Pasture Research Update

SOUTH AUSTRALIAN RESEARCH & DEVELOPMENT INSTITUTE

PIRSA

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Feb 2017

PREMIUM FOOD AND WINE FROM OUR CLEAN ENVIRONMENT

mla MEAT & LIVESTOCK AUSTRALIA

SOUTH AUSTRALIA

Government of South Australia

Primary Industries and Regions SA

SARDI

SOUTH AUSTRALIAN RESEARCH AND DEVELOPMENT INSTITUTE

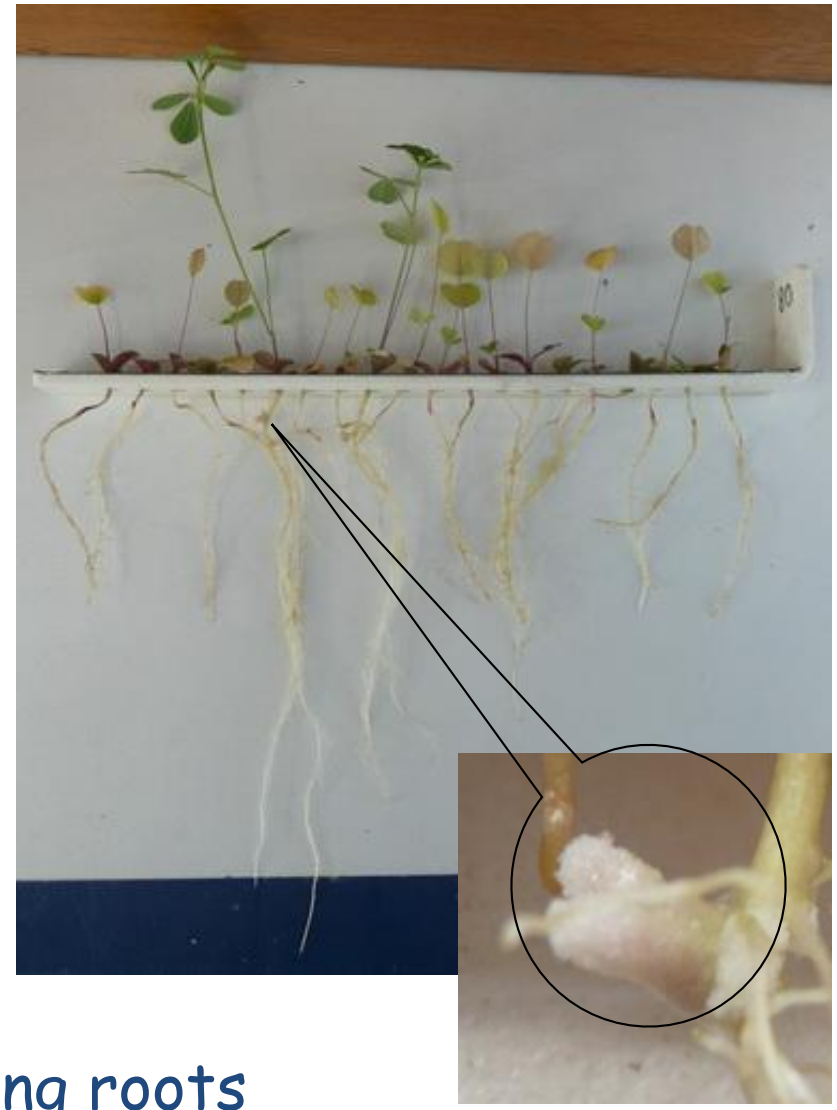
Overview

1. Breeding lucerne with tolerance to acidic soils
2. New pasture developments
   - New brachy sub clovers
   - MLA Pre-breeding activities for annual pastures
   - SU tolerant medics
   - Glyphosate tolerant lucerne
   - Messina
   - New proposal for collaborative farmer driven research

Intolerance of lucerne to acidic soils

- **Poor root growth**
  - Tolerance to low pH
  - Aluminium toxicity
  - Mn, availability other nutrients
- Poor nodulation
  - **Survival of Rhizobia in soil**
  - **Nodulation potential of plant**

