CASE STUDY

Key findings from diverse shrubs and pasture demonstration sites in the Victorian Mallee, 2023-2024

KEY MESSAGES

- Three existing diverse forage shrubs/pasture demonstration sites were monitored for shrubs survival and pasture production during 2023-2024.
- Old Man saltbush and Silver saltbush showed the best survival, and appear the best option for a mixed shrub planting to complement pasture in the Victorian Mallee.
- Other more palatable and less vigorous species such as Ruby saltbush and Tar bush should only be grown when excellent weed control is achieved before planting, and the site is set up for short duration/high intensity rotational grazing.
- The broadcasting of medic in the inter-row space between shrubs was a successful way of augmenting native pastures, leading to the production of around 2 t/ha of good quality pasture to accompany approx. 1 t/ha of edible shrubs biomass per year.
- Mixed shrubs/pasture stands are likely to be able to support around 50 ewes/ha for one month each year (500 ewes for a month on a typical 10 ha site) avoiding the need to feed those stock grain and hay; the grazing value (avoided costs of supplementary feeding) may be around $3,400 per 10 ha site per year.
- With material costs around $8000 to $10,000 per 10 ha site, set up costs can be recovered after only 3-4 years of improved grazing.
- Additional benefits are likely to include reduced erosion across the farm, better water balance, improved biodiversity and better drought resilience.

INTRODUCTION

Perennial forage shrubs have been shown previously to reduce farm business risks and improve predictability of farm feed supply on mixed farms in southern Australia[1]. Benefits include growing more feed and having shrubs as 'living haystacks' to fill feed gaps or allow deferred grazing of pastures in autumn. Environmental benefits include improved biodiversity, better water use in the landscape (reducing salinity risks) and reduced grazing pressure elsewhere on the farm.

To date, most shrub plantations in the Mallee have been based on Old man saltbush, with limited other species or pastures grown. While these plantings are highly drought resilient, palatability and feed intake can be low due to the high salt content. Growing a mix of shrub species in an alley farming system, with pasture grown in-between, increases the range of nutrients and minerals available in feed, increases feed intake, and reduces the chance of any one shrub species being lost to pests and diseases. However, diverse forage shrubs and pasture plantings have not yet been adopted at scale on farms in south-eastern Australia.

The present project examined the performance of three previously established diverse shrubs and pasture demonstration sites in the Victorian Mallee. Two of the sites, at Wargan and Patchewollock, had been planted to a mix of Old man saltbush, Ruby saltbush and Tar bush in 2022. Another older site, planted in 2015 at Murrayville, was also monitored to follow the survival of these same three species plus Silver saltbush, River saltbush and Rhagodia. The focus of the work was to:

1. identify which forage shrub species survive best in NW Victoria

2. investigate benefits and costs of forage shrub/pasture plantings, and likely impact on whole farm feed supply.

RESULTS SUMMARY

1. Shrub survival

At Wargan and Patchewollock, where new mixed species shrubs stands were established in 2022, Ruby saltbush showed the best overall survival rate (58%), while establishment of Tar bush and Old Man saltbush was more variable (38-50%). Data from both sites are shown in Table 1. At the time of writing (June 2024), Old Man saltbush plants at these sites were ready for grazing, but Ruby saltbush and Tar bush were still too small to be grazed (for example, see Figure 1). Shrubs at Wargan and Patchewollock appeared to struggle with weed pressures, probably due to unseasonally wet spring and early summer conditions in both 2022 and 2023. If possible, future efforts to establish diverse shrubs plantings should begin with knockdown weed control the year before establishment to reduce the weed seed bank.

At the older site planted at Murrayville in 2015 (Figure 2), valuable data was obtained on long term survival of a wider range of species, with Silver saltbush and Old Man saltbush showing the best long term persistence (50-60%), and River saltbush, Tar bush, Ruby saltbush and Rhagodia surviving at around 30-40% (Table 2). The loss of approximately half the shrubs across the site was likely due to a combination of drought and grazing pressure over the period 2018-2020, when the site was regularly grazed. The lower survival of River saltbush, Tar bush, Ruby saltbush and Rhagodia was likely due to the lower vigour, lower tolerance of weeds, and higher palatability of these species.

Table 1. Shrubs survival at the Wargan and Patchewollock sites to June 2024.

