farmtalk

This article contains information most relevant to the less than 350 mm rainfall mallee farming region

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MALLEE SUSTAINABLE FARMING INC. SA NSW VIC

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The Role of Lucerne in Mallee Farming Systems

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GRDC Grains Research & Development Corporation

Grain & Graze Profit through knowledge MALLEE

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healthy soils for sustainable farms

State Government Victoria Department of Primary Industries

NSW DEPARTMENT OF PRIMARY INDUSTRIES

RURAL SOLUTIONS SA

Lower Murray Darling CMA CATCHMENT MANAGEMENT AUTHORITY

Department of Environment & Climate Change NSW

The issue

Threats to Mallee cropping systems are real and ongoing and come in the form of threats to the resource base as well as from economic forces. Farming systems based on perennials such as lucerne can have a positive impact in offsetting and adapting to these threats.

A survey of Mallee farmers who took part in a 2001 lucerne establishment project was completed in 2006 to establish their perceptions of the role and future of lucerne on their farms.

- They all nominated livestock production and weed control benefits from lucerne as the main drivers, not salinity benefits.
- The average property size was 2000 ha with individual plans to establish between 130 – 500 ha of lucerne.
- All respondents established the lucerne with a cover crop (by different methods) and reported good initial emergence but poor survival over the first summer.
- They blamed climate not competition from the cover crop as the survival constraint.
- In several cases the sites required protection from sand blasting, so some protection for the lucerne seedling and the soil was essential.

What we know

Lucerne is well adapted to up to 80% of Mallee soils. It can help address salinity and be useful in managing erosion. As a component of a cropping rotation it may also provide biological soil health benefits, through fixing N and controlling difficult weeds, with improved competition and greater opportunity for non-selective herbicide use.

It has the potential to improve returns from a prime lamb livestock enterprise, more so in response to the predicted climate change scenario of increased size and number of "out of season" rainfall events.

However, the ability of lucerne to dry out the soil profile can have a negative impact on the subsequent annual crop yield (see *farmtalk* # 27 "Farming systems to reduce recharge").

While perceptions that the failure of lucerne to establish successfully and persist restricts the widespread use of lucerne, there is much scientific and commercial experience showing low risk establishment options.

What it means

The research measured the 2005 lucerne persistence, production and water use on 3 commercial farms involved in the 2001 project, 4 years after establishment.

In 2006 and 2007 the transition from lucerne to annual cropping was measured at 2 of the commercial sites through the crop water use efficiency.

The persistence and production performance of 54 lines of alternative perennial legumes were evaluated from 2004 – 2007.

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Lucerne

Table 1: The 2005 lucerne biomass (t/ha), persistence (plts/m^2) and estimated soil water deficit (mm) since the 2001 sowing at 3 commercial sites

	t/ha	plts.m^2	mm
Site 1	3.5	20	80
Site 2	1.8	16	40
Site 3	3	8	100

All 3 sites maintained adequate lucerne populations (~10 plants/m^2) produced valuable biomass and had reduced soil water content in the 0-1.6m soil profile after 4 years.

Table 2: 2006 and 2007 water use efficiency (kg grain/mm of available water) of wheat following lucerne at 2 sites

	2006	2007
Site 1	13	19
Site 2	9	20

The wheat following lucerne had a higher than average Mallee water use efficiency at both sites in 2007. In one case it reached the optimum level of 20 kg/mm.

Alternative perennial legumes

Table 3: Total production (t/ha) and persistence (plts/m^2) of lucerne and alternative perennial legumes from 2004 to 2007

	t/ha	plts.m^2
Australian luncernes	3-4	8
Introduced lucernes	2-3	4
Wild lucernes	1-2	2
Alternative species	0-1	0

- *Medicago sativa* ssp. *Sativa* (commercial lucerne) had the top 11 total biomass producing lines over the course of the study.
- Commercial lucerne lines were the top 6 biomass producers.
- Ten *Argyrolobium uniflorum* (alternative genera) lines maintained high densities until the extended 2006 drought.
- Four lines of *M. sativa* ssp. *caerulea* (wild lucerne) maintained similar plant densities to the commercial lucerne lines.
- The other alternative species *Lotus, Melilotus, Hedysarum, Astragalus, Cullen*, *Bituminaria and Onobrychis* lines failed to persist over 3.5 years.

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Where to next

Commercial stands of lucerne were shown to be productive and quite persistent on Mallee cropping land. They accessed more soil water than is normally available to annual crops and pastures.

Returning the land to crop following a lucerne phase produced less than potential yield in a dry year (2006). Potential yield was achieved in response to a season of above average early season rain (2007).

An animal enterprise that can capitalise on season production is necessary to allay the cost of lucerne establishment and management.

Viable legume plant alternatives or options for lucerne (*Medicago sativa)* suitable for the Mallee are not currently available.

The study has confirmed the production and persistence advantages of commercial lucerne in the low rainfall Mallee environment over a range of perennial species. This is understandable when the many centuries of commercial lucerne plant development are considered.

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