Multiple trait selection



Nodulated plants with long roots

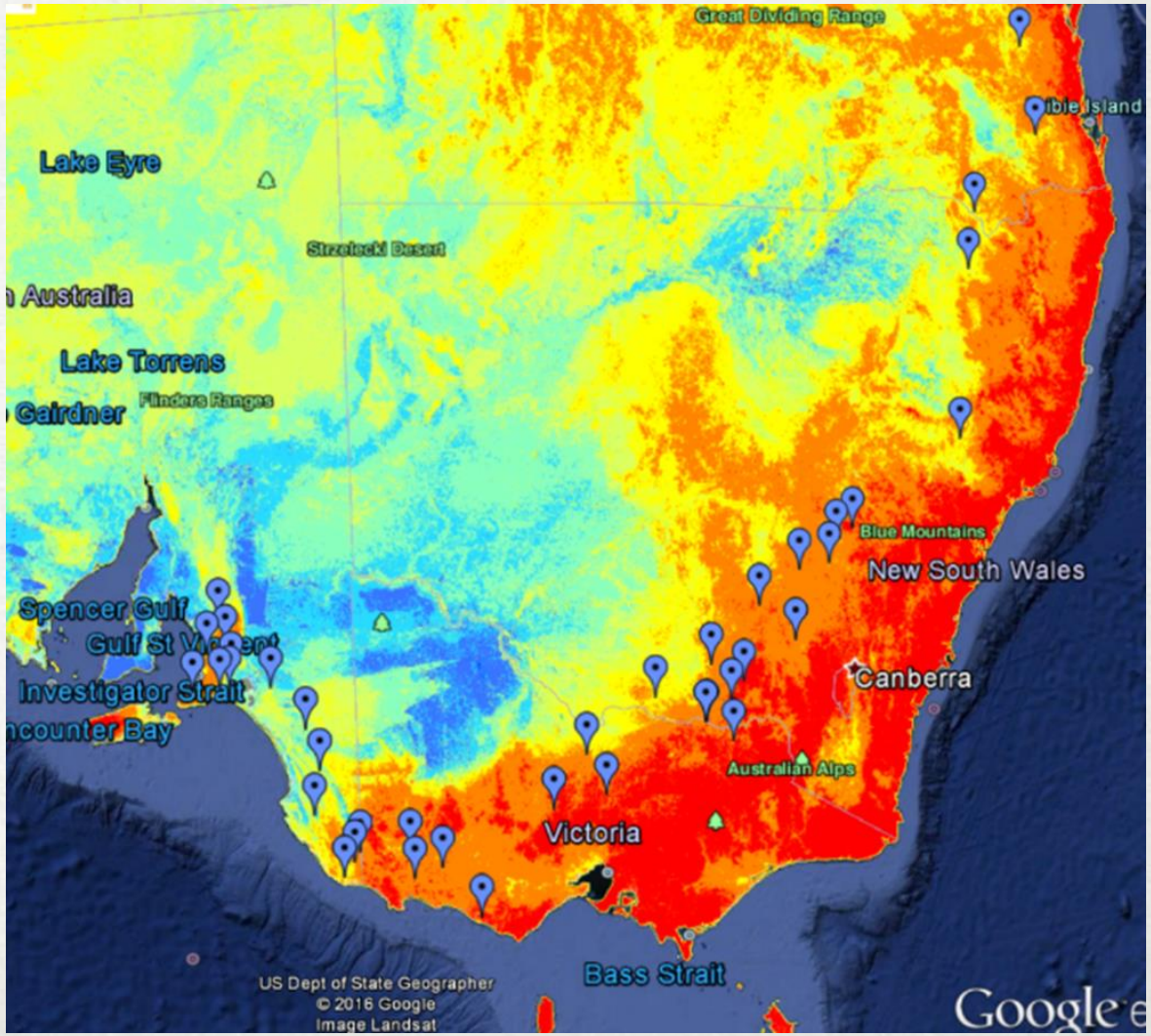

SARDI 7
Average <2% nodulation
TA33
2 cycles selection for nodulation
~60% nodulation

