New options increase forage shrub potential

EverCrop *researchers are investigating the potential fit for native perennial shrubs in low-rainfall farming systems across soil types. (Photos courtesy: Bill Davoren: pictured above, CSIRO)*

New *EverCrop* trial results highlight the potential of promising native perennial shrub species for mixed plantings across a range of soil types in low-rainfall areas.

Many mixed farmers in the South Australian Mallee already have a block of forage shrubs on their farm, usually a type of old man saltbush (*Atriplex nummularia*), which delivers a range of benefits including: reduced supplementary feeding during autumn, forage options during drought, deferred grazing of regenerating annual pastures on other parts of the farm, a handy containment area during major cropping periods and a low-input production option on areas of low cropping potential.

To date the Future Farm Industries CRC *Enrich* project team has focused on identifying new native shrub species to boost production and enhance livestock health from these forage blocks. While they have made significant progress, the team is currently investigating where these promising shrubs can best be placed in the Mallee farming landscape.

key points

- Native perennial forage shrub options in low-rainfall farming systems are set to increase follow the latest *Enrich* and *EverCrop* trial results.
- Recent *EverCrop* trial results show potential production of shrub species across a range of soil types.
- Improved shrub options through FFI CRC projects could boost profitability of mixed-species plantings across a broader range of mixed farming systems in low-rainfall areas.

According to *EverCrop* project leader, Dr Rick Llewellyn, CSIRO, little previous work has been done to determine how well forage shrubs will grow on different soil types.

"Our recent trial results suggest growth can still be strong and shrubs can provide reliable feed on heavy constrained swale soils that are risky for cropping. But higher growth rates are likely on sandier soils where rooting depth is deeper," Rick said.

"While soil type impacts production, there is a wide range of management factors that influence where a producer might place a new block of forage shrubs and it is usually not going to be on the soil where they might grow best."

The *EverCrop* team is developing a forage shrub growth prediction tool to help estimate production under different seasonal conditions on different soil types.

According to Rick the outcomes of this research will allow producers to estimate production rates and feed supply reliability from shrubs planted in different parts of the landscape — particularly during the dry times when the forage shrub feed is valued most.

Enriching results

During 2009 the *Enrich* and *EverCrop* teams established an experimental site at the Mallee Sustainable Farming research site at Waikerie, South Australia as part of the broader *Enrich* program, which includes many other similar sites across southern Australia.

The team selected 15 potential forage shrub species based on earlier data from the *Enrich* project (see *Future Farm* issue 7 for more information), which suggested a range of potential benefits (see Table 1).

Species were measured for their survival, productivity and general suitability between 2009 and 2012 and the site was grazed during autumn 2011 and 2012.

When researchers assessed edible biomass before the first grazing during 2011, River Murray saltbush was the most productive species, yielding about 3 kg per plant (about 7 tonnes per hectare) (see Figure 1).

Results from 2012 saw edible biomass increase, with old man saltbush and River Murray saltbush producing more than 5 kg per plant (about 10 t/ha).

The low ground-covering creeping saltbush declined in edible biomass productivity over time and Australian bindweed, tagasaste and tree medic produced little growth.

Although old man saltbush was clearly the most productive shrub, several shrubs show promise for inclusion in the low-rainfall grazing systems of the Mallee in terms of adaption and production according to *Enrich* project leader, Dr Jason Emms, SARDI.

"Providing livestock with alternative feed (plants) of different chemical and nutritional attributes can boost production by allowing animals to mitigate excess anti-nutritional factors," Jason said.

"River saltbush, old man saltbush, river Murray saltbush, ruby saltbush, tar bush, Mallee saltbush and thorny saltbush all appear to have potential as components of shrub-based grazing systems."

Exploring soil type impacts

Alongside the *Enrich* trial, *EverCrop* researchers established a trial investigating shrub growth across a typical dune-swale landscape at the Waikerie, SA site.

Old man saltbush (De Koch) and Mallee saltbush were grown in alternate rows 5 m apart with old man saltbush planted at 3.5 m intervals and Mallee saltbush at 2 m.

The 140 m long rows run from the heavier constrained swale soil up to the deep sand at the top of the dune.

"Plants established well and although the site does not reflect an extreme soil-type gradation by Mallee standards, there were large differences in growth between the swale and dune soil types," Rick said.

During early autumn of 2011 and 2012, edible biomass was almost twice as high on the dune sand (see Figure 2).

"Edible biomass at the end of autumn this year (2013) will be largely determined by early autumn rainfall due to the extremely dry 2012 spring and 2012–13 summer, which has restricted summer growth," Rick said.

