Kapinnie Herbicide Efficacy

Blake Gontar[1], Andrew Ware[1], Brian Purdie[1], Ashley Flint[1]
[1]SARDI, Port Lincoln

Key messages

- **No significant difference in ryegrass control was found between plots treated with any of the three pre-emergent herbicides tested**
- **Though not statistically significant, the trial demonstrated a trend of increased herbicide efficacy with increasing herbicide carrier volume**

Why do these trials?

These trials are associated with the GRDC Stubble Retention Project seeking to develop management guidelines for stubble retained farming systems on the Lower Eyre Peninsula (LEP). Two key areas of concern in farming systems where stubble is not grazed, burned or cultivated are reliance on herbicides to combat weeds and the efficacy of pre-emergent (soil incorporated) herbicides when applied to stubble-covered soil.

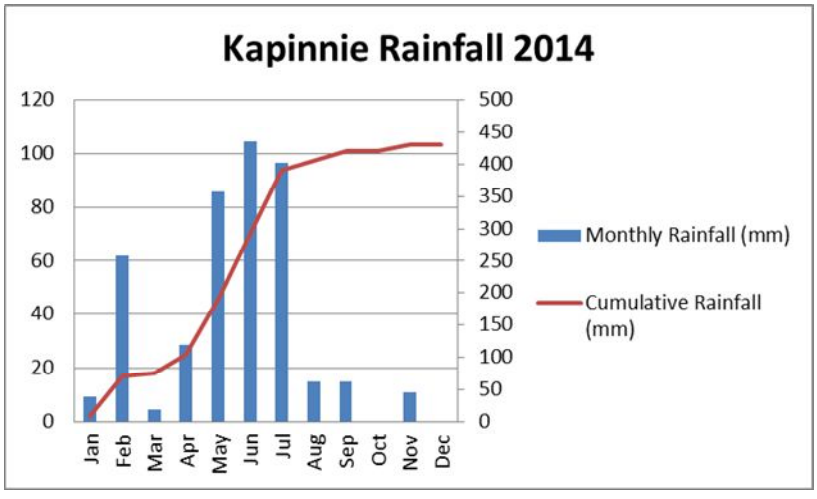
How was it done?

Two trials were conducted at Wanilla and Kapinnie throughout 2014 to assess the efficacy of three herbicide types applied at four different carrier volumes. Because of logistical constraints at sowing, the Wanilla site did not present useful data; this report refers only to the Kapinnie trial hereafter.

The twelve treatments included herbicides pyroxasulfane (as 118 g/ha Sakura), prosulfocarb (as 2.5 L/ha Boxer Gold) and combined trifluralin (1 L/ha) and tri-allate (as 1.6 L/ha Avadex), each applied with carrier volumes (rainwater) of 50, 75, 100 and 150 L/ha. Treatments were applied immediately prior to sowing the plots with wheat (variety Wyalkatchem) at 180 pl/m2 to a depth of 4 cm. Plots were sown on the 23rd May using a tined plot seeder with 22.5 cm row spacing. An 18:20 N:P fertiliser was applied at 100kg/ha, treated with fungicide (Impact @ 400mL/ha). Each combination of herbicide and carrier volume was replicated four times in a randomised complete block design.

The site received approximately 345 mm of growing season rainfall, however, as Figure 1 (below) highlights, this rainfall was largely concentrated in May-July, with a sharp shut off in the season. Because of the nature of the trial site's soils (sand over dense sodic clay), the trial suffered some waterlogging, as did much of the region.

Figure 1 – Rainfall at the Kapinnie trial site in 2014



What happened?

Crop establishment showed no signs of being affected by application of pre-emergent herbicides (P = 0.9728, CV 14.72). With no significant differences in crop establishment evident, differences in crop yield would likely indicate impact of resource competition from ryegrass. However, there was no significant effect of treatment on yield (P = 0.8882, CV 26.19). Table 1 (below) displays the average yield for each treatment combination.