SARDI 7 SERIES 2 LUCERNE

Heritageseeds

- Target:
  - Very persistent, especially in the colder, wetter regions with acidic soils. Aim was to replace winter active 3-5's in these environments.
  - Excellent aphid and disease tolerance

- Method:
  - 30 years of recurrent selection for these environments.
  - Evaluation trials sown unfenced and managed by farmers



FIELD EVALUATION

-with natural soil and 3 lime rates

MEAT & LIVESTOCK AUSTRALIA

Soil Chemistry

Site	Depth	NO_3	P Colwell	K Colwell	S	pH ($CaCl_2$)	DTPA Mn	Exc. Al	Exc. Ca	CEC total	Al CEC
		mg/kg	mg/kg	mg/kg	mg/kg	pH	mg/kg	meq/100g	meq/100g	meq/100g	%
Tooperang	0-10	5	89.4	91	6	4.2	10.7	0.4	2.5	3.5	11
	10-20	1	13	29	4	4.5	3.8	0.3	0.3	0.7	41
	20-30	3	3	146	12	4.5	2.2	0.9	3.5	6.7	14
Pewsey Vale	0-10	61	88	116	9	4.1	10.7	0.8	1.9	3.3	24
	10-20	12	51	94	4	4.3	3.8	0.6	0.9	2	33
	20-30	11	33	86	4	4.4	2.2	0.6	0.8	1.7	32
Holbrook	0-10	42	48	323	16	4.3	140	0.8	4.4	7	12
	10-20	14	11	216	12	4.6	101	0.3	4.5	6.6	5
	20-30	20	6	177	11	5.1	45	0.1	5.4	8.1	1
Boralma	0-10	46	15	319	8	4.3	100	0.8	2.1	4.3	16
	10-20	6	6	189	4	4.7	60	0.6	2.8	4.5	18
	20-30	4	4	151	2	5	24	0.3	3.7	6.4	5

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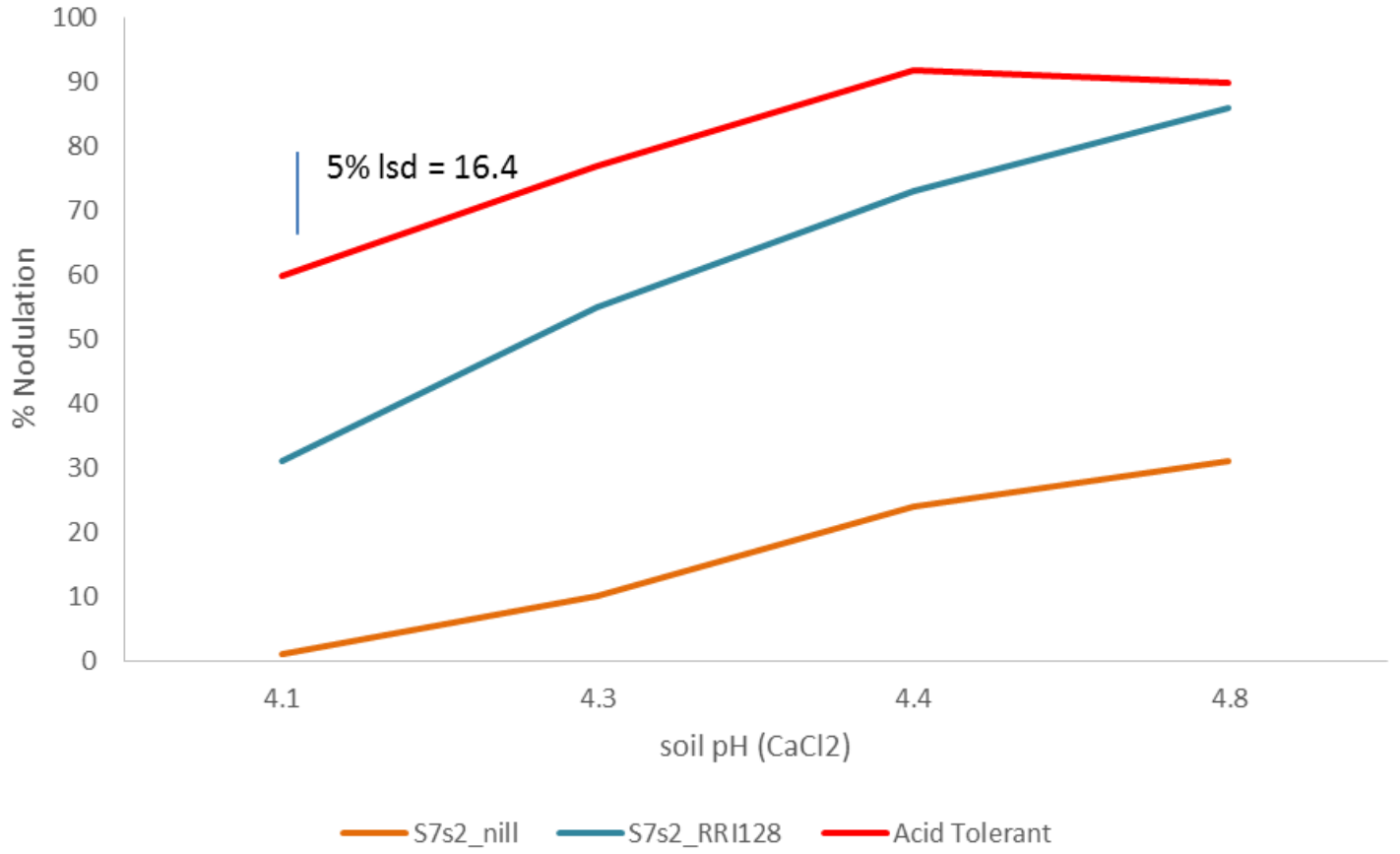
Impact of pH on nodulation

