

Case study

Annual grass control in perennial pastures – Enhanced Producer Demonstration Site (PDS)



Barley grass full treatment on right hand side (Spring 2021)

Location: Mount Dryden, Victoria

Landscape: Undulating country at the foot of the Grampians.

Soils: Poorly structured, pale, sandy loam soil of sedimentary origin; prone to waterlogging, acidic, low in fertility and not suited to cropping.

Property size: 2700ac (owned and leased)

Average rainfall: 563 mm

Enterprises: prime lamb and cropping

Over-sowing and weed control demonstration– ‘Marenda’

Wayne and Caterina Burton farm at Mount Dryden, near Ararat. They purchased their initial block in 2003 and since then, the family have invested time renovating the farm and improving the fertility, infrastructure, and the pasture species. Wayne also works off farm as a canola breeder.

Wayne and Caterina have been involved in the Perennial Pasture Systems (PPS) group since it began 2007. PPS is an independent farmer group that conducts pasture research across central Victoria and the Southern Wimmera and provides information on productive pasture management to members. Wayne sits on the management board and was group president from 2015- 2017.

Producer demonstration project

Wayne and Caterina are host producers for the Enhanced Producer Demonstration Site (EPDS) run by PPS and Agriculture Victoria and co-funded by Meat and Livestock Australia (MLA).

The aim of the demonstration is to investigate methods of controlling barely grass in perennial pastures. It has been evaluating three main strategies, which include;

- Early season competition using grazing cereal, annual ryegrass and clover
- Conventional and emerging chemical control options; and
- Physical removal of seed heads including hay, silage and grazing.

Barley grass (*Hordueum leporinum*) has a significant impact on the ability to turn off seed-free meat and wool. Despite providing useful early-season feed, it produces prolific seed numbers and competes with perennial species, especially after dry periods which the PPS group and many other producers encountered in 2014-15.

Site history and treatments

The 'Marenda' demonstration site is a 24-ha paddock that was sown to a phalaris and sub clover mix in 2006. The paddock was selected for the trial because of its heavy infestation of barley grass and other weeds.

The demonstration was set up in May 2020 with the intention of controlling barley grass and at the same time, bulking up feed and extending the productive life of the paddock. The three-treatment trial (detailed in Table 1) included:

- Full Treatment- Over sowing, weed control and Nitrogen
- Partial Treatment 1: Over sowing and Nitrogen (no weed control)
- Partial Treatment 2: Weed control and Nitrogen (no over sowing)

Table 1: Treatment details

Treatment	Over sowing	Spray topping	Fertiliser
Full Treatment	Tetila Ryegrass @ 16kg/ha Balansia and Trikkala clover @4kg/ha	Paraquat 250 @ 1L/ha	MESZ 100kg/ha Urea 40kg/ha GranAm 40kg/ha
Partial Treatment 1 (no weed control)	Tetila Ryegrass @ 16kg/ha Balansia and Trikkala clover @4kg/ha		MESZ 100kg/ha Urea 40kg/ha GranAm 40kg/ha
Partial Treatment 2 (no over sowing) (4ha)		Paraquat 250 @ 1L/ha	MESZ 100kg/ha Urea 40kg/ha GranAm 40kg/ha
Date	14 May 2020	12 May 2020	July 2020

The 2020 growing season had below average rainfall at Mount Dryden (563mm), however most of this rainfall (462mm) occurred in April to October, which was great for spring growth.

Pasture cages were placed in the paddock and dry matter measurements and feed tests were taken on approximately monthly through the growing season (August 30, October 1, November 9, and December 19).

Key Results

Dry matter

Dry matter production across the across the paddock was highest under the Full Treatment of spray topping with over sowing and Nitrogen (Fig 1, Table 2), followed by Partial Treatment 1 (over sowing and Nitrogen).