Table 1 – Average yield across replicates for each treatment combination

Herbicide X Carrier Volume	Yield (t/ha)
BoxerGold@100L/ha	3.49
Sakura@75L/ha	3.46
BoxerGold@150L/ha	3.42
Trifuralin+Avadex@100L/ha	3.41
Trifuralin+Avadex@150L/ha	3.38
Trifuralin+Avadex@75L/ha	3.35
Sakura@150L/ha	3.24
Sakura@100L/ha	3.23
BoxerGold@50L/ha	3.05
Sakura@50L/ha	2.99
Trifuralin+Avadex@50L/ha	2.81
BoxerGold@75L/ha	2.53
P < 0.05	**LSD 1.20**

This trial evaluated whether different herbicides were more or less responsive to carrier volume at application. It has been previously suggested that low-solubility pre-emergent herbicides such as trifluralin may benefit from higher carrier volumes in stubble-retained systems (Borger *et al*, 2013). The interaction of herbicide with carrier volume in this trial did not result in a significant difference on either ryegrass emergence (P = 0.6409, CV 122.67) or late-season ryegrass abundance (P = 0.6409, CV 122.67).

Similarly, no significant difference in ryegrass abundance was detected between herbicides, independent of the effect of carrier volume (P = 0.2303, CV 84.63). These results reflect a similar study conducted in Western Australia, which found no difference in efficacy between trifluralin and pyroxasulfane on ryegrass abundance (Borger *et al*., 2013).

Table 2 – Effect of herbicide treatment only on average ryegrass abundance and crop yield

Herbicide	Ave. Ryegrass Abundance	Average Yield (t/ha)
Boxer Gold	15.44	3.12
Sakura	9.23	3.23
Trifluralin & Avadex	11.35	3.24
P < 0.05	**LSD 7.34**	**LSD 0.41**

Finally, the effect of carrier volume, independent of herbicide type, on ryegrass abundance was considered. Whilst the effect of carrier volume on late season ryegrass counts was not statistically significant to the 5 % confidence level (P = 0.2302, CV 94.11), and likewise, neither was the effect of carrier volume on crop yield (P = 0.08, CV 14.23), there did appear to be a trend of reduced ryegrass/increased yield with increased water rate. Table 3 (below) presents the average ryegrass counts and crop yields for each of the four carrier volumes.

Table 3 – Effect of carrier volume only on average ryegrass abundance and crop yield

Carrier Volume (L)	Ave. Ryegrass Abundance	Ave. Yield (t/ha)
50	17.33	2.95
75	12.36	3.11
100	7.83	3.38
150	10.50	3.3458
P < 0.05	**LSD 9.39**	**LSD 0.38**

What does this mean?

The variability of naturally-occurring ryegrass makes presents difficulties in statistical analysis. This variability is reflected in the high CV coefficients reported throughout. Despite this, the trial did demonstrate a likely ryegrass-control benefit from applying pre-emergent herbicides at carrier volumes beyond 100 L/ha. This is evident in the 'trend' of reduced ryegrass and higher crops yield (potentially the result of decreased competition from less-vigorous ryegrass), in plots sprayed with either the 100 or 150 L/ha carrier volumes. These proposed carrier volumes sit above the common industry practice of around 70 L, evident from anecdotal accounts.

Whilst it is surprising that no differences were detected between herbicide types, given the anecdotal suggestion of ryegrass resistance to trifluralin particularly, it may be that the addition of tri-allate is sufficient to counter any loss of efficacy in trifluralin. It may also be possible that trifluralin resistance has not developed on this site.

Where to from here?

A further trial seeking to 'iron out' the variability of ryegrass abundance is proposed for 2015 and will hopefully further evaluate carrier volume impact and differences in efficacy between herbicide types. If variability in ryegrass sampling can be reduced, it is possible that more subtle, yet significant, differences in herbicide efficacy may be evident. It is planned that the proposed trial will also evaluate the impact of varying stubble loads and stubble treatments such as high standing, slashing, burning and rolling.

Acknowledgements

The funding support from GRDC for this research and the Moroney family for hosting this trial is gratefully acknowledged.