(Holbrook, Boralma, Pewsey Vale, Tooperang)



*(Combined results from no-lime and limed experiments to achieve pH gradient.

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Lucerne still extends the growing season and gives summer feed on acid soils .

Decile 1-2 spring inducing a soil water deficit from mid-September in 2015.

<u>58% of production from Nov, Dec and Mar cuts</u>

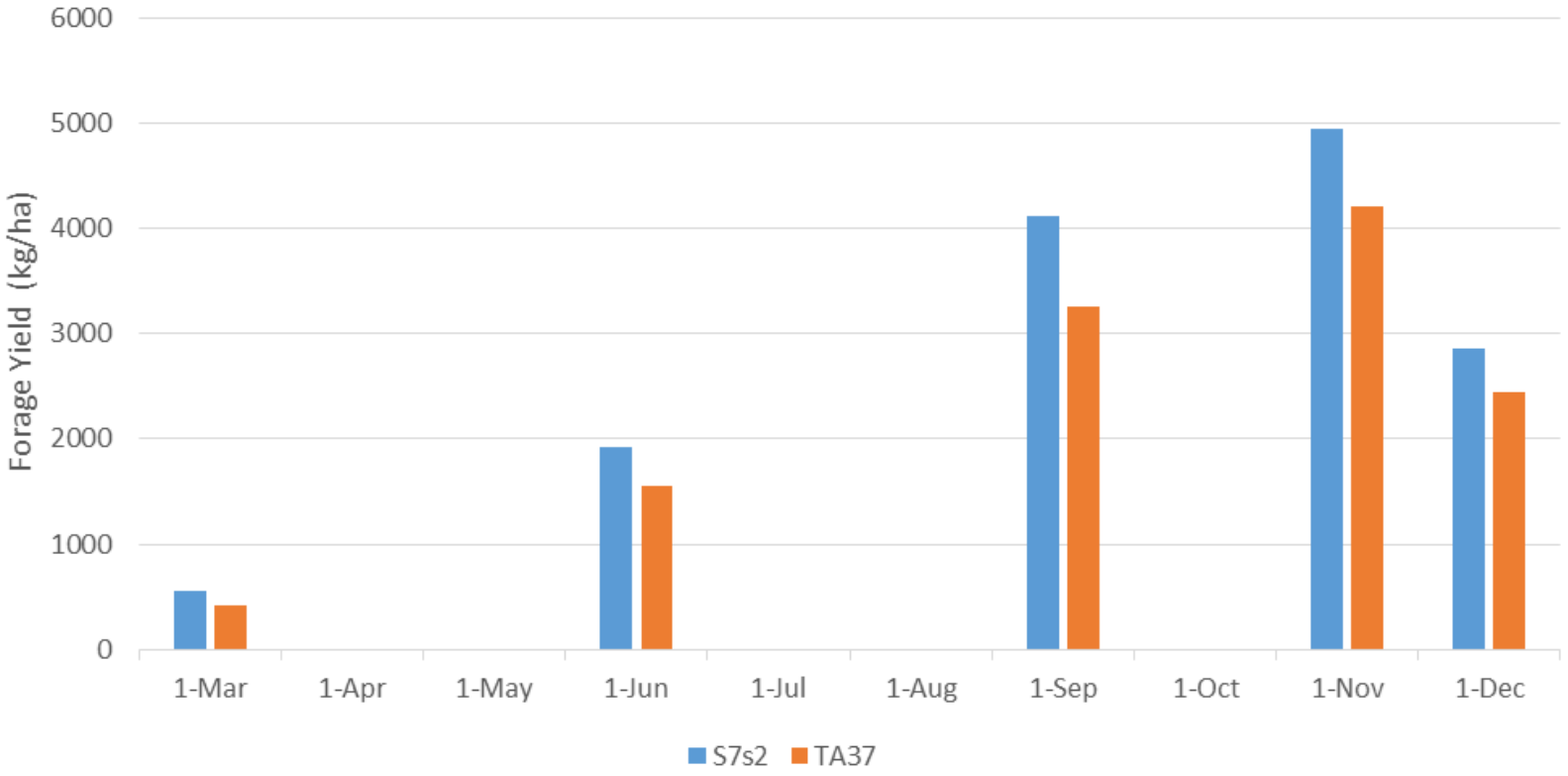
- Total production:

Tooperang: 14.4t/ha

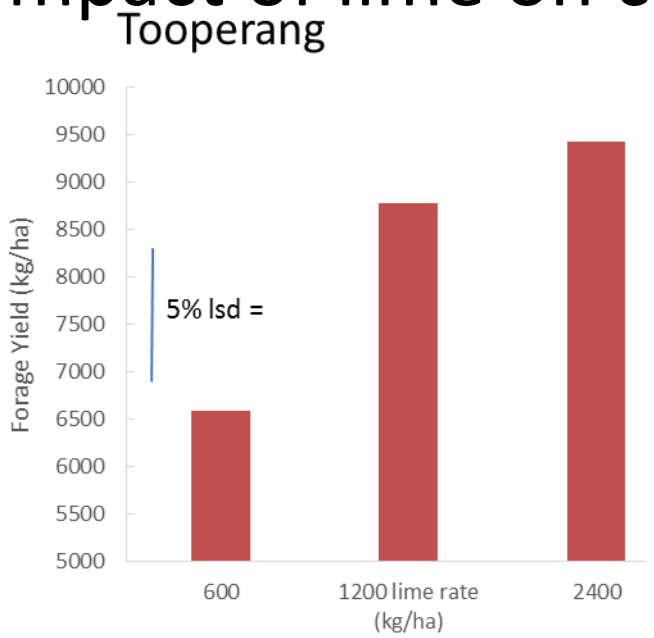
Pewsey: 12t/ha

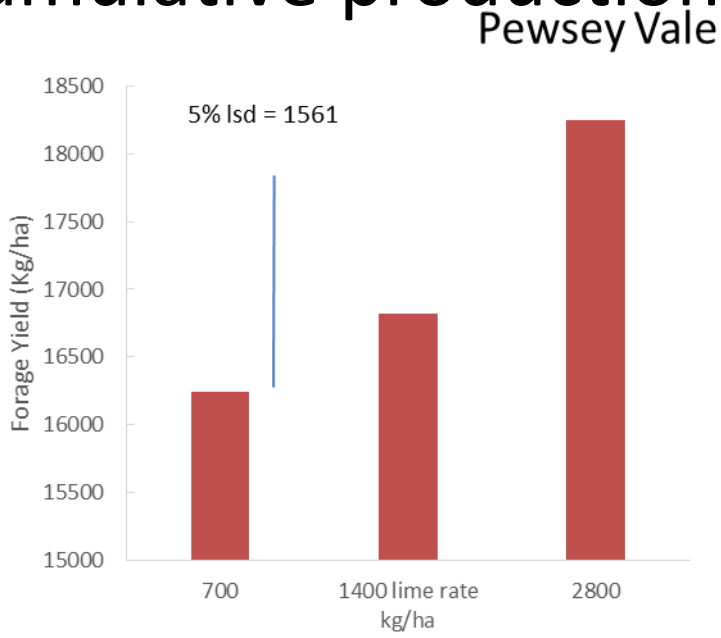
Holbrook: 11t/ha

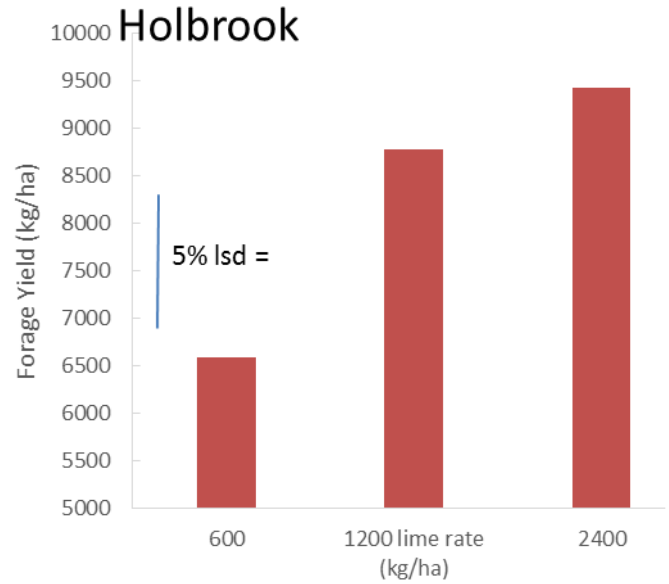
Boralma: 2t/ha

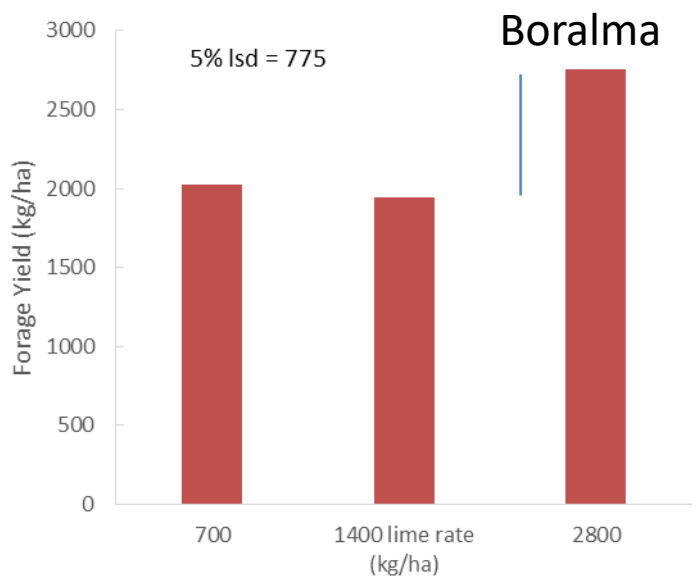