"Being a less-selected and developed species, Mallee saltbush has far more variability between plants but average results indicate a similar gradient on growth from swale to dune."

Interpreting the results

According to Rick, Mallee mixed farmers want improved forage block options to help manage livestock around their cropping program. The ongoing trial results do not mean producers now have a 'silver bullet' new forage shrub option, but it does mean new native species and improved types of old man saltbush have the potential to make forage shrubs a more valuable option across more mixed farming systems.

"If the feed quality of available shrub options stays the same, a few producers might establish small shrub plantings on their most marginal soils as we see now, Rick said.

"Forage shrub blocks are likely to remain only a small proportion of the whole-farm area on typical mixed farms. But if higher quality, more productive options become available, the options become more profitable and attractive to more producers.

Our whole-farm economic analysis shows that improving feed quality drives the whole-farm value of forage shrub blocks and they can become a more attractive option on better soils."

Rick is quick to point out that finding suitable plant species is only one part of developing sustainable grazing systems.

"Through the *EverCrop* project, the next phase involves looking at the broad range of feedbase options and their best fit for mixed farmers in the low-rainfall zone."

For more information on saltbush research, read 'Saltbush development narrows the field', *Future Farm*, Issue 11 August 2012.

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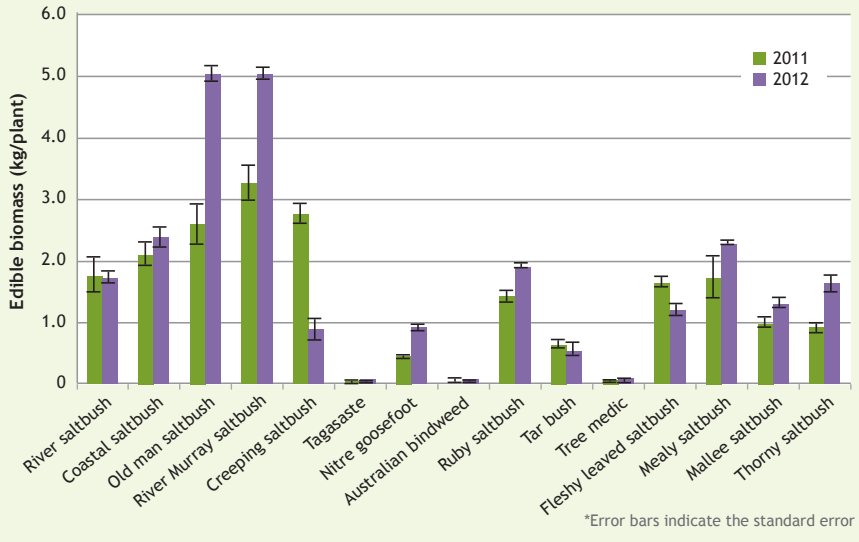
Table 1 Waikerie trial species and reason for inclusion

Common name (species name)	Reason for inclusion
River saltbush (*Atriplex amnicola*)	Biomass production
Coastal saltbush (*Atriplex cinerea*)	Biomass production
Old man saltbush (*Atriplex nummularia* cv. Eyres Green)	Commercial standard
River Murray saltbush (*Atriplex rhagodioides*)	Biomass production
Creeping saltbush (*Atriplex semibaccata*)	Biomass production
Tagasaste (*Chameacytisis prolifer*)	Commercial standard
Nitre goosefoot (*Chenopodium nitrariaceum*)	Anthelmintic potential, antimethanogenic potential
Australian bindweed (*Convolvulus remotus*)	High fermentability, anthelmintic potential
Ruby saltbush (*Enchylaena tomentosa*)	Antimethanogenic potential, moderate biomass
Tar bush (*Eremophila glabra*)	Anthelmintic potential, antimethanogenic potential
Tree medic (*Medicago strasseri*)	High nutritive value
Fleshy leaved saltbush (*Rhagodia crassifolia*)	Antimethanogenic potential
Mealy saltbush (*Rhagodia parabolica*)	Anthelmintic potential, antimethanogenic potential, moderate biomass
Mallee saltbush (*Rhagodia preissii*)	Biomass production, anthelmintic potential, antimethanogenic potential
Thorny saltbush (*Rhagodia spinescens*)	Biomass production

Figure 1 Average edible biomass during autumn 2011 and 2012*



*Error bars indicate the standard error

Figure 2 Average edible biomass of the De Koch old man saltbush 2012 across soil types at Waikerie from the heavy constrained swale soil to the sandy dune soil (more reliable cropping soil)