Background
Areas of the Central Murray district have faced a decline in the amount of irrigation water available for agriculture due to water buybacks associated with the Murray Darling Basin Plan. This means that large areas of land that were previously irrigated have reverted to dryland, and the frequency of irrigation in other areas has been greatly reduced. To remain viable the community needs to increase productivity of retired irrigation land and gain the necessary knowledge to adopt large scale practice change.

The majority of the retired irrigation lands are on heavy sodic soils that have proven to be unreliable for cropping or grazing in current management systems being practiced.

Socio-economic assessment results
The region faces structural challenges due to farm consolidation and water buybacks. Key findings from a MDBA socio economic report for the region was that “dryland winter cropping is considered to be only marginally viable west of Deniliquin due to a combination of heavier clay textured soils and low rainfall of around 350mm, and therefore the future will likely be dryland grazing of a range of species”. Source: Guide to Proposed Basin Plan Technical Background Part III, NSW Central Murray Community Profile.

Land where irrigation has been removed in the project area tends to slowly return to a semi-native state, however where land levelling has been carried out, or disturbance has been high, much of the naturalised pasture is dominated by non-productive species such as barley grass and roly poly.

The Economically Viable Options for Retired Irrigation Land (EVORIL) project is exploring, through the use of five producer demonstration sites in the Wakool Shire, the biophysical and economic feasibility of various pasture species for retired irrigation lands in the Western region of the Murray Catchment, including management options.

About the project
The project was initiated in 2013 and is planned to run until 2017. The project has two components, small plot trials to evaluate new and existing pasture species to local conditions (soil and rainfall), as well as persistence and regeneration between seasons. Producer demonstration sites have been sown to species identified as having potential from the small plot trials and to test livestock performance. Livestock grazing and assessment will provide production information on the retired irrigation areas to compare against the “do nothing” (voluntary/naturalised pasture) approach.

Species and varieties trialled are principally selected on their ability to grow on an average district rainfall of approximately 300-375mm. Other criteria included the ability to tolerate heavier sodic soil types, frost, waterlogging and persistence (either producing hard seeds or drought tolerance).

Different research strategies being examined include;
1. Annals that will grow, flower, seed and regenerate.
2. Annals that will maximise growth from rainfall but require re-sowing each season.
3. Perennials, including grasses, legumes, medic and forage shrubs that will survive the summer and take advantage of out of season rainfall.
4. Experimental species (natives and exotics) that are currently undergoing evaluation.
5. Site preparation, sowing and management practices.
6. Livestock grazing to test species palatability and persistence under grazing conditions.
7. Livestock performance grazing different species and production systems.
8. Determining the quality and quantity of promising trial fodder species.
9. Re-establishing natural native grasses on retired irrigation areas – time, management and productivity comparisons.
10. Forage shrub grazing systems.
11. Economic analysis and management considerations of alternative grazing system options.
The Sites (see Map also)


The trial plan is based on an adaptive management approach to incorporate new information on fodder species and management considerations as they arise from research findings at the EVORIL trial sites, external research organisations and practical farmer feedback.

During trials in 2014 and 2015 promising trial species were identified and incorporated in producer demonstration sites with a range of production system options. Findings to date are outlined in the following Technical Notes related to the project;

- Technical Note 2.1 - Small Plot Trials: Grasses, Legumes, Herbs and Medics
- Technical Note 2.2 - Producer Demonstration Site Trials: Grasses, Legumes, Herbs and Medics
- Technical Note 3 - Forage Shrubs and Grazing Considerations
- Technical Note 4 – Management Considerations for Establishing Dryland Fodder

Trials are required over a longer term to determine the seasonal impacts on the persistence and feasibility of trial species and production systems. Perennials for example, need to be assessed in terms of both suitability to the local environment, as well as the impact of different grazing management regimes. Hard seeded annuals need to be assessed not only for their ability to set seed, but take into consideration the quantity of seed that may be eaten by stock and seed breakdown time of many hard seeded varieties to ultimately determine successful establishment.

The project has received animal ethics authorisation for animal research as approved by and in accordance with the Animal Care and Ethics Committee of the Secretary NSW Trade and Investment.

For Further Information
Damian Jones (WMLIG Agronomist) on 0409 181 099 or Rick Ellis (WMLIG Project officer) on 0428 372 357.