Impact of lime on cumulative production

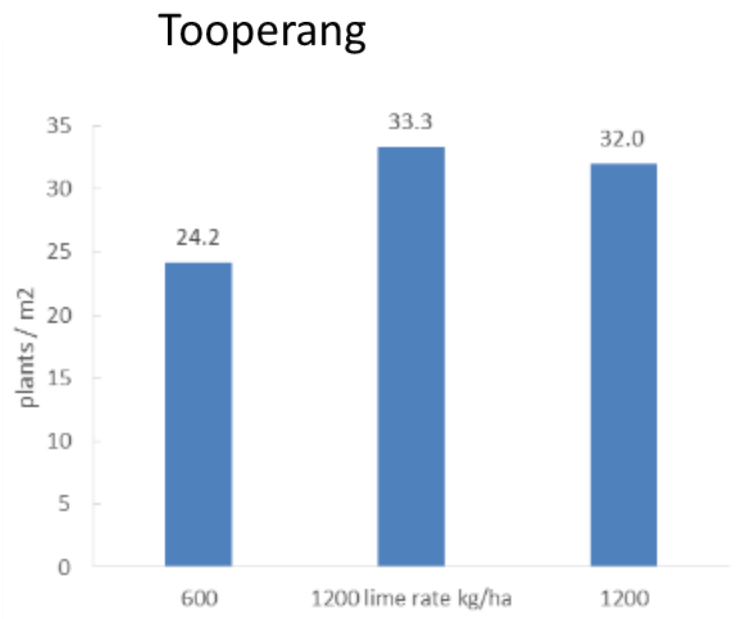


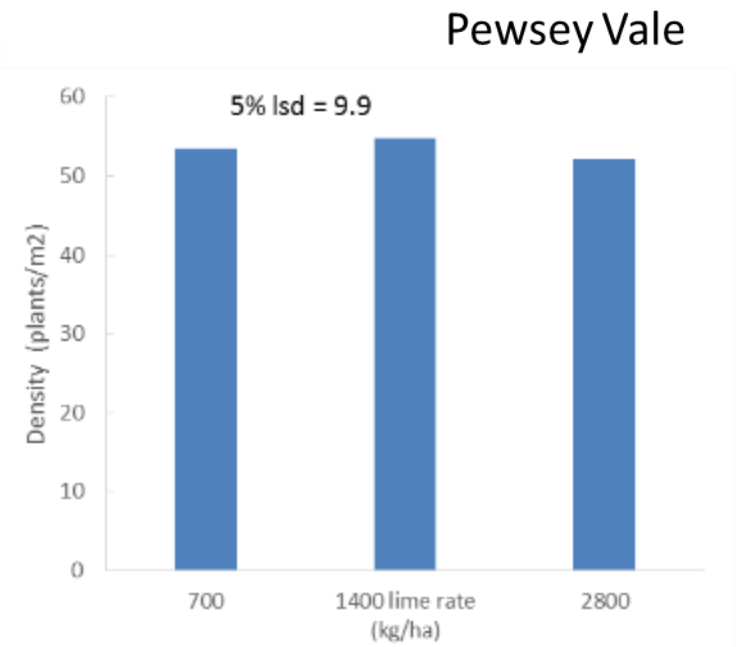


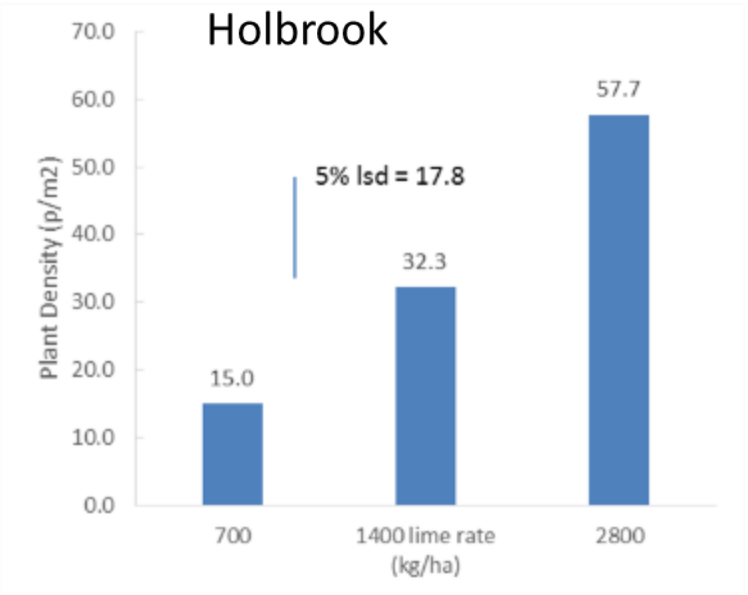


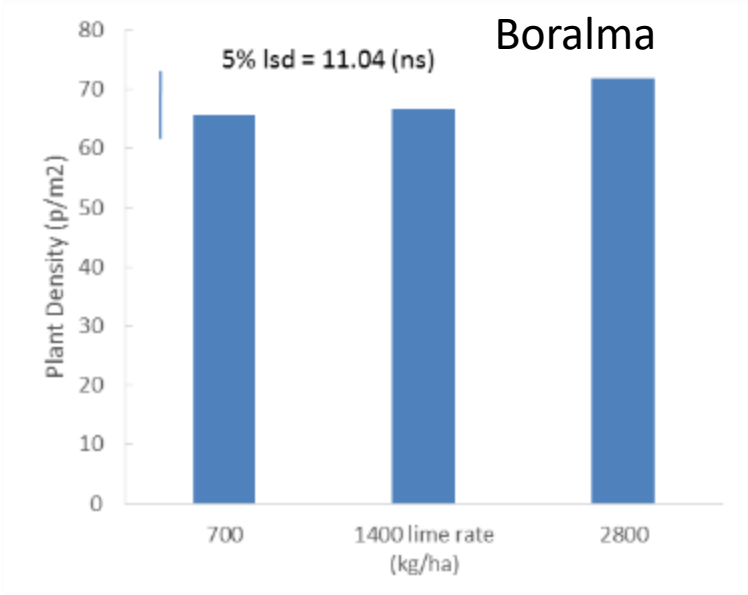