	Wargan	Patchewollock	Average
Ruby saltbush	49%	68%	58%
Old Man saltbush	60%	39%	50%
Tar bush	50%	25%	38%

Figure 1. Shrubs site at Patchewollock. By autumn 2024, some Old Man Saltbush plants were well established (A), a few Tar bush plants had grown above their tree guards (B), and many Ruby saltbush plants were still not well enough established to tolerate grazing (C).

Figure 2. The Murrayville demonstration site, pictured in early 2024, provides an opportunity for farmers to see six different forage species growing in Mallee conditions.

RESULTS SUMMARY CONT...

2. Productivity, benefits and costs

Forage shrubs planted in rows with pasture strips in-between have been shown previously to produce around 1 t/ha of edible biomass per year, with productivity driven primarily by rainfall and soil type, and the feed produced high in protein (>20%) and minerals. In this project, medic seed was broadcast in the inter-row space between shrubs, and successfully thickened up pasture stands (for example, see Figure 3). Pasture testing showed it is possible to produce around 2 t/ha of pasture in-between shrub rows each year, with pasture of moderate to good quality in spring (7.5% crude protein, metabolisable energy 9.0 MJ/kg DM), and low in quality in autumn (5.2% crude protein and metabolisable energy 5.1 MJ/kg DM).

On a per hectare basis, the combination of 1 t/ha of shrubs biomass and pasture at 2 t/ha was calculated to supply around 50 adult sheep a good quality ration for 1 month each year (i.e., a 10 ha site could be expected to support 500 ewes for 1 month). Younger stock would require supplementary grain and hay for growth.

Producers hosting the new shrubs sites of this project indicated they plan to use shrubs in the autumn, when paddock feed is depleted, and when stock would otherwise need to be contained and fed grain and hay at a cost of at least $1.70/ewe per week. Thus, the economic value of grazing a 10 ha shrubs/pasture stand was estimated at $3,400.

As at 2024, the material costs for a 10 ha shrubs/pasture site were around $8000 to $10,000, depending on labour requirements and water availability. Costs would therefore be recovered in sheep enterprises after around 3-4 years of improved grazing. Additional benefits are likely to include reduced erosion across the farm, better water balance, improved biodiversity and better drought resilience.

Table 2. Long term shrub survival data from the Murrayville demonstration site, 8 years after planting.

Shrub type	Numbers planted	No' plants surviving	Survival %
Silver saltbush	200	132	66
Old Man saltbush	280	136	49
River Saltbush	40	16	40
Tar bush	240	83	35
Ruby Saltbush	378	131	35
Rhagodia/Mallee saltbush	160	44	28
Total	**1298**	**542**	

