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New pasture varieties for southern Australia



Talk outline

- Background – need for new pasture species / cultivars
- FFI CRC pasture products
 - 5 legume species
 - 4 grass species
- Concluding comments



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Background

Need to expand range of new forage options:

- Productive, profitable and resilient
- Year round low cost feed
- Farmers need to remain competitive
- Keep ahead of
 - natural resource degradation
 - climate change and climate variability
 - Diseases and pests
- Perennial based farming systems required in some regions
- Limited commercial options in low rainfall zones
- Extend areas of adaptation of existing species



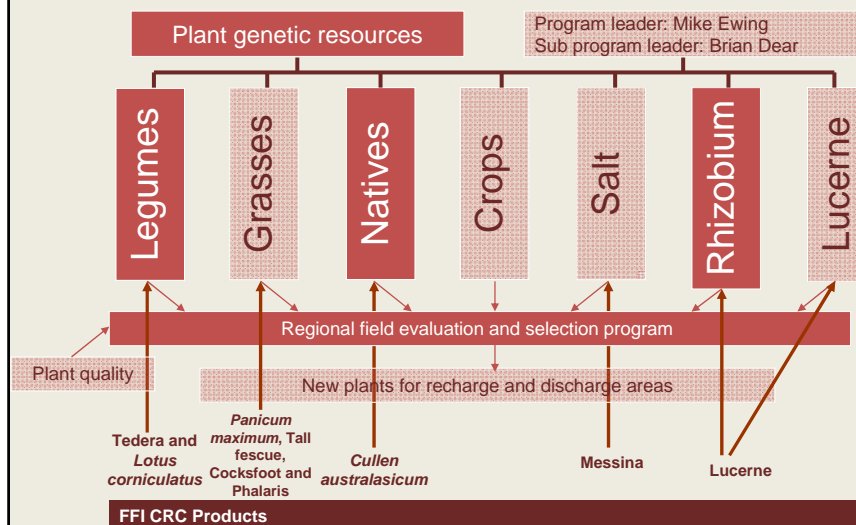
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Germplasm scoping & acquisition

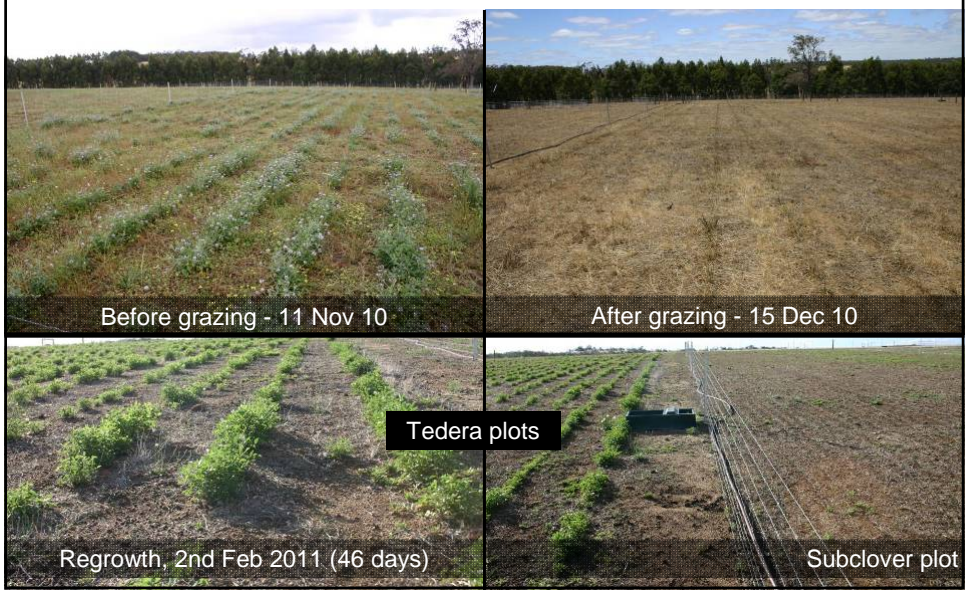
- GRC's acquired over 720 species (over 2500 accessions)
- multiplied and characterised at Waite, SA and Medina, WA

