

Enriching upper EP forage options

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RESEARCH

Searching for answers



Location:

Minnipa Ag Centre

Rainfall

Av. Annual: 324 mm

Av. GSR: 241 mm

2013 Total: 334 mm

2013 GSR: 237 mm

Soil Type

Red sandy loam

Environmental Impacts

Soil Health

Soil structure: Stable

Compaction risk: Nil

Ground cover or plants/m²: Forage shrubs

Perennial or annual plants: Perennial

Water Use

Runoff potential: Low

Resource Efficiency

Energy/fuel use: Standard

Greenhouse gas emissions (CO₂,

NO₂, methane): Minimal

Social/Practice

Time (hrs): Site establishment time

Clash with other farming operations:

Standard practice

Labour requirements: Minimal

Economic

Infrastructure/operating inputs:

Establishment costs

Cost of adoption risk: Low-medium, depending on establishment success

sowing, site preparation and design and the best options for weed management.

Why do the trial?

Forage shrubs are an ideal option for producers wanting to develop a beneficial and profitable use for their unproductive cropping land, particularly due to the perennial nature of these shrubs to offer out-of-season feed. A shrub-based system provides the opportunity for a valuable forage source not only in the summer-autumn period, but also at other stages of the year when pasture is not a viable option, making this an efficient alternative to manage seasonal variability in low rainfall mixed farming regions.

The research aimed to investigate alternative shrub based grazing systems using perennial native shrubs and to evaluate the use of these shrubs as a feed base for multiple benefits in farming systems, including improved livestock production and health, environmental resource management and sustainability of farming landscapes for the future.

How was it done?

The *Enrich* project at Minnipa, Piednippie and Elbow Hill sites on Eyre Peninsula (EP) established a sound foundation to introduce perennial forage shrubs to EP farming systems (EPFS Summary 2010, p 138-139, EPFS Summary 2011, p 135-138 and EPFS Summary 2012, p 143-145). The trial allowed species performance to be evaluated under three key environments in the region, which has generated key outcomes to furthering perennial shrub research in the area. A crucial result from the research was determining species 'best-bets' through analysing establishment, growth, edible biomass, palatability, recovery and persistence of the shrubs. This work linked to the national

Enrich project, which conducted further research into species adaptation, nutritive value, grazing management strategies and the overall contribution of forage shrubs to the whole farm.

Following this evaluation, the project generated sufficient interest to continue work to test a more efficient establishment option for forage shrubs in mixed farming systems on the EP. Direct seeding of the 'best-bets' species from the *Enrich* project was trialled at Minnipa from 2011 to 2013.

What happened?

Enrich Minnipa: This site was grazed for the last time for 18 days in March 2012. A dry spring resulted in poor shrub recovery with significantly low survival measurements recorded in November. Lack of summer rainfall over 2012/13 decreased the number of shrubs surviving even further when measured in autumn 2013 and subsequently a deficiency of biomass lead to no grazing occurring in 2013. Survival measurements will be taken in autumn 2014 to determine future opportunities for this *Enrich* site.

Enrich Piednippie: This site was grazed for the last time over two weeks in April 2012. This graze was only a partial graze as sheep were allowed to leave the *Enrich* site to graze the surrounding paddock. This resulted in shrubs thriving on winter and early spring rainfall in 2012 and significant overgrowth was observed during the last survival measurements in October 2012. Some maintenance will need to be carried out on the site to graze or slash the shrubs down to a more manageable level in autumn 2014 when survival measurements will be taken. The farmer will use this site as a livestock feed base, particularly in the autumn/winter feed gap, in the future.

Key messages

- **Perennial shrub-based systems can be a productive addition to conventional feed sources particularly to address feed shortages and complement other forages such as stubbles.**
- **Increased plant diversity is important for feed utilisation, nutrition and animal performance.**
- **Direct seeding is an option for establishing perennial shrubs, however further study needs to be done in order to understand time of**

Hay yard: The hay yard forage shrub direct seeding site was sown in June 2011. All of the perennial shrubs established well after some good rain in August and September after sowing, however the germination of spring weeds over many plots caused some shrubs to be out-competed by weeds. The most successful species included ruby saltbush (*Enchylaena tomentosa*), creeping saltbush (*Atriplex semibaccata*) and mallee saltbush (*Rhagodia preissii*) which established well and have grown significantly since sowing. Sandhill wattle (*Acacia ligulata*) also established well but subsequent survival has been poor. Higher seeding rates and/or better seed quality are required for old man saltbush (*Atriplex nummularia*) and river saltbush (*Atriplex amnicola*) with only a small number of plants emerging. Survival measurements have been taken each year in spring and autumn since sowing and biomass measurements were taken in spring 2013. The site will be grazed over the autumn/summer period and recovery and shrub survival after grazing will be measured to determine the future of the site.

