

Building drought resilience of vulnerable soils in low rainfall cropping and grazing systems

CASE STUDY

Establishing a diverse
forage shrub/pasture mix
in the Victorian Mallee





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Farmer Name: Matt Curtis
Location: Wargan, VIC
Property size: 4000 ha
Rainfall: 250mm
Enterprises: Merino and crossbred lambs, cropping – wheat, barley, peas, vetch
Demo Focus: Growing a mix of different forage shrubs and pasture to boost whole farm feed supply

Growing perennial shrubs on mixed farms can reduce farm business risk and improve predictability of farm feed supply. Shrubs can also improve the feed base by allowing more feed to be produced on less productive land, allow delayed grazing of pastures to increase autumn pasture bulk, and contribute better feed utilisation. 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 increases the range of nutrients and minerals available in feed, increases feed intake, and reduces the chance of plants being lost to pests and diseases. However, diverse forage shrubs plantings are not yet widely adopted in the Victorian Mallee.

Key Messages

- This case study explores the way a forage shrubs and pasture mix is being used on Matt Curtis's farm to improve whole farm feed supply, reduce erosion risks, and improve drought resilience.
- Matt's shrubs stand includes native saltbush/bluebush and planted saltbush, plus Matt is trialling 10 ha of new forage shrub options including Ruby Saltbush, Old Man Saltbush and Tar bush, with medic broadcast between rows.
- Established shrubs are being used to hold stock during autumn lambing, and in dry springs shrubs can also be used to hold stock before stubbles become available.
- Based on the results of this demonstration, it is estimated the new diverse shrubs/pasture mix planting will be able to feed around 500 grown sheep a high quality ration for 2-3 weeks, once or twice each year.
- With material costs around \$10,000 for a 10 ha site, costs are likely to be recovered after around 4 years of improved grazing.
- Additional benefits include reduced erosion across the farm, better water balance, improved biodiversity and better drought resilience.

Demonstration Details

Matt Curtis' property supports significant stands of native saltbush and bluebush, plus 50 ha of Old Man Saltbush planted over 10 years ago. These shrub areas are generally used to hold stock during lambing.

In this demonstration, an additional 10 ha of diverse forage shrubs was planted with Ruby Saltbush (*Enchylaena tomentosa*), Old Man Saltbush (*Atriplex nummularia*) and Tar bush (*Eremophila glabra*).

The aims of the site were to demonstrate:

- how diverse shrubs are established in the Mallee
- survival rates of different shrubs
- establishment of novel pastures in the inter-row space
- how diverse shrubs and pastures mixes can boost the farm feedbase and improve farm drought resilience.

The site was prepared by spraying with a knockdown herbicide (glyphosate) and deep ripped to a depth of 40-50 cm, with rows 12 m apart. Tubestock seedlings were planted with a 75 mm Pottipukti (hand held seedling planter) in June 2022; plants were spaced at 3 m for the smaller shrubs and 5 m for the larger shrubs (averaging 200 plants/ha). Seedlings were protected with biodegradable tree guards and

watered during dry periods (2 waterings per year over late summer and autumn in 2023 and 2024). Medic seed was spread across the site in June 2023 at 10 kg/ha to top up native pasture in the inter-row using a snail bait spreader.

Results

- Plant survival over the first 2 years of the demonstration was around 60-70% (Table 1), which is about the expected survival rate, with some plants appearing stunted due to weeds. There were no obvious differences in survival between different species.
- Medic established well during the winter of 2023 and was assessed for quantity and quality in September 2023 (Figure 1). Pasture testing showed high quality (19% crude protein and ME at 10.0 MJ/kg DM), and 1.5 t/ha of dry matter.
- By early 2024, shrubs were around 15-30cm high with Old Man Saltbush shrubs larger than the other two species, which were still too small to be grazed (Figure 1). Shrubs are expected to be ready for grazing in 2026.

Table 1. Shrubs survival at the Curtis site

	Dec-22	Jun-23	Dec-23
Ruby Saltbush	77%	68%	61%
Old Man Saltbush	78%	73%	61%
Tar Bush	71%	68%	59%