CRC Salinity sub program 5 - New and better varieties of herbaceous plants

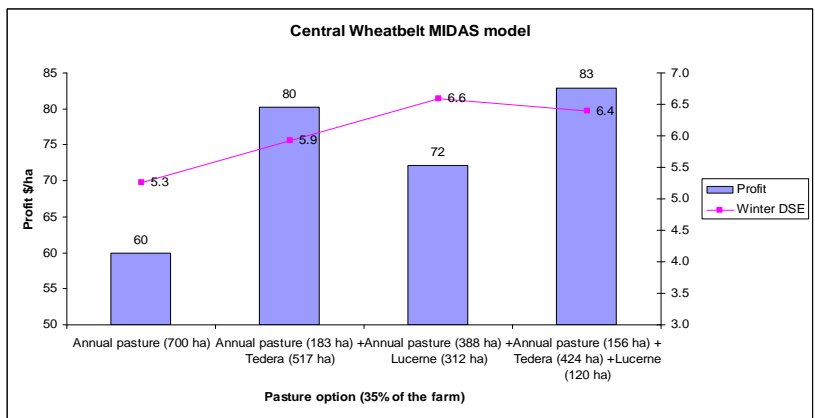


Tedera

- unique capacity to fill the autumn feed gap
- remains green with minimal leaf shedding during summer and autumn
- strategic fodder preservation advantage over existing forage options



Economic modeling MIDAS



Potential area of adaptation: 6.3 M ha in WA, 2.8 M ha in Vic and 5.6 M ha in NSW

Messina (*Melilotus siculus*) and associated salt tolerant strain of rhizobia

- annual legume with exceptional levels of salt and waterlogging tolerance
a species with the potential to transform the grazing value of saline landscapes.

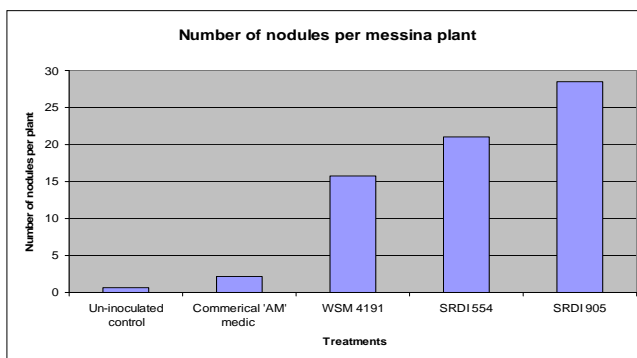
- potential to be integrated with saltbush



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Messina (saltland pasture)



- Rhizobium problem solved
- Best accessions to be selected at SA and WA by 2014
- Agronomy package also to be developed by 2014

Potential area of adaptation: 0.6 M ha in southern Australia



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Lotus corniculatus Target Zone

Rainfall <600 mm
Cropping and grazing

Lucerne

- Most sub soils with AL³⁺ less than 10%
- Lucerne is likely to be more productive than Lotus corniculatus in this zone

Rainfall 600 to 850 mm
Grazing systems
Currently no perennial legumes in this zone

Lotus corniculatus

- Most sub soils with AL³⁺ greater than 10%
- Soils are too acid for Lucerne
- Summers are too long and harsh for White clover
- Waterlogging tolerant
- Target area is 12 m ha

High rainfall (>850 mm)
Grazing tablelands

White clover

- Most sub soils with AL³⁺ greater than 15%
- Summers are significantly softer for White clover
- White clover is likely to be more productive than Lotus corniculatus in this zone

Lotus breeding and commercialisation

Four Lotus corniculatus cultivars have been produced and Plant Breeders Rights has been granted for all cultivars

A commercialisation process has been agreed to with PGG Wrightson

Seed increase is underway

We still need to:

- Establish best bet grazing management for production, persistence and recruitment
- Establish \$ per unit area benefit over comparator systems in target zone
- Determine best options for weed control in the year of establishment

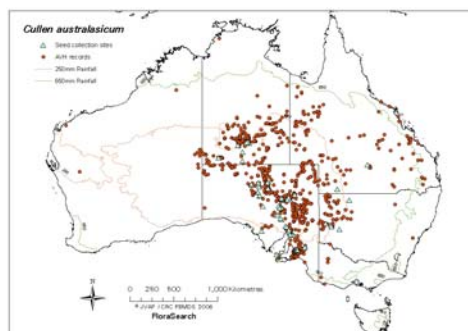
Cullen australasicum

Possible option for low input mixed farming systems

One of the most promising native legumes
Productive and drought tolerant
Good seed production
Acid or alkaline soils
Range of phenology & habit, grazing tolerant



Barbedmin NSW, June 2005 following 3 months of drought (light red earth, pH 5)