Acknowledgments
The EVORIL project is co-ordinated by the Western Murray Land Improvement Group (WMLIG) and is supported by Murray Local Land Services through funding from the Australian Government’s National Landcare Programme.

The project could not be done without the generosity of local landholders hosting the producer demonstration sites on their properties. The project is also grateful for the support of the CSIRO and local production groups.
Project status
Over 40 species and varieties of grasses, legumes, herbs and medics are being trialled as part of the EVORIL Project. Species were principally selected on their ability to grow on an average district rainfall of 300-375mm of annual rainfall. Other criteria included the ability to tolerate heavier soil types, frost, waterlogging and persistence (either producing hard seeds or drought tolerance). Trial site information is outlined in EVORIL Technical note 1 – Project Overview and Trial Methodology.

Portions of the larger areas have been sown to lucerne in 2014, and further areas were sown in 2015 to a number of species identified as having potential in the small plot trials. There is room to expand the small plot trials if other species/varieties are identified as having potential next season. Examples of these would be the native/sub-tropical grasses.

Seasonal condition summary
The 2014 and 2015 growing seasons had very dry springs, making the challenge of seed set and potential for dry matter production challenging.

Species List - Small Plot Trials: 44 species and varieties have been trialled in the small plots at 4 sites to date. These species are outlined in Appendix 1.

Promising species
Species that performed the best under the seasonal conditions to date were cereals (made the best use of available moisture), wimmera ryegrass, barrel medic, snail medic, spineless burr medic (trefoil), arrowleaf clover, serradella, lucerne, bladder clover and rose clover. Information about these species and the positive and negative findings are outlined in Table 1 below.

### Table 1: Promising trial species overview and trial results to date

<table>
<thead>
<tr>
<th>Name</th>
<th>Photo</th>
<th>Description</th>
<th>Trial Results (Positive and Negative comments)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Barrel Medic (A)</strong></td>
<td><img src="image1.png" alt="Photo" /></td>
<td>Medicago truncatulata Varieties sown: Parrago – mid-late maturity, Sown at 10 kg/ha</td>
<td>Has been sown for many years and is more tolerant of clay soils than many of the other medics. It has good levels of hard-seededness and tolerance of insects. A consistent performer, both from reasonable dry matter and seed production. Produces burrs which can contaminate fleeces.</td>
</tr>
<tr>
<td><strong>Snail Medic (A)</strong></td>
<td><img src="image2.png" alt="Photo" /></td>
<td>Medicago scutellata, Varieties sown: Sava – early-mid maturity, Silver – mid maturity, Sown at 10 kg/ha</td>
<td>A quick maturing legume that has large pods and seeds. The downside is the large pods and seeds are potentially at risk from overgrazing. However the plots at “Willowbank” were grazed for a reasonable period and the number of pods remaining and regeneration was excellent.</td>
</tr>
<tr>
<td><strong>Spineless Burr Medic (A)</strong></td>
<td><img src="image3.png" alt="Photo" /></td>
<td>Medicago polymorpha, Variety sown: Cavalier – mid maturity, Sown at 10 kg/ha</td>
<td>Also known as trefoil, however differs from trefoil in that the spines on the burrs are greatly reduced and do not stick to the wool. It also has a higher proportion of soft seeds for better 2nd year establishment. The spineless (and it seems not all the plants produce burrs that are spineless) burr medic has performed quite well, producing good levels of dry matter, many burrs and good regeneration.</td>
</tr>
<tr>
<td><strong>Arrowleaf Clover (A)</strong></td>
<td><img src="image4.png" alt="Photo" /></td>
<td>Trifolium vesiculosum, Varieties sown: Gefalu – early maturity, Zukumax – mid maturity, Sown at 8 kg/ha</td>
<td>Usually suited to higher rainfall areas but there are early maturing varieties available. It is hard-seeded, with a vigorous root system but can be a slow winter grower. It is not tolerant of waterlogging. A surprising result in 2014 where both varieties hung on in the dry conditions and flowered quite late. Most other species had matured when the arrowleaf was still green and flowering. Regeneration has been quite poor which may be the result of poor seed production due the dry finish in 2014 or hard-seededness.</td>
</tr>
<tr>
<td><strong>Serradella (Pink)</strong></td>
<td><img src="image5.png" alt="Photo" /></td>
<td>Trifolium hirtum Variety sown: Margurita – mid season maturity, Sown at 10 kg/ha</td>
<td>Hard seeded, quick maturing legume that prefers lighter soils. Serradella grew quite well in 2014 and produced many pods. The 2015 season had patchy establishment, and it may be due to the level of hard-seededness.</td>
</tr>
</tbody>
</table>
### Grasses, Legumes, Herbs and Medics.

