4.1 EFFECTS OF SELECTIVE HERBICIDES ON PHALARIS PASTURE

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KEY MESSAGES

- Selective herbicide applications in pastures must be carefully chosen to reduce the negative indirect effects on desirable species, with broadleaf herbicide treatments causing less notable damage to phalaris compared to grass herbicides.
- The height of the pasture pre-spray did not have a significant effect on weed control.
- Reducing phalaris biomass pre spraying reduces leaf area for chemical uptake.
- When choosing a selective herbicide by clear on your objective of what you are trying to achieve and understand all the consequences of using a particular product.

Keywords: phalaris, pasture, herbicide, weeds, grazing

BACKGROUND

Phalaris pastures are widely grown in the High Rainfall Zone of Victoria due to their production, persistence, and nutritional value for livestock. Occasionally there is a need to intervene to remove weeds to improve their production and prolong the productive life of the pasture. Although selective herbicides can be effective in removing target weeds, they can cause loss of pasture production or even death of desirable species.

Reported ways to minimise damage can include grazing short before application to reduce leaf area uptake and applying in winter, when desirables are growing slowly (MLA 2022). The use of selective herbicides in phalaris pastures is not widely documented, including the indirect pasture damage some chemicals cause on phalaris.

The aim of this trial was to demonstrate the effect of various selective herbicides had on the tolerance of Australian Phalaris; identify which selective herbicides can be used safely in phalaris pastures for control of annual weeds and if grazing prior to herbicide application reduced damage to the phalaris.

METHOD

Treatments

Ten treatments were monitored for their indirect effects on the phalaris pasture. The trial site was prepared by grazing a 6 m by 24.5 m area to reduce leaf area, while the 'ungrazed' plots were fenced off to create a difference in biomass, with the 'grazed' section 4 cm tall (approximately 1000 kg DM/ha) and the 'ungrazed' section left at 8 cm tall (approximately 2000 kg DM/ha) (Figure 1).

Figure 1. *Photo of trial plots pre-spraying. Grazed plots in lower half of image, ungrazed plots and remainder of paddock (ungrazed) in upper half of image 2/8/22. Photo: T. Ferguson*

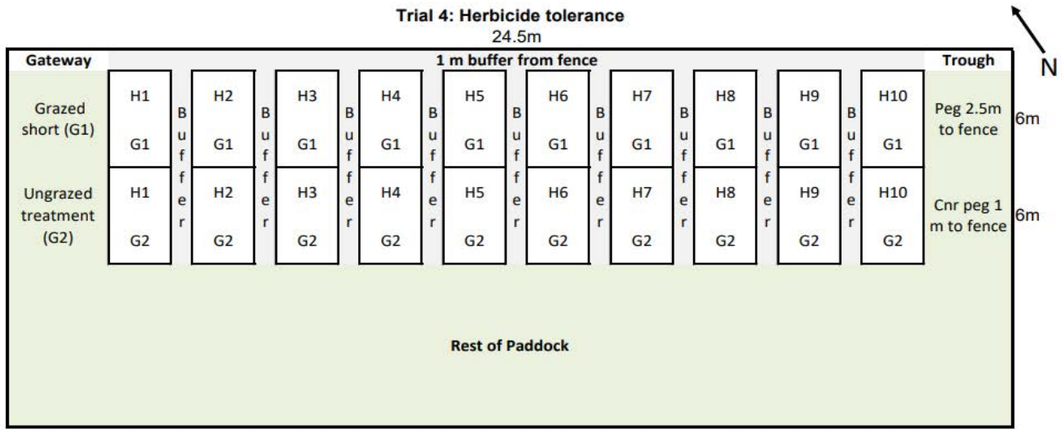

Figure 2. Trial Layout

Table 1. *Herbicide treatments and mixing rates. Herbicide group in brackets.*

Treatment	Product	Active Ingredient	Rate Unit/ha	Uptake
H1	Ecopar plus	Pyraflufen-Ethyl (14)	450mL	Foliar contact
	AgriTone® 750	MCPA amine (4)	330mL	Foliar translocated
H2	AgriTone® 750	MCPA amine (4)	675mL	Foliar translocated
H3	Legacy MA	MCPA (iso octyl ester) (4) + Diflufenican (12)	1000mL	Foliar translocated
H4	Agtryne MA	Terbutryn (5)+ MCPA amine (4)	1250mL	Foliar contact & translocated
H5	Simazine 900 wg	Simazine (5)	800g	Foliar translocated or root absorbed
H6	Shogun	Propaquizafop (1)	200mL	Foliar translocated
	BS1000 (A)		200mL	
H7	Raptor® 700 g/kg	Imazamox (2)	50g	Foliar translocated
	Liase (A)		2000mL	
	Hasten (A)		500mL	
H8	Verdict® 520	Haloxyfop (1)	50mL	Foliar translocated
	Uptake (A)		500 mL	
H9	Control			
H10	Rustler	Propyzamide (3)	1000 mL	Root absorbed

