



LEFT: Forage shrubs can boost bottom lines and benefit livestock production while providing environmental benefits. (Photo: Marta Monjardino)

Shrubs also deliver increased water-use efficiency and a decreased risk of wind erosion and soil acidity.

The modelling found forage shrubs provide a win/win situation when planted on marginal and poor soils (see Figure 1).

“The net value of shrubs turned out to be positive in 80% of the scenarios modelled,” Dr Monjardino said.

“In 60% of the scenarios investigated, the net value was greater than \$50,000 and in 20%, more than \$100,000 per year.”

However, Dr Monjardino warned, farmers needed to devote the correct percentage of land to shrubs to reap the rewards of the non-traditional farming system.

“The model found that by planting more than 20% of a property to shrubs farmers risked cheating themselves of the returns from the current record grain prices.

“On the other hand, by planting a farm area of less than 10% the establishment cost of the shrubs was likely to outweigh the returns.”

The modelling process

Dr Monjardino performed the modelling using the whole-farm *Model of an Integrated Dryland Agricultural System* (MIDAS).

MIDAS was chosen because of its complex framework, which allowed for the integration of biological, physical and financial information relevant to farm-level economics.

Using the MIDAS model, the benefits of incorporating forage shrubs into a ‘typical farm’ situation were assessed.

Forage shrubs benefit more than the bottom line

By Laureta Wallace
Kondinin Group

A recent economic evaluation of the benefits of forage shrubs, carried out by the *Enrich* project, has revealed producers’ bottom lines have a lot to gain from the introduction of the alternate farming plants. However, dollars are not the only rewards on offer. Reduced soil erosion and acidity, carbon sequestration and improved animal health and performance are among the other benefits making a strong case for the inclusion of forage shrubs into Australian mixed farming systems.

Mixed enterprise producers can increase their annual net profits, in some instances by up to \$100,000, as a result of planting between 10-20 per cent of their land to forage shrubs such as saltbush.

These exciting results have come from economic modelling of the findings from the *Enrich* project, carried out by consultant, Dr Marta Monjardino.

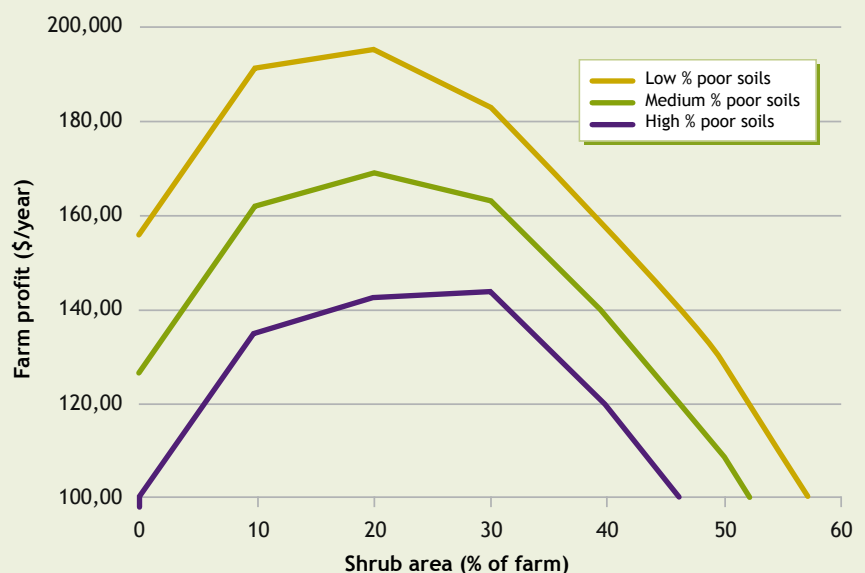
Enrich researchers screened about 60 species of Australian native shrubs of which 15 were shortlisted and are to be further examined at nine regional sites across southern Australia.

The shrubs are being evaluated for a range of traits such as biomass, bioactive effect on rumen microorganisms and gastrointestinal parasites (see *Focus on Perennials*, Issue 4).