**Site Trials:**
The promising species have been incorporated into producer demonstration sites. Refer to Technical Note 2.2 – Producer Demonstration

### Appendix 1: Trial Grass, Legume, Herb and Medic Species List 2014 and 2015

<table>
<thead>
<tr>
<th>Name</th>
<th>Photo</th>
<th>Description</th>
<th>Trial Results (Positive and Negative comments)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bladder Clover (A)</strong> <em>Trifolium spumosum,</em>&lt;br&gt; Variety sown: Bartolo – mid maturity.&lt;br&gt; Sown at 10 kg/ha</td>
<td></td>
<td>Produces high yields of hard seeds with a range of soil types, as long as they are not waterlogged. It can be grown with as little as 325 mm annual rainfall.</td>
<td>Establishment was good in 2014, but with OK dry matter production from large rosettes. Regeneration has been quite poor in 2015 despite abundant flowers last season. As per the description, it is hard seeded, and so this has probably impacted on the establishment in 2015.</td>
</tr>
<tr>
<td><strong>Rose Clover (A)</strong> <em>Trifolium hirtum</em>&lt;br&gt; Variety sown: SARDI – early-mid maturity.&lt;br&gt; Sown at 8 kg/ha</td>
<td></td>
<td>Suited to a wide range of soils, especially lighter textured soils. It is sensitive to heavy grazing or cutting. Will persist under lower rainfall than subclover but still marginal. Seed heads can contaminate fleeces.</td>
<td>Initial impressions were quite good, with the plants establishing well, flowering early producing seed in a tough 2014 spring. However, the plants looked like a “ball on a stick” and the feed value appeared poor. Feed test results showed the plants to be as good as the other clovers/medics. Regeneration in 2015 has been excellent and the plants quite productive.</td>
</tr>
<tr>
<td><strong>Cereals (A)</strong> Hindmarsh barley – 80 kg/ha.&lt;br&gt;Potoroo oats sown at 90-100 kg/ha&lt;br&gt; Scenario wheat: Sown at 80kg/ha.</td>
<td></td>
<td>Oats, forage cereals, wheat, barley have early maturity options available. Quick feed and quicker to grazing if sown late compared with ryegrass. Scenario wheat is a red winter wheat requiring vernalisation to run to head, giving longer grazing potential.</td>
<td>Readily available for opportunity sowing as most farms would have something in the silo if the opportunity to sow arose. Major issue is the cost sowing every season. Cereals only sown at Stoney Crossing and have proven to be the most efficient at converting rainfall to dry matter. barley is the preferred option as straw can be utilised as feed.</td>
</tr>
<tr>
<td><strong>Lucerne (P)</strong> <em>Medicago sativa,</em>&lt;br&gt; Varieties sown: Silverado – Highly Winter Active, rating 5&lt;br&gt; Silverosa – Winter Active, rating 7&lt;br&gt; L56 – Semi winter dormant, rating 5&lt;br&gt; L70 – Winter Active, rating 7&lt;br&gt; L91 – Highly winter active</td>
<td></td>
<td>A well-known legume that produces quality forage and can utilise summer rainfall. Lucerne performs better on the loamier soils, as the heavier soils restrict the moisture availability and rooting depth.</td>
<td>The lucerne varieties have been quite persistent in the small plots, with variable results in the larger areas. A part of this persistence is due to competition, or lack of it, as the small plots tend to have less weeds/grass compared with the larger areas sown. At ‘Operina’, where the grasses were controlled in spring 2014, there was a much higher level of survival compared to the uncontrolled areas.</td>
</tr>
<tr>
<td><strong>Mediterranean fescue (P),</strong> Features <em>fusidinacea</em>&lt;br&gt; Variety sown: Sown at 10 kg/ha.</td>
<td></td>
<td>Different to the tall fescues in that it is winter active and more drought tolerant. It is slow to establish and the district rainfall is still marginal for persistence.</td>
<td>Persistence is still an issue with the paddock demonstration having what seemed dormant crowns still alive in autumn 2015 failing to reshoot following rain. Establishment has been good in the 2015 small plots but growth has been lower than the ryegrasses. Other paddocks in the district sown to Resolute have shown the ability to go in to summer dormancy and reshoot the next winter.</td>
</tr>
</tbody>
</table>

(A) Annual  (P) Perennial

The promising species have been incorporated into producer demonstration sites. Refer to Technical Note 2.2 – Producer Demonstration

Site Trials: Grasses, Legumes, Herbs and Medics.