Note: *(A is Adjuvant)*

The trial layout is described in Figure 2.

All treatments were applied by a hand boom on the 9th of August 2022. Herbicides applied and their rates are listed in Table 1.

Trial Management

The entire trial was periodically grazed by Aussie White sheep throughout the growing season to manage the pasture at 4 cm, with grazing periods determined by the level of ground cover present.

Data Collection & Analysis

Visual observations were made monthly post-application using European Weed Research Council (EWRC) ratings for crop tolerance to record effects, with a focus on treatment impact on the phalaris pasture and if the pasture weeds returned during the growing season. The higher the EWRC rating (1-9), the more severe the damage to the pasture is, with 1 demonstrating no effect and 10 demonstrating total loss of the pasture. A score of 5 relates to strong chlorosis and/or stunting along with a thinning of the pasture sward (shown in Table 2, page 62).

RESULTS

Effect on Phalaris One Month Post-Treatment

One month after the herbicide applications occurred, there were some differences between treatments (Table 3) for Phalaris damage. The most damaging treatments resulted in chlorosis and stunted Phalaris growth in H6 Shogun, H8 Verdict and H10 Rustler treatments which were all grass selective herbicides.

Two Months Post-Treatment

There were no observable changes since the first month observations.

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Table 2. European Weed Research Council Rating Scores

EWRC Score	Crop Tolerance	Efficacy (Weed Kill)	Weed Control (%)
1	No effect	Complete kill	100
2	Very slight effects; some stunting and yellowing just visible	Excellent	99.9–98.0
3	Slight effects; stunting and yellowing; effects reversible	Very good	97.9–95.0
4	Substantial chlorosis and/or stunting; most effects probably reversible	Good–acceptable	94.9–90.0
5	Strong chlorosis/stunting; thinning of stand	Moderate but generally not acceptable	89.9–82.0
6	Increasing severity of damage	Fair	81.9–70.0
7	Increasing severity of damage	Poor	69.9–55.0
8	Increasing severity of damage	Very poor	54.9–30.0
9	Total loss of plant and yield	None	29.9–00.0

Table 3. One-month post-treatment observations, 6th September 2022

Herbicide treatment	Grazed	Non grazed	Comments
H1	1	1	No visual effect
H2	1	1	No visual effect
H3	1	1	No visual effect
H4	2	2	Slight suppression of growth, no visible chlorosis
H5	2	2	No chlorosis but looked a pale colour and a bit sick. Danthonia unaffected
H6	6	7	Second worst affected treatment, but phalaris still alive. Danthonia unharmed
H7	4	5	Slight chlorosis effects in ungrazed, but reduced vigour and stunting
H8	7	7	Most damaging treatment, but still alive
H9 (Control)	1	1	No visual effect
H10	5	5	Yellowing, yield reduction

Table 4. Three months post-treatment observations, 8th November 2022

Herbicide treatment	Grazed	Non grazed	Comments
H1	1	1	No visual effect
H2	2	2	Slight chlorosis developing
H3	1	1	No visual effect
H4	3	2	Some slight chlorosis visible in grazed. Growth is even
H5	3	2	Recovered well, some small bare patches forming in grazed
H6	4	5	Some bare patches visible. Recovered from yellowing
H7	3	3	Slight chlorosis still visible, but recovered well from stunting
H8	6	6	No chlorosis, but reduced growth
H9 (Control)	1	1	No visual effect
H10	4	3	Recovered from yellowing, slight growth suppression still observable. A few bare patches visible