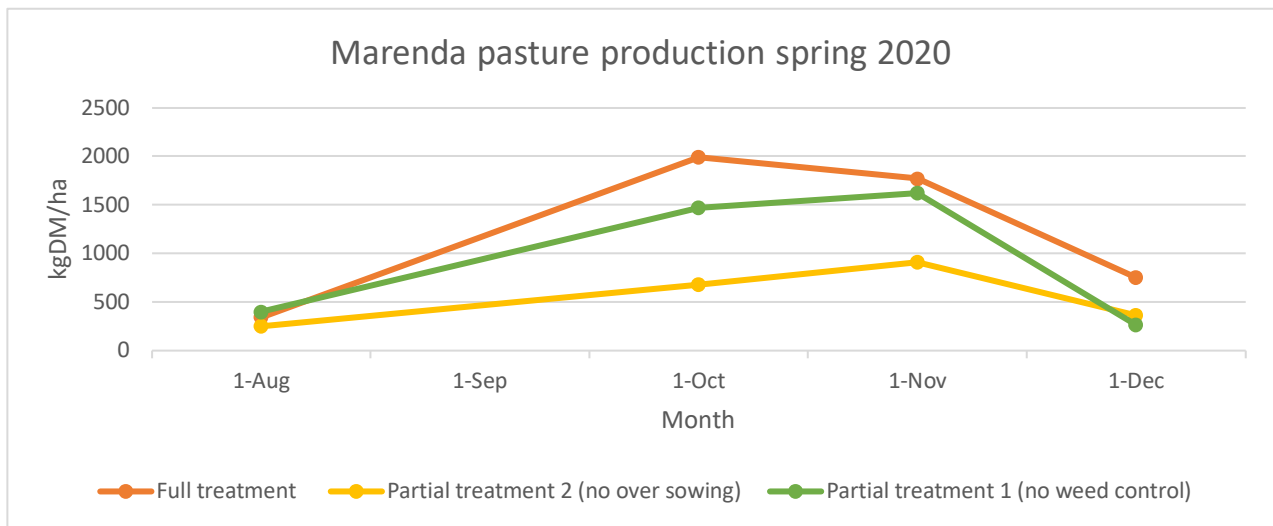


Figure 1 Marenda pasture production spring 2020 measured in kgDM/ha under pasture cages, cut in August, September, October, November, and December.

Table 2: Total dry matter production (Aug 1- Dec 1 2020) for each treatment

		Total Dry Matter Production / ha
Full Treatment	Over sown, weed control and Nitrogen	4851 kgDM/ha
Partial Treatment 1 (no weed control)	Over sown and Nitrogen	3754 kgDM/ha
Partial Treatment 2 (no over sowing)	Weed control and Nitrogen	2194 kgDM/ha

Table 3 Feed test results from each of the treatments in September and October 2020

		September			November		
		DODM	ME (MJ/kgDM)	CP %	DODM	ME (MJ/kgDM)	CP %
Full Treatment	Over sown, weed control and Nitrogen	82.9	12.6	33.8	73.2	11.0	14.5
Partial Treatment 1 (no weed control)	Over sown and Nitrogen	70.6	11.3	27.9	59.1	9.0	17.1
Partial Treatment 2 (no over sowing)	Weed control and Nitrogen	69.4	11.1	26.9	59.4	9.1	20.7

Barley grass control

The effectiveness of controlling barley grass was measured 5 months after the treatments in May 2020 through seed head counts for the three treatments. The results showed that weed control was very effective on this site with both the Full Treatment and Partial Treatment 1, however seed counts were high in Partial Treatment 2 (no weed control). Over-sowing without weed control did little to reduce the amount of barley grass present

