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Native shrubs for grazing in the dry, semi-arid sand dunes of the Mallee region of Victoria, Australia

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Introduction

Native shrubs have potential for growth and grazing in dry areas where alternative perennial pasture options are limited. Deep-rooted perennials have also been shown to reduce groundwater recharge and salinity to improve ecological stability. A forage shrub evaluation experiment was established at the Walpeup Research Station in the Mallee region of Victoria, Australia to compare the performance of a range of native species. The work was conducted as part of the Enrich project with the Future Farm Industries Cooperative Research Centre.

Method

The site at Walpeup (35.1°N; 142.0°E) is in a rolling landform, with sand dunes and clay swales present within 100 m of each other. The soil is red and red-brown, developed from calcareous sandy loam, with little silt or clay remaining on the dune, tending to more underlying red-brown clay progressively down the slope. Mean annual rainfall is 330 mm and during the 2009-2011 study period, 318 mm fell in 2009, 573 mm in 2010 and 490 mm in 2011. For this experiment, 36 plants of 16 species (Table 1) were planted in 3 m rows at 1.5 m intervals in 4 replicates on 14 July 2008. In winter 2010 and 2011, 20 mixed-aged merino ewes (77 sheep/ha) grazed each replicate for about 3 weeks in turn. On 28 June 2011 the edible biomass, defined as leaves and soft shoots, was measured prior to grazing using the non-destructive 'Adelaide' technique (Andrew *et al.* 1979). Analysis of treatment differences was conducted using ANOVA, with mean separation by 5% LSD in the Genstat (version 14) statistical program (Payne *et al.* 2009).

Results

On 28 June 2011, *A. nummularia* yielded the most biomass, with 5557 kg edible dry matter/ha (Table 1). Annual yield from *R. parabolica*, *A. rhagodioides* and *A. amnicola* averaged 3383 kg/ha and the 5 species with the lowest production yielded a mean of 363 kg/ha.

A. semibaccata grew prostrate and produced a thick 20 cm deep 'carpet' prior to the first grazing. *A. semibaccata* and *E. tomentosa* both produced a number of recruits from shed seed (>10/plant, data not shown), highlighting their potential as sown species.

Discussion

This experiment showed that while *A. nummularia* has the highest biomass production, it is not the only perennial shrub that will establish, tolerate grazing and recover in the Victorian Mallee region. *Atriplex* and *Rhagodia* species showed the best combination of productivity and persistence 3 years after planting. However, poor grazing preference for some *Atriplex* species often led to an inability to control excess herbage with stock and resulted in an increase of woody stems, perpetuating poor grazing preference (D. Monks, unpublished data). From this work *A. nummularia*, *A. amnicola*, *A. rhagodioides*, *R. preissii*, *Enchylaena tomentosa* and *Eremophila glabra* have been selected for further evaluation, based primarily on productivity and grazing preference. Demonstration trials of these species have been established at a further site in the Victorian Mallee to promote a more diverse range of perennial shrubs to local landholders.

Table 1. Mean edible biomass on offer on 28 June 2011 of shrubs at Walpeup Research Station, Victoria (planted on 14 July 2008).

Species	Dry matter (kg/ha)
<i>Atriplex nummularia</i>	5557 a
<i>Rhagodia parabolica</i>	3824 b
<i>Atriplex rhagodioides</i>	3271 b
<i>Atriplex amnicola</i>	3053 bc
<i>Rhagodia crassifolia</i>	2506 cd
<i>Atriplex vesicaria</i>	1918 cd
<i>Rhagodia spinescens</i>	1804 de
<i>Rhagodia preissii</i>	1638 de
<i>Atriplex cinerea</i>	1571 de
<i>Eremophila glabra</i>	1542 de
<i>Enchylaena tomentosa</i>	911 ef
<i>Atriplex semibaccata</i>	762 ef
<i>Chamaecytisus prolifer</i>	82 f
<i>Medicago strasseri</i>	38 f
<i>Cullen australasicum</i>	24 f
<i>Convolvulus remotus</i>	-
Mean	1900
P value	<0.001
LSD (5%)	1154.7

Values with the same letter indicate no difference in means. *Convolvulus remotus* was too small to measure.

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