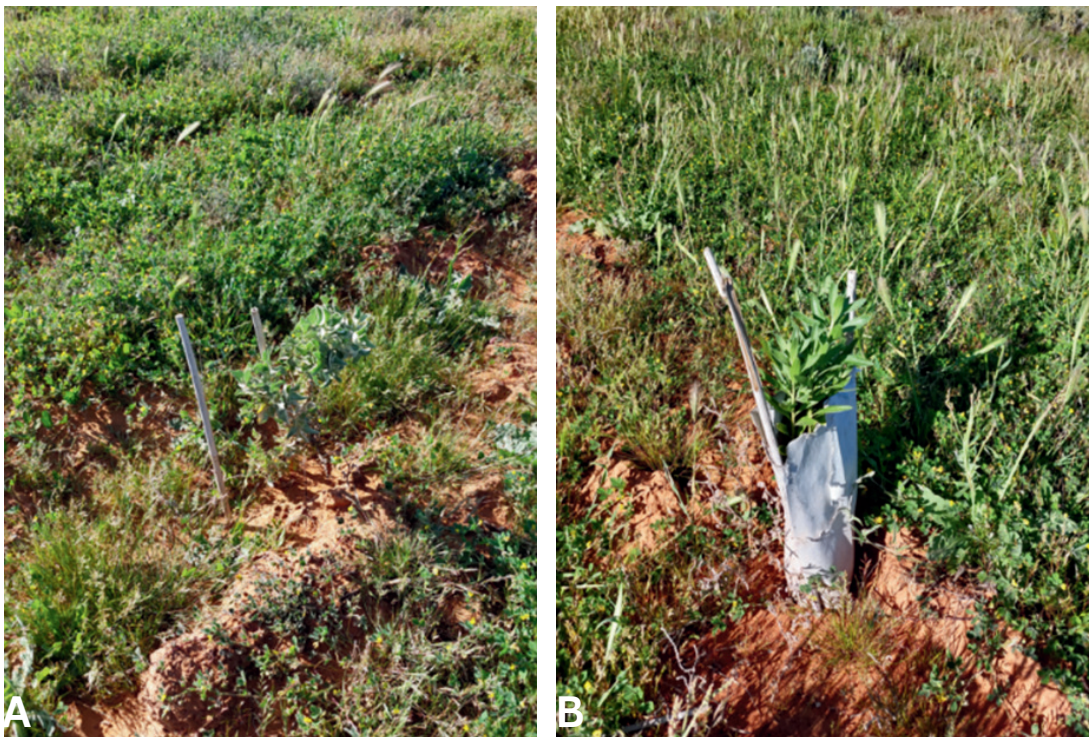

Figure 3. By spring 2023, medic pasture had established well across the Wargan site, significantly boosting forage production.

IMPLICATIONS FOR COMMERCIAL PRACTICE

Based on the site sown in 2015, mixed plantings of Silver saltbush and Old man saltbush appear to offer the best combination of survival, vigour and palatability in the Victorian Mallee. Such stands would offer many of the benefits of a mixed planting (feed and mineral diversity, lower salt levels than Old Man saltbush alone), without the complications of having large differences in time to maturity, hardiness and palatability.

Based on results from the 2015 site, and the more recent sites, the less vigorous and more palatable Ruby saltbush and Tar bush should only be included at sites with excellent weed control history (at least two knockdown sprays to deplete the weed seed bank), and the potential to graze using high intensity/short duration rotational grazing. This would require the site to be set up with multiple smaller paddocks to allow stock to be quickly rotated through different paddocks. Farmers must also be prepared to wait longer to first grazing, since Ruby saltbush and Tar bush take longer to mature. If sites have high weed pressures or are subjected to longer periods of low intensity grazing, Ruby saltbush and Tar bush should not be included.

Regarding productivity and contribution to the overall feedbase of a typical Mallee farm, a 10 ha planting is likely to provide enough feed to support around 500 grown sheep for 30 days each autumn, with costs recoverable after around 3-4 years of grazing. This is a highly useful contribution to overall farm resilience and profitability. However, typical mixed farms in the Mallee often have around 1000 ewes, may want to run sheep in smaller mobs (especially if ewes are lambing), and will often want to run sheep on mixed shrubs plantings for more than 30 days. It is therefore likely that most farmers going into shrubs will need to set up multiple small (5-10 ha) paddocks to allow rotational grazing to occur, and to allow a large proportion of the flock access to high quality forage for one to two months each year. This would allow shrubs to support sheep in autumn, in a typical feed gap, but would also open up the possibility of putting sheep on shrubs at other times of year when groundcover may be low.

FAST FACTS

- Silver and Old man saltbush appear to offer the best combination of survival, vigour and palatability in the Mallee.
- Diverse shrubs produce around 1 t/ha of high quality forage per year (protein >20%, and high mineral content).
- Complementary pasture in the inter-row space grows at around 2 t/ha per year, and is lower in protein but higher in energy.
- A 10 ha shrubs/pasture site can support around 500 ewes for 1 month each year, worth approx. $3,400 in avoided feeding costs.
- Material costs for setting up a 10 ha shrubs/pasture site are around $8,000 - $10,000, so set up costs can be recovered after 3-4 years.
- To maximise shrub survival and early vigour, comprehensive weed control should be undertaken before planting (at least two knockdown sprays).
- Where multiple shrub species are grown in a shrubs planting, short duration/high intensity rotational grazing must be practiced to prevent more palatable species from being grazed out.

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FURTHER READING

1. **Perennial forage shrubs providing profitable and sustainable grazing – Key practical findings from the Enrich project** (https://cdn.environment.sa.gov.au/environment/docs/Enrich_Booklet.pdf).

2. **Perennial forage shrubs – from principles to practice for Australian farms** (https://cdn.environment.sa.gov.au/environment/docs/Enrich-booklet-companion.pdf).