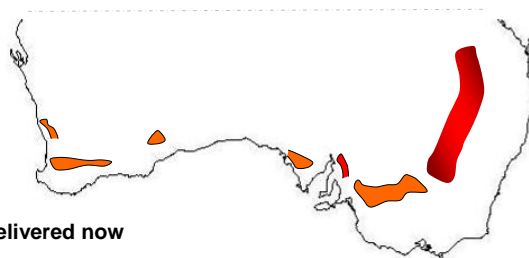
Distribution of *Cullen australasicum* showing herbarium records and seed and rhizobial germplasm collection sites. (Dear *et al* 2007)



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Cullen will impact where lucerne is poorly adapted due to requirements of controlled grazing



Potential area of adaptation -
primary (red) 9 M ha,
secondary (orange) 7.5 M ha

Delivered now

- Elite accessions and parent plants selected based on maturity, herbage production, disease resistance and seed production
- Established 6 evaluation trials in SA, NSW and Qld in 2010 ready for evaluation under persistent grazing in 2011-13.

Next 3 years

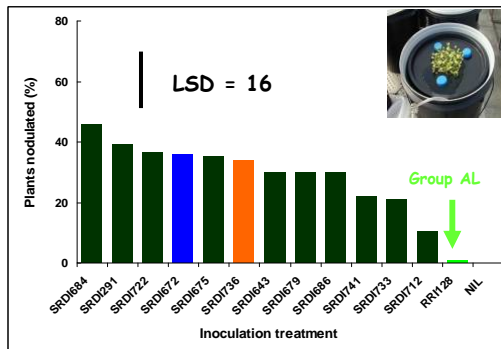
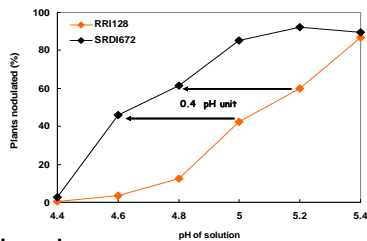
Continue evaluation of field trials with a view to selecting an accession for commercialisation in 2014



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Lucerne nodulation – acid soil tolerant rhizobia needed SARDI Ten lucerne in solution culture at pH 4.75



Delivered now

Identified a short-list of 2-3 strains from >250 from greenhouse and field evaluation
Elite host germplasm selected for improved nodulation and root growth in acid soils

Next phase

In 2012 a new acid tolerant rhizobia inoculant will be selected
Strain replacement should ensure new strain is being used by farmers in 2012/13
We anticipate a new strain would increase adoption by 0.5 - 1 M ha in Australia.



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Tropical grass:

Panic grass (*Panicum maximum*) varieties for southern Australia

Four elite lines identified

- Excellent persistence under grazing in target environments
- Higher biomass than control varieties
- Favourable growth habit
- Good seed production - 5 kg of breeders seed by June 2011
- Widely adapted. Evaluations are conducted in numerous sites in northern NSW, WA and in southern Queensland (5 sites)

Potential area of adaptation: 3.5 M ha in WA, 4 M Ha in NSW and 5 M ha in Queensland



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Temperate Grasses:

for medium low rainfall environments < 600 mm

Cocksfoot

- Develop persistent, drought tolerant, summer dormant cocksfoot with increased nutritive value for low input recharge areas and acid soils



1. *Very fine-leaved* 2. *Fine-leaved* 3. *Currie replacement* 4. *AVH48*



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Temperate Grasses:

for medium low rainfall environments < 600 mm

Tall fescue

- Develop a persistent, drought tolerant tall fescue to extend the species' area of adaptation into lower and less reliable rainfall regions receiving a high proportion of their annual rain in summer

- *Synthetic 1*, summer-active
- *Synthetic 2*, summer-active
- *Synthetic 3*, winter-active



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Temperate Grasses:

for medium low rainfall environments < 600 mm

Phalaris

- Develop persistent, drought tolerant, summer dormant phalaris cultivars with increased nutritive value for low input recharge areas and acid soils

5 elite phalaris lines developed by CSIRO

Develop establishment and management packages for the new cultivars to assist with their commercial uptake



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Concluding comments

- A total of 5 legumes and 4 grasses are being developed by the FFI CRC
- Some of them are already in the hands of the seed industry and most of them will be released to the seed industry by the end of the FFI CRC funding phase in 2014
- These new products will extend the area of adaptation of existing pasture species and will increase the supply of year-round forage



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