Table 5. Four months post-treatment observations, 19th December 2022

Herbicide treatment	Grazed	Non grazed	Comments
H1	1	1	No visual effect
H2	3	1	Bare patches in grazed from weed removal
H3	2	2	Possible reduced growth of phalaris compared to control
H4	2	2	Even but slightly reduced growth
H5	2	2	Phalaris recovered well
H6	3	3	Some bare patches
H7	2	2	Phalaris recovered well
H8	3	1	Some bare patches in grazed treatment
H9 (Control)	1	1	No visual effect
H10	3	3	Bare patches visible in both grazed and ungrazed treatments

Table 6. Five months post-treatment observations 9th January 2023

Herbicide treatment	Grazed	Non grazed	Comments
H1	1	1	No visual effect
H2	1	1	No visual effect
H3	2	1	Slight bare patch in grazed
H4	1	1	No visual effect
H5	3	2	Some bare patches
H6	3	3	Bare patches
H7	1	1	No visual effect
H8	2	1	Slight bare patch in grazed
H9 (Control)	1	1	No visual effect
H10	5	5	Bare patches in both plots, very little ground cover

Three Months Post-Treatment

Treatments had begun to recover since the first month observations see Table 4 for the observational scores.

Four Months Post-Treatment

In December 2022 (Table 5), there were little noticeable differences in phalaris damage between the grazed and non-grazed plots. The treatments that had successfully resulted in weed reduction were still observable.

Five Months Post-Treatment

By five months post-treatment application (Table 6), most plots had recovered well from any negative effects, except for treatment 10, which experienced bare patches leading to significantly reduced ground cover.

The trial results showed that after three months post-treatment, most plots had recovered significantly from the effects of chlorosis and supressed phalaris growth.

Figure 3. Observations of treatments 6 (right) and 7 (left) with slight yellowing visible in treatment 7, 8th November 2022. Photo: T. Ferguson

DISCUSSION

Before applying selective herbicides to a pasture, producers must first decide what weed species they want to target. Doing this narrow down the herbicide choices available to which producers then need to determine the level of negative impact on pasture that they will accept. For producers not willing to accept damage to their desirable species, applications through spot spray, brush-on or selective herbicides and/or the use of strategic grazing management would be their best options. For producers with a lower level of risk, they may be comfortable using a less selective chemical that may control a greater variety of undesirable species but may also have a greater negative effect on their pastures.

This trial has shown that the Group 1 (formerly known as group A) 'fops' herbicides (Shogun and Verdict) along with the Group 3 (formerly Group D) propyzamide treatment (Rustler) had the greatest negative effects on the phalaris sward, while the broadleaf weed herbicides treatments (Ecopar + Agritone 750, Agritone 750 and Diflufenican 500 + LVE Agritone) had few negative effects on phalaris. All the treatments included in the trial affect plants through foliar translocation (with some treatments also taken up via contact), except Rustler, which affects the plant through root absorption.

Ways to minimise damage to phalaris pastures, can include grazing short before application to reduce leaf area uptake and applying in winter, when desirables are growing slowly. It was found during the trial, that by reducing the leaf area of the phalaris pasture, there is less contact able to be made with the herbicide, resulting in less chemical effects on your desirable pasture. Livestock may also selectively graze the more palatable sown pasture species pastures and have reduced grazing pressure on unpalatable weeds until it becomes their only option. Through carefully managed grazing, the leaf area of desirable pasture species can be reduced while leaving the weeds and less desirable plant species relatively untouched by livestock, resulting in larger leaf area sizes and increased herbicide contact.

Weed control is a long-term issue facing most farmers in the High Rainfall Zone, so a control plan that includes a range of approaches is best to reduce the risk of developing herbicide resistance. Generally, in pastures to achieve long term control of weeds, the focus should be on optimising the growing conditions favoured by the desirable sown species and preventing weed establishment, rather than treating weeds as they emerge (Eerens *et al.* 2002).

CONCLUSION

This trial has reinforced the need for producers to make well informed herbicide decisions when controlling weeds in grazing operations, particularly phalaris based pastures. To reduce the potential impacts on the pasture species, producers need to first prioritise what weed species they wish to target, and then make a careful decision on the appropriate control method for their farm. This trial has shown that the MCPA based selective herbicide treatments were less damaging to the phalaris sward, while still having a successful weed reduction when compared to the other treatments. All herbicide treatments had greater weed control than the control plot which received no chemical sprays. Further work in phalaris pastures is required to support the findings from the 2022 growing season.

ACKNOWLEDGMENTS

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REFERENCES

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