North 1 (A): This site was sown in August 2012 to put into practice some of the lessons from the hay yard site. Unfortunately rainfall totals were significantly low from sowing until autumn in 2013 and subsequently the site had poor establishment and was abandoned.

North 1 (B): Another direct seeding forage shrub site was sown next to the North 1 (A) site in June 2013 as a mixed stand of the successful species from the hay yard site, with an increased seeding rate to improve shrub establishment and weed competition. Good rains after sowing have resulted in successful establishment of some species; however shrub resilience will be determined after the 2013/14 summer period. This site will be monitored and shrub survival recorded to determine the trial success. Grazing will be undertaken if shrubs survive in the future.

What does this mean?

The *Enrich* sites provided excellent information to assist with shrub selection and management, however establishing shrubs from seed appears one of the major hurdles in the further adoption of forage shrubs and more research is required. These sites were used as a 'trial and error' opportunity to understand what the major hurdles for shrub establishment on the EP are. An important conclusion from the demonstration sites was that more work needs to be done on more workable direct seeding practices before promoting it as a cost and production efficient option to growers, especially on time of sowing, site preparation and design, and weed management.

There has already been excellent research undertaken in establishing perennial shrubs resulting in some good information available about important management strategies that should not be overlooked. The following essential points should be considered in applying shrub systems on farm:

- **Site design:** Much work has been done in the areas of shrub-based system designs, however ultimately the design of a feedbase is determined by species choice, site size and location, machinery, labour availability and personal choice. Layout (block, alley or belt), shelter, purpose and shrub structure, size, and variety are important factors that need to be considered for shrub success. Layouts that comprise opportunities for cropping and grazing in the same area will maximise the return on investment for shrub-based systems as the complementary feedbase will provide benefits that will promote production.
- **Site preparation:** Considerations include weed control (critical pre and post sowing in the establishment year), pest control and seed bed preparation. Information regarding species tolerance to herbicides is quite limited

and therefore other options including cultivation, scalping (removing top layer of soil from sowing row to reduce weed competition in increase water catchment) and most importantly forward planning need to be used.

- **Time of sowing:** In this region, research specifies that sowing should occur soon after the break of the season, allowing plants time to establish before the warmer and drier conditions over summer with the disadvantages of frost risk, weed competition and possible slower plant growth over winter.
- **Sowing method:** Success of direct seeding is extremely variable under all methods of sowing. Depth control is the most important factor in the sowing operation and establishment will decline if the seed is buried at depths greater than 5 mm. Seed source, viability, pre-treatment and mixture are also noteworthy influences that need to be considered as part of the seeding operation.

- Grazing management:** The aim for these grazing systems is for livestock to incorporate the forage shrubs into their daily diet. They will take time to adjust to a new feed source when first introduced to the shrubs and may focus on other feed sources before they become accustomed to the shrubs. However it is more ideal for livestock to balance their diet and include different feed sources for optimal animal nutrition and production. Increasing grazing pressure, rotating animals through smaller paddocks (providing a fresh allocation of feed), using animals with different levels of experience and using watering points and/or feed supplements to

control livestock movement are options for managing grazing behaviour and achieving dietary mixing.

- Plant and site maintenance:** Plant size (grazing or slashing) and health (avoiding under or overgrazing shrubs, especially during particular periods of the year) are two other factors that need to be maintained for optimal productivity. The role of forage shrubs can be to provide shelter, ground cover and/or a component of the livestock diet.

Perennial forage shrubs are well adapted to EP and can contribute to the farm feedbase and livestock productivity. Experimenting still needs to be undertaken in order for shrub-based systems to become established via direct seeding

as a potential broadacre option in this region. The successful establishment of perennial forage shrubs through direct seeding is currently very dependent on seasonal variability, and until better practices are determined and the issues that have been encountered in this study can be overcome, more research needs to be done in order to achieve success.

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