“Across a broad range of scenarios there was a consistent message that by planting forage shrubs on between 10-20% of their farm, mixed enterprise producers could boost their profits,” Dr Monjardino said (see Figure 1).

“The increase in net profit flows from a reduced need for supplementary feeding during summer and autumn and the deferring of grazing of annual pastures. This allows them to properly establish and, as a result, maintain higher stocking rates.”

FIGURE 1. Impact of changing the relative proportions of Land Management Units (LMUs) on whole-farm profit across a range of shrub areas



key points

- Planting forage shrubs to 10-20% of a typical mixed farming system can produce annual net profit gains of \$50,000-\$100,000
- Shrubs provide livestock forage during summer and autumn reducing the need for supplementary feed
- Grazing pressure is released allowing annual pastures to establish and higher stocking rates to be maintained.

The farm

The typical farm used in the model is a 2000 hectare cropping and livestock enterprise located in Western Australia's central wheatbelt. The property has an annual rainfall of 350 mm. The maximum average daily temperature is above 30°C. The farm has a range of soil types and, as a result, was divided into eight main land management units.

The average crop area is between 50-60% with crops grown including wheat, barley, lupins, canola, and pulses. Sheep are the dominant livestock and are grazed mainly on annual pasture, although a small area of perennial species (lucerne) is also grown. Wool production makes up most of the sheep enterprise, by value of production, although prime lamb production has increased during recent years as a result of improved prices.

The shrub

The characteristics of a typical shrub were used in the model and it was assumed they were grown with a pasture understorey.

"Only on poor soils were shrubs found to be profitable without a pasture understorey," Dr Monjardino said.

"We only dealt with shrubs in general, we did not model for the variety of species, this will most likely be carried out in *Enrich II*.

"However, if one shrub had to be identified as the shrub the modelling relied on then it would be oldman saltbush."

The scenarios

Results were calculated for the profitability of forage shrubs under a variety of scenarios, which included altering factors such as land class, commodity prices and shrub characteristics including biomass production and nutritive value.

The commodity prices used were about \$200 per tonne of grain and 800 cents/kilogram for wool, however, since the modelling was carried out, prices have risen to about \$400/t and 1000 c/kg – effectively bringing down the profitability of shrubs when compared with crops (see Figure 2).

"Since these results were revealed, inputs cost have also increased, so it really is a dynamic process," Dr Monjardino said.

Calculating carbon

Dr Monjardino also carried out preliminary modelling based on the new frontier of carbon sequestration and emissions and the role shrubs could play. It was found that for the typical farm used in the model to be carbon neutral 13% of the property would need to be shrubs.

"This was based on an assumption that shrubs sequestered an average of five tonnes of carbon per hectare per year," Dr Monjardino said.

Greenhouse gas emissions for the farm were broken into six categories:

1. Methane from the rumen of livestock (42%)
2. Livestock excretions in the field in the form of nitrous oxide (included in the above percentage for all livestock emissions)
3. Fertiliser application in the form of N₂O (7%)
4. Nitrogen-fixing legume crops and pastures (28%)
5. Crop residues (17%)
6. Fuel use (5%)
7. On-farm electricity use (1%).

Livestock benefits

Another interesting area of analysis was the possible animal health and performance benefits of particular shrubs.

"Because of the shelter and shade shrubs provide, they can potentially improve lamb survival rates," Dr Monjardino explained. "The research project also has been screening shrub species for anthelmintic effects – a capacity to reduce gut parasites – so we are keen to incorporate the benefits of a reduced need for drenching animals.

"In reality, the entirety of what shrubs can offer farmers is far from being completely realised.

"For the moment, the key to success is to get the balance of shrubs compared with pasture and cropping land right.

"From these preliminary results, shrubs seem very positive – they are a low risk way of making the most of marginal and poor land.

"In addition to the environmental and economic benefits there are also the aesthetic improvements to the farm landscape.

"Farmers have more to gain than to lose by investing in these plants." ↓

More information

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FIGURE 2. Whole-farm profit against shrub area for a range of wheat prices (ASW 10%) for 2002 and 2008 (dashed line)