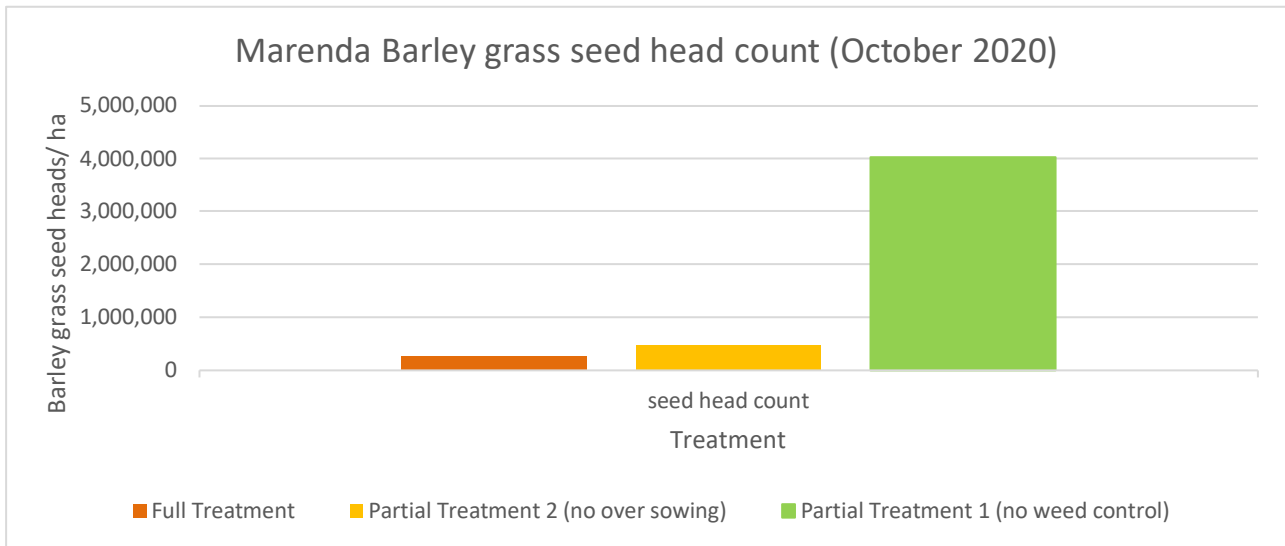


Figure 2: Shows the barley grass seed head counts at the three treatment sites in October 2020

Cost: Benefit

A cost: benefit analysis was undertaken to compare the three treatments (Table 4). The analysis included an estimate of the operational cost of treatments, inputs (including chemical and seed), hours of labour and the relative cost of the equipment. The cost of barley grass seed head contamination was beyond the scope of the project and was not included in the cost: benefit analysis.

Feed test values were used to calculate a market value of the feed based on Metabolisable Energy

Partial Treatment 2 (no over sowing) was used as the basis of comparison for the benefit: cost. The cost of weed control was \$27/ha which is shown as an 'avoided cost' for Partial Treatment 1 and not included as an additional cost in the Full Treatment as Partial Treatment 2 also had an application of herbicide.

The analysis shows a clear benefit to using both weed control and over sowing and a reduced benefit when over sowing was completed without weed control. This highlights that the minimal cost of weed control was justified by the additional benefits it gives to production.

Table 4: Cost: benefit analysis of the Full Treatment and Partial Treatment. Costs and benefits measured above the control.

	Full Treatment Over sown, weed control and Nitrogen	Partial Treatment 1 (no weed control) Over sown and Nitrogen
Extra Benefits (above Partial Treatment 2- no over sowing)		
Value of extra DM (\$/ha)	\$979	\$455
Avoided costs (spraying) (\$/ha)		\$27
Total benefits (\$/ha)	\$979	\$481
Extra investment costs (above Partial Treatment 2 no over sowing)		
Over sowing (\$/ha)	\$137	\$137
Total costs (\$/ha)	\$137	\$137
Total benefits (above Partial Treatment 2 no over sowing) \$/ha	\$842	\$345

The benefits of the Full Treatment (over sowing, weed control and Nitrogen) is summarised in Table 5. The Full Treatment increased dry matter production throughout the season leading to the highest return per hectare. It also incurred the lowest seed numbers, reducing the likelihood of barley grass seeds impacting on animal health and germinating in the following year.

Table 5: Summary of treatment benefits

Treatment		Dry Matter Production	Seed head counts /ha	Extra benefits above Partial Treatment 2
Full Treatment	Over sown, weed control and Nitrogen	4851kgDM/ha	250,011	\$842/ ha
Partial Treatment 1 (no weed control)	Over sown and Nitrogen	3754 kgDM/ha	4,020,989	\$345/ ha
Partial Treatment 2 (no over sowing)	Weed control and Nitrogen	2194 kgDM/ha	464,305	N/A

Over-sowing with annual species was a highly valuable tool and extends the life of perennial pastures while continuing to produce highly valuable feed throughout the growing season.

Producer feedback

Wayne is happy with the results and the comparative feedback from the different treatments. "Absolutely, I will do this again. The early break in 2020 meant the clover was big enough to spray, which contributed to the good success.

I did over-sow a couple of paddocks this year (2021) but due to the late break, I was unable to spray prior to sowing, so the results weren't as good. I was still able to grow a good amount of quality feed, but I haven't had the weed control benefits from spraying. I was also unable to get fertiliser on this year as paddocks were too wet.

The 2021 trial sites are still looking good, and the barley grass control is evident 12 months later. I'm looking forward to seeing the seed head counts this month (October 2021). There is still some barley grass, but it's certainly not a carpet. Ultimately, I would have liked to treat the paddock again this year with propaquizafop but it was too wet in winter to get on, so I will have to follow up and possibly look at topping again in late this spring."

References

Claire D. Lewis, K. F. (2019). Using a two-price market value method to value extra pasture DM in different seasons. *Agricultural Systems*, 178(102729), 1-8.

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