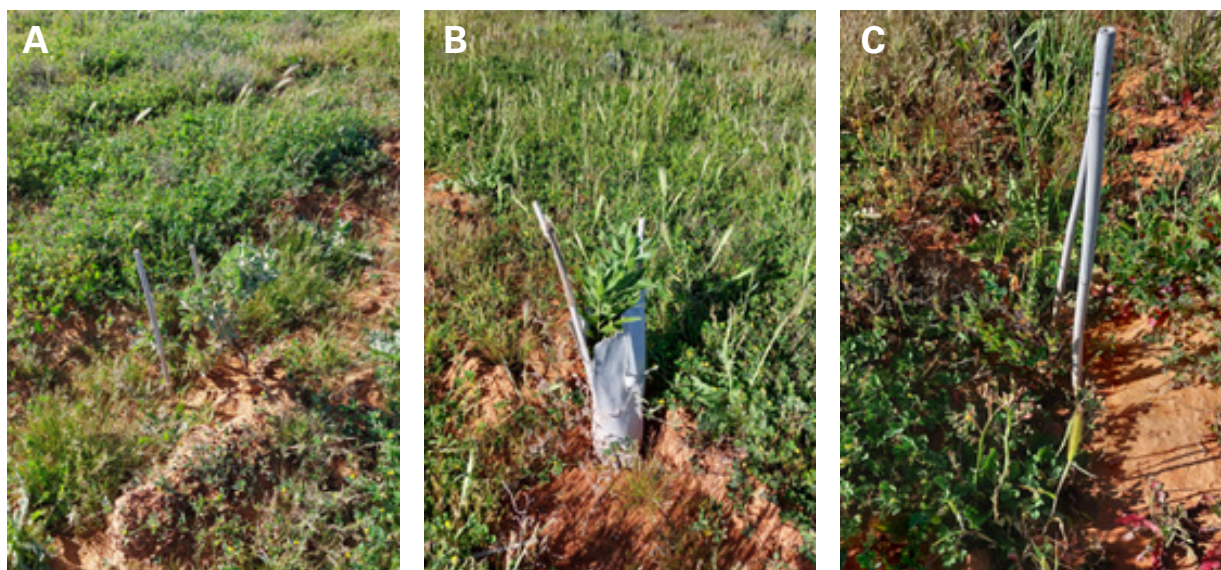


Figure 1. By spring 2023, many Old Man Saltbush plants were well established (A), a few Tar Bush plants had grown above their tree guards (B), while most Ruby Saltbush plants were still not well enough established to tolerate grazing (C). Medic was well established across the site (A,B,C), significantly boosting forage production across the site.

Insights from the demonstration and next steps

Old Man Saltbush plants grew to the point they were ready for grazing during the demonstration, but the Ruby Saltbush and Tar Bush remained too small to be grazed. Having multiple species in a forage shrubs site does delay grazing, since the site cannot be grazed until all species are ready.

The stunting or loss of some plants due to weed pressures highlighted the importance of careful weed control the year before planting. Weed pressures may have been exacerbated due to unseasonal rains in the early summer of both 2022 and 2023, and the smaller species (Ruby Saltbush and Tar Bush) may be more susceptible to weed competition than Old Man Saltbush. Further monitoring of the site is recommended to assess shrub survival once grazing commences over multiple seasons.

Grazing management will be made easier by the fact that Matt has other significant areas of natives, which will allow the planting to be rotationally grazed - short sharp grazings of no more than 2 weeks duration will be needed on the mixed shrubs planting to ensure even grazing.

Previous work has shown that once forage shrubs are well established, they are likely to yield approx. 1 t/ha of 'extra' biomass (additional to pasture) each year, which in autumn would be higher in protein and mineral content than other available feeds. (See 'Perennial forage shrubs - from principles to practice for Australian farms'.)

Based on the findings of this demonstration, 1.5 t/ha of high quality pasture can also be produced across the 10 ha, so total feed produced may be 2.5t/ha, or 25 t across 10 ha.

500 ewes eating 500 g/day of shrub and 600g pasture/day would be able to graze this for 23 days, assuming 50% pasture utilisation (500 sheep x 1.1 kg/day x 23 = 12.7 t). This could be used for lambing, filling an autumn feed gap, or provide grazing for stock in spring before stubbles become available.

According the Matt, 'Sheep are generally put into containment pens in late summer/early autumn, based on feed availability and ground cover, then onto shrubs about 2 weeks prior to lambing. Having an additional 10 ha of diverse shrub planting available will further reduce the need for containment feeding'.

Estimated costs and benefits

Approx. costs of a 10 ha site for materials and seedlings (excluding site preparation and labour associated with planting) are (2024 prices):

- 2000 plants @ \$2 each = \$4000
- Fencing (1.5 km) approx. \$4000 (materials only).

Thus, each site may cost \$8000 to \$10,000, depending on labour requirements and cost of providing water.

As at 2024, feeding ewes a maintenance ration in containment costs approx. \$1.70/ewe/week (excluding labour), so the grazing value of 23 days for 500 sheep is approx. \$2,500. Thus, it may take around 4 grazings to recover set-up costs.

Additional benefits of shrubs include shelter for stock in extreme weather, increased biodiversity, and increased water use, reducing salinity issues in areas with high water tables.



Conclusions

Forage shrubs already provide a useful, complementary feed source on Matt Curtis's farm, allowing sheep to be released from containment earlier to lamb down on good quality feed in autumn.

The diverse forage shrubs and medic pasture established in this demonstration site will add valuable extra feed once shrubs are ready for grazing in 2026.

Once mature, the planting may feed around 500 grown sheep for 2-3 weeks each autumn, delivering sufficient feed value to recover set up costs (\$5,000 - 10,000) in around 3-4 years.

Survival of the diverse shrubs plantings was as expected, at about 60-70% across the three tested species. With diverse forage shrubs, extra effort should be made to control weeds prior to planting.

Further reading

- 1. Perennial forage shrubs - from principles to practice for Australian farms**
(<https://www.wool.com/globalassets/wool/land/pastures/grazing-management/accordion/perennial-forage-shrubs--from-principles-to-practice-for-australian-farms.pdf>).
- 2. Native forage shrubs for low-rainfall areas - A guide to successfully using shrub-pasture mixes for grazing livestock**
(<https://cdn.environment.sa.gov.au/environment/docs/Enrich-booklet-companion.pdf>).

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