For Further Information

Damian Jones (WMLIG Agronomist) on 0409 181 099 or Rick Ellis (WMLIG Project officer) on 0428 372 357.

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Promising species
The promising species identified by small plot trial work (see Technical Note 2.1 – Small Plot Trials: Grasses, Legumes, Herbs and Medics) have been incorporated into 9 larger producer demonstration site (PDS) trials at 4 locations totalling 29ha. Site details, species and sowing rates are outlined in Table 1 below.

Table 1: Larger scale grass, legume, herb and medic pasture mix trials 2015;

<table>
<thead>
<tr>
<th>Location / Site</th>
<th>Sub-site</th>
<th>Species and sowing rate (kg/ha)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wakool ('Willowbank')</td>
<td>Lucerne sand rise (4ha)</td>
<td>Lucerne – highly winter active (3kg/ha), Snail medic - Sava &amp; Silver (2kg/ha), Serradella (2kg/ha)</td>
</tr>
<tr>
<td></td>
<td>Annual oversow into Lucerne stand – semi winter dormant (4ha)</td>
<td>Wimmera ryegrass (10kg/ha), Snail medic - Sava &amp; Silver (2kg/ha), Spineless burr medic – Cavalier (2kg/ha),</td>
</tr>
<tr>
<td></td>
<td>Annual mix (5ha)</td>
<td>Wimmera ryegrass (10kg/ha), Snail medic - Sava &amp; Silver (2kg/ha), Spineless burr medic – Cavalier (2kg/ha), Arrowleaf clover – Zulumax (2kg/ha), Mediterranean fescue - Fletcher (5kg/ha)</td>
</tr>
<tr>
<td>Mallan ('Northdale')</td>
<td>Lucerne mix (4 ha)</td>
<td>Lucerne – Semi winter dormant (3kg/ha), Snail medic - Sava &amp; Silver (2kg/ha), Spineless burr medic – Cavalier (2kg/ha)</td>
</tr>
<tr>
<td>Stoney Crossing ('Glenallen')</td>
<td>Annual mix (4ha)</td>
<td>Wimmera ryegrass (10kg/ha), Snail medic - Sava &amp; Silver (2kg/ha), Spineless burr medic – Cavalier (2kg/ha), Arrowleaf clover – Zulumax (2kg/ha)</td>
</tr>
<tr>
<td></td>
<td>Native pasture re-establishment area (8ha)</td>
<td>A native pasture re-establishment area has been set up to determine the length of time it takes for the natural incursion of native pastures. The area is used as a control to be against other alternative trial species.</td>
</tr>
<tr>
<td>Mallan ('Belvedere')</td>
<td>Maddy Nth (4ha) Medic / Clover mix</td>
<td>Snail medic - Sava &amp; Silver (2kg/ha), Spineless burr medic – Cavalier (2kg/ha), Arrowleaf clover – Zulumax (2kg/ha)</td>
</tr>
<tr>
<td></td>
<td>Maddy Sth (Creekside - west) (2ha) Perennial grasses</td>
<td>Snail medic - Sava &amp; Silver (2kg/ha), Spineless burr medic – Cavalier (2kg/ha), Arrowleaf clover – Zulumax (2kg/ha)**</td>
</tr>
<tr>
<td></td>
<td>Maddy Sth (roadside - East) (2ha) Medic / Clover mix</td>
<td>Gala brome (10kg/ha), Mediterranean fescue – Resolute (5kg/ha), Uplands cocksfoot (10kg/ha)</td>
</tr>
</tbody>
</table>

*Fertiliser rates were 50 kg/ha MAP.

Grazing trials
Larger scale grazing trials will be conducted to determine the profitability of promising species progressed from the small plot trials against standard district practice (dryland Lucerne or voluntary / naturalised pastures).

Variable rate pasture trials
Farmers expressed a desire to also have variable rate plots sown to a pasture mix with different sowing rates at field day discussions in 2014.

Trials were conducted at sowing rates varying from $20/ha to $105/ha. Seed rate trials costs and productivity information gathered in the 2015 season are outlined in Table 2.

