plants/m^2)	Late Barley grass (heads/m^2)	Late Barley grass av. seed head length (cm)	Wheat yield (t/ha)
Control Untreated	-	-	178 bc	711 ab	907 c	63	0.32 e
Trifluralin (1.5 L/ha)	D	9	141 b	323 bcd	536 b	68	0.48 d
Trifluralin (2 L/ha)	D	12	153 bc	296 bcd	474 b	61	0.56 cd
Trifluralin (1.5 L/ha) + Diuron 900 (400 g/ha) (pre-emergent)	D+C	14	182 bc	642 abc	420 b	64	0.60 c
Trifluralin (1.5 L/ha) + Avadex (1.6 L/ha) (pre-emergent)	D+J	25	107 a	189 cde	579 b	66	0.64 c
Trifluralin (2 L/ha) + Avadex (1.6 L/ha) + diuron 900 (500 g/ha) (pre-emergent)	D+J+C	28	146 b	156 de	343 ab	60	0.63 c
Trifluralin (1.5 L/ha) + Boxer Gold (2 L/ha) (pre-emergent)	D+B	37	162 bc	794 ab	1089 c	63	0.35 e
Sakura (118 g/ha) (pre-emergent)	K	40	173 bc	126 de	86 a	64	0.98 ab
Sakura (118 g/ha)+ Avadex (3 L/ha) (pre-emergent)	K+J	70	158 bc	74 ef	81 a	58	1.07 a
Boxer Gold (2.5 L/ha) (pre-emergent)	K+J	28	203 c	1547 a	893 c	63	0.33 e
Boxer Gold (2.5 L/ha) (pre-emergent) + Sakura (118 g/ha) (pre-emergent)	K+J	68	122 a	28 f	109 a	65	0.93 b
LSD (P=0.05)			*50.5*	*608*	*278*	*ns*	*0.11*
Post Emergent Herbicide Treatments							
Control Untreated		-	178 bc	711 ab	907 c	58 c	0.32 de
Trifluralin (1.5 L/ha) IBS + Lexone (180 g/ha) (post)	D+C	15	41 a	126 c	542 ab	76 c	0.16 f
Boxer Gold (2.5 L/ha) (post)	K+J	28	150 bc	689 a	532 a	58 c	0.46 b
Glean (20 g/ha) (post)	B	1	134 b	1213 a	916 c	54 bc	0.39 bc
Monza (25 g/ha) (post)	B	10	134 b	534 b	426 a	45 a	0.66 a
Crusader (500 ml/ha) (post)	B	34	137 bc	809 a	911 c	49 ab	0.34 cd
Atlantis (330 ml/ha) (post)	B	29	147 bc	910 a	782 bc	57 c	0.27 e
LSD (P=0.05)			*43*	*117*	*243*	*6.6*	*0.07*

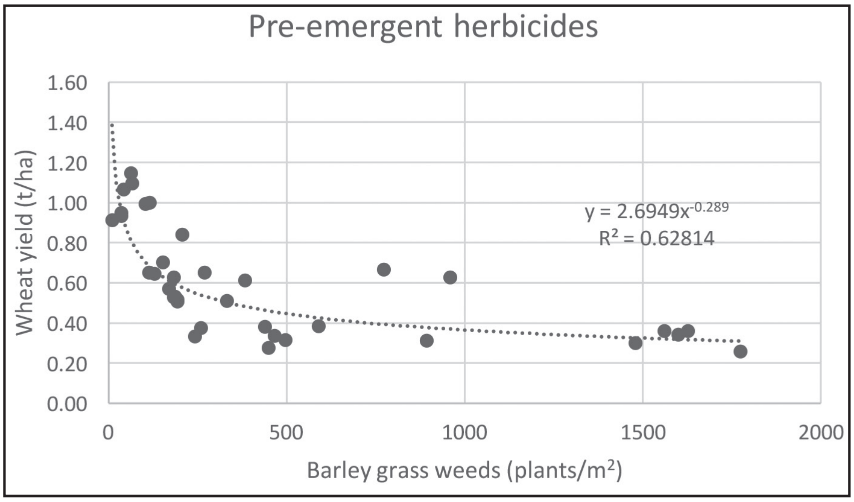

Figure 1 Wheat yield (t/ha) and Barley grass weeds (plants/m²) at Minnipa 2018 in a high pressure weed situation

Trifluralin (1.5 L/ha) IBS followed by Lexone (metribuzin) (180 g), and Monza (25 g/ha) as post emergent herbicide options showed a reduction in Barley grass plant numbers after two months. The treatment with Trifluralin (1.5 L/ha) IBS, followed by Lexone (180 g/ha) post-emergent, had rainfall following PE application and resulted in significant crop damage and death due to the herbicide washing into the crop row but was quite effective against Barley grass. Weed seed head size was also measured pre-harvest to assess any resulting weed suppression. Monza showed a reduction in head number and head size, however has some significant plant back restrictions for following crops and pastures and may not suit all systems.

The wheat yield at the site reduced with increasing Barley grass numbers (Figure 1). Early control of Barley grass achieved higher yields as shown in Figure 1, whereas late control of Barley grass did not increase grain yield (Table 1).

What does this mean?

The dry seeding conditions again at the start of the 2018 season resulted in challenging conditions for both establishing crops and weed control. Many crops were dry sown this season due to the late break resulting in very little pre-sowing grass weed control.

Increased seed dormancy in Barley grass populations may also be limiting early grass control with pre-emergent herbicides.

Previous research suggests that under the production regimes of upper EP, stubble management is unlikely to impact negatively on performance of pre-emergent herbicides. However, adequate water rates should be maintained when applying pre-emergent herbicides when targeting grass weeds in stubble situations. With the low production season in 2017 and scarce feed reserves there were very low stubble residues at seeding in 2018.

The 2018 herbicide trial was sown after the season break into adequate moisture and high Barley grass pressure. The herbicide options with Sakura and Avadex, in mixtures, provided good early Barley grass control. Early grass weed control is important to achieve higher yields. However, other grass weed control methods, particularly crop and herbicide rotations, must also be incorporated into farming systems to reduce grass weed pressure and delay herbicide resistance. Monza may be a useful herbicide post application in paddocks with high Barley grass numbers, but be aware of the plant back restrictions for pastures.

Reducing the weed seed bank is pivotal to managing all grass weeds. Effective two-year breaks during the pasture/break crop phase may be important in paddocks with high grass weed numbers to adequately reduce the Barley grass weed seed bank. Where dormant (later germinating) Barley grass is present, more expensive Sakura based herbicide mixes could be justified despite the added cost, as it provides a longer control period.

If Barley grass herbicide resistance is suspected, the first step is to test the population to know exactly what you are dealing with. To ensure Group A resistance is kept in check, make sure any suspected resistant plants are dealt with in pasture systems by following up with a knockdown herbicide as early as possible to prevent any seed set. Always have follow up options to control any survivors and to preserve group A herbicides. Another option may be to use other chemical groups like propyzamide (in moist conditions) to reduce the Barley grass population before using a group A herbicide. Using alternative chemical groups by including canola or Clearfield systems as a different rotational break may also be an option. The loss of Group A herbicides within current farming systems can result in high Barley grass weed seed bank carry over.

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