Final Plant Density at 3 lime rates









Summary

- Performance of lucerne overall much better than expected on highly acidic soils
  - Long-term breeding for adaptation on acidic soils with S7S2 successful
  - High forage yield and nutritive value

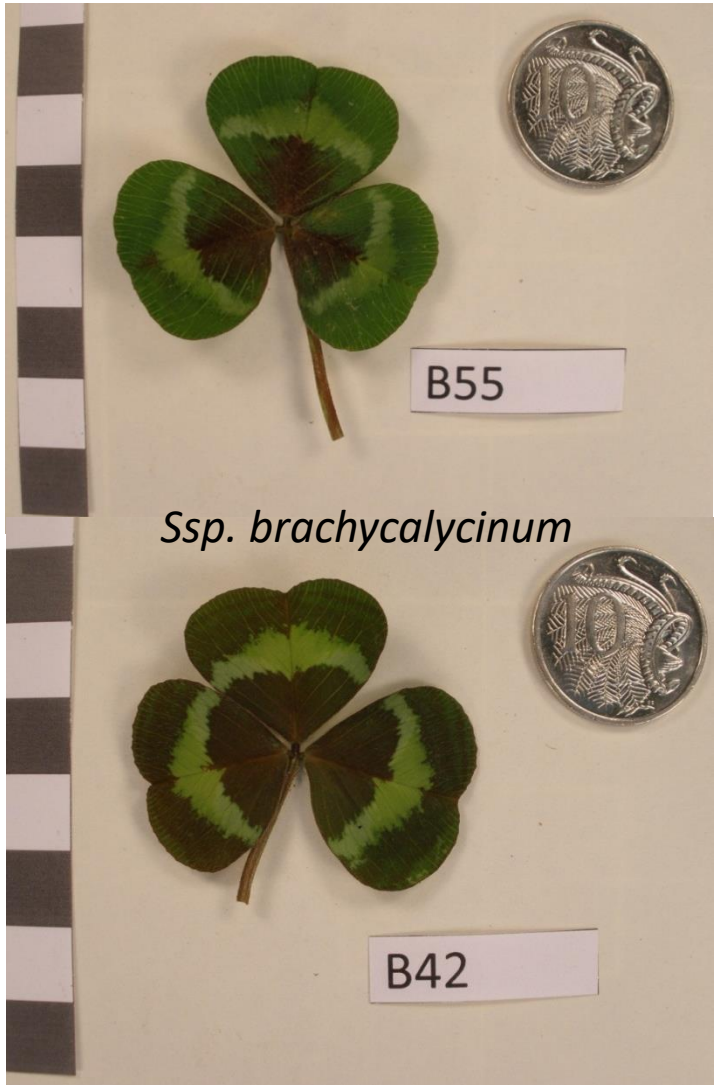
- Yield further improved with lime
  - Return on investment in first 18 months
  - Likely to improve resilience (combined