‘At the 2014 EVORIL trial site field days farmers wanted larger scale trials of several promising species at various sowing rates so they could compare the cost of establishment against the returns in the form of dry matter production’.

Damian Jones, WMLIG Agronomist
Table 2: Variable rate pasture plots and dry matter yield.

<table>
<thead>
<tr>
<th>Location</th>
<th>$ Sowing rate / ha</th>
<th>Species sown (species selection varied based on suitability to soil type)</th>
<th>Dry Matter Yield (kg/ha)</th>
<th>$ dry matter @$200/tn³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wakool ('Willowbank')</td>
<td>$20/ha</td>
<td>The $60/ha base mix consisted of wimmera ryegrass (10kg/ha), snail medic (2kg/ha), spineless burr medic (2kg/ha), arrowleaf clover (2kg/ha) and mediterranean fescue (0.5kg/ha)</td>
<td>1509</td>
<td>$301.20</td>
</tr>
<tr>
<td></td>
<td>$45/ha</td>
<td></td>
<td>2146</td>
<td>$429.20</td>
</tr>
<tr>
<td></td>
<td>$70/ha</td>
<td></td>
<td>2652</td>
<td>$530.40</td>
</tr>
<tr>
<td>Noorong ('Operina')</td>
<td>$35/ha</td>
<td>The $60/ha base mix consisted of wimmera ryegrass (10kg/ha), snail medic (2kg/ha), bladder clover (2kg/ha) and arrowleaf clover (2kg/ha)</td>
<td>1472</td>
<td>$294.40</td>
</tr>
<tr>
<td></td>
<td>$70/ha</td>
<td></td>
<td>1943</td>
<td>$388.60</td>
</tr>
<tr>
<td></td>
<td>$105/ha</td>
<td></td>
<td>2285</td>
<td>$457.00</td>
</tr>
</tbody>
</table>

Note:
• ¹Samples taken in mid-October were almost entirely from pasture sown and very few weeds and volunteer grasses.
• ²The data was highly variable due to “endemic” ryegrass germinating after the trials were sown, adding to the overall plant population in the plots. Statistical analysis suggests all treatments are similar.
• ³Default value of $200/tn used for comparison purposes only and based on the cost of importing equivalent pasture hay. Not based on feed tests.

Variable Rate Pasture Plot - Results/discussion

• As outlined in Table 2, the results to date indicated that investing more on seed provided the greatest returns on investment for dry matter production - higher sowing rates cost more but grow more and compete with weeds. For example, investing $70/ha for seed at Willowbank in 2015 returned $229/ha more than dry matter than at the sowing rate of $20/ha or $179/ha net benefit.
• Dry matter production based on sowing rates is highly dependent on the season, and decisions have to be made whether sowing is planned for a good or poor season.
• At the rate of $70/ha it was found that ryegrass caused excessive competition for Arrowleaf clover establishment, so the ryegrass sowing rate shall be revised.

Other Technical Notes related to the project
• Technical Note 1: Project Overview
• Technical Note 2.1: Small Plot Trials: Grasses, Legumes, Herbs and Medics
• Technical Note 3: Forage Shrubs and Grazing Considerations
• Technical Note 4: Management Considerations for Establishing Dryland Pastures

Publications
• Loi, A. (2010). Twin sowing and summer sowing: Alternative techniques to introduce legumes into pastures, Department of Agriculture and Food Western Australia.
• Hackney, B. “On-demand” hardseeded pasture legumes – a paradigm shift in crop-pasture rotations for southern Australian mixed farming systems.

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Why forage shrubs? What the research is telling us?
Perennial Australian shrubs provide out of season feed, contribute to protein and mineral nutrition, improve the efficiency of livestock digestion, help control gut parasites, and provide shade and shelter. And there is a suite of other Natural Resource Management (NRM) benefits, such as controlling dryland salinity, wind erosion and improving biodiversity.

Research organisations see forage shrubs as being vitally important to the pasture mix for grazing enterprises as a dryland alternative in the region. Perennial forage shrubs can diversify the farming system and improve resilience by providing feed in dry periods and filling seasonal feed gaps. The profitable fit for shrubs is on heavier soil types that are not the best for cropping but can support reasonable inter-row pasture.

CSIRO research has found that saltbush and forage shrub options with improved feed quality characteristics will offer the opportunity for improved economic returns and increased profitability from larger plantings.

The EVORIL project has forage shrub trial sites at Noorong and Stoney Crossing (see map). Seven native shrub species are being trialled, Old Man Saltbush (Atriplex nummularia), Western Black Wattle (Acacia hakeoides), Myall (Acacia pendula), Yarran (Acacia melvillei), Tar Bush (Eromophila glabra), Sandhill Wattle (Acacia ligulata).

The WMLIG has been collaborating with CSIRO on an Old Man Saltbush (OMS) Improvement Project since 2013 near Moulaneme where 12 superior performing genotypes were planted. As a result of the trials, the CSIRO recommended the ‘Anameka’ line for further trials in the region.

Intermediate EVORIL trial results of mixed shrubs
For further information relating to the intermediate outcomes of the trial, refer to Technical Note 4, – Guidelines for Establishing Dryland Pastures (Intermediate Outcomes).

Foetal programming: Grazing pregnant ewes on saltbush from mid pregnancy to early lactation induces salt handling adaptations in the offspring, which appears to allow them to gain more tissue weight when grazing saltbush as adults. Consuming high amounts of saltbush during pregnancy also passed onto the offspring via foetal programming.

The health benefits of OMS and grazing acceptance are also passed onto the offspring via foetal programming. Dr Hayley Norman CSIRO says, ‘ideally OMS would make up 30% by feed intake but it has been found from local knowledge that body weight can not only be maintained, but gained on higher intakes, which appears now to be related to foetal programming’.

If considered together, these benefits have a positive impact on the overall quantity and quality of lamb and wool produced on the farm, and thus on-farm-profitability.

Economic analysis
The project investigating a range of forage shrubs and management regimes to increase production in the retired irrigation areas and compare the economic impact of adopting this system vs the do nothing (voluntary / naturalised pasture) alternative.

New improved cultivars of OMS such as ‘Anameka’ are more expensive, but appear more productive and feed efficient. The establishment costs may affect the rate of adoption, so the project is investigating the economics of different cultivars recommended by CSIRO and established direct drilling techniques to determine if the added establishment investment is justified.

Saltbush research has found that improving feed quality of plants was more important than increasing plant biomass. Saltbush is a high value supplement but has limited energy and fibre so a supplementary understorey is required, especially a legume or companion plant that provides additional feed requirements as well as fix nitrogen to benefit OMS growth.

Livestock benefits of Saltbush
There are a host of compounds found in saltbush lead to positive productive outcomes for livestock;

- Vitamin E and other compounds increases live-weight gain by up to 10%,
- Sulphur improves wool production and staple length by up to 10%,
- Vitamin E and selenium act as a mechanism for preventing leaking enzymes which reduces heat stress, and improves performance.
- Bioactivity in the rumen is improved which reduces methane generation and parasitic activity improving feed conversion efficiency,
- Increased lamb survival rates from extra shade and shelter.

The health benefits of OMS and grazing acceptance are also passed onto the offspring via foetal programming. Dr Hayley Norman CSIRO says, ‘ideally OMS would make up 30% by feed intake but it has been found from local knowledge that body weight can not only be maintained, but gained on higher intakes, which appears now to be related to foetal programming’.

If considered together, these benefits have a positive impact on the overall quantity and quality of lamb and wool produced on the farm, and thus on-farm-profitability.

Incorporating new high performing saltbush cultivars:
The EVORIL trial is using a new high performing cultivars of Old Man Saltbush (OMS) called ‘Anameka’. Dr Hayley Norman, (CSIRO) says ‘the cost of Anameka is significantly higher than other OMS plants but has superior feed benefits such as 64% digestibility against the average OMS that has 50% digestibility. A 10% increase in digestibility doubles the production over the average of the shrub enterprises in WA’. Dr Hayley Norman, CSIRO
## Other Technical Notes for the EVORIL project

- **Technical Note 1** - Project Overview,
- **Technical Note 2.1** - Small Plot Trials: *Grasses, Legumes, Herbs and Medics,*
- **Technical Note 2.2** - Producer Demonstration Site Trials: *Grasses, Legumes, Herbs and Medics,*
- **EVORIL Technical Note 4** - Management Considerations for Establishing Dryland Fodder

## Publications

- Monjardino M, Bathgate A, Llewellyn R. 2014. Opportunities for plant improvement to increase the value of forage shrubs on low-rainfall mixed farms, CSIRO publishing.
- Chadwick MA, Vercoe PE, Williams IH, Revell DK. 2009. Programming sheep production on saltbush: adaptations of offspring from ewes that consumed high amounts of salt during pregnancy and early lactation.
- Digby SN, Masters DG, Blanche D, Hynd PL, Revell DK. 2010. Offspring born to ewes fed high salt during pregnancy have altered responses to oral salt loads. Animal, 81-88
- Norman HC, Old Man Saltbush Improvement project, Jeff and Leslie Gray Moulamein Property, May 2014.

## References

1. Perennial forage shrubs providing profitable and sustainable grazing, key practical findings from the *Enrich* project.

## For Further Information

Damian Jones (WMLIG Agronomist) on 0409 181 099 or Rick Ellis (WMLIG Project officer) on 0428 372 357.

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Forward
The EVORIL project has run for two years. Both of years the season finished early due to a lack of moisture after promising starts. The project is being run over a five year term (2013-17) to take into account the effects of seasonal conditions on the many species being trialled and also the time it takes for seed breakdown of many hard seeded varieties.

The 2014 and 2015 trial seasons were not successful from a dry matter production perspective, however it did provide information on what species were more successful in challenging seasons. Promising species for additional trial work have been selected on their ability to persist, albeit in a semi dormant state and/or their ability to quickly set seed for the following year when the season shut down early. The promising species are being trialled in larger producer demonstration sites where sheep grazing will be conducted.

Future grazing research will focus on;
• The identification of promising trial fodder varieties that will persist with local soil types and climatic conditions and prove to be palatable to livestock and nutritionally beneficial.
• Providing information on the effect grazing management has on plant persistence, such as stocking rate and rotation timeframe.
• Improving the knowledge about alternative grazing systems for livestock producers.
• Determine the sustainability and economic feasibility of grazing new fodder species against traditional fodder species in modified and marginal landscapes.

Site Preparation
Weed control tips
Look at effective weed control as being a relatively long term management proposition. Weed control has taken two years. So far three key pasture establishment tips are;
1. Prepare at least the season before sowing improved pasture species by applying general herbicide to knock down the seed bank. Hard seeded varieties may have to be sown to allow time for seed breakdown which may be several years.
2. Establish varieties that still allow you to control weeds that are of a particular issue. For instance establish medics if you intend to control barley grass, so you have the correct herbicide mode of action options.
3. Re-establish grasses into the legume, medic pasture base as grasses drive productivity and use nitrogen fixed by the legumes.

Be careful of sulfonylurea (SU) herbicides (e.g. Glean) as residues have residual impacts on the roots of legumes at extremely low concentrations for many years.

‘If there was one message about establishing pastures on retired irrigation land is that it is not a one year sow and forget proposition’.
Damian Jones, WMLIG Agronomist

Practical farmer learnings
The host farmer at ‘Belvedere’ slashed barley grass to reduce seed set. Slashing was chosen instead of grazing so that the new trial species were not over-grazed during their establishment phase. The site also had a trial area containing grasses (Gala brome, Mediterranean fescue and Uplands cocksfoot), so a barley grass selective herbicide could not be used.
Mixed Species Forage shrubs

Early trials have indicated that although a mixed forage shrub system is ideal for improving NRM outcomes, feed nutrition diversity and associated livestock health benefits, it has also created management implications.

Sheep choose some shrub varieties before grazing others, which can be detrimental to certain species before grazing commences on other species. Extended grazing exclusion periods required for some species, not necessarily suit the optimal grazing requirements of other species. For example, grazing Old Man Saltbush (OMS) early may encourage the plant to grow as a lower growing, spreading shrub more suitable to grazing enterprises. If saltbush is not grazed at critical stages, the plant may form a more upright growth habit reducing foraging access by livestock.

It is recommended that if a farmer is seeking a mixed species shrub system, that a phased introduction is done where slower establishing species susceptible to grazing pressure be introduced in the first year/s and are excluded from grazing before planting other shrubs such as saltbush. Saltbush does better being grazed young to modify its structure to a lower growing shrub form more suitable for livestock grazing, so it is best to plant saltbush in the second year if planting mixed shrubs susceptible to grazing.

At Noorong (‘Operina’), the host farmer already has a well-established shrub based pasture system which uses sheep and cattle to totally utilise the saltbush plant biomass. Cattle graze the upper levels of the shrub, and sheep the lower parts, ensuring leaves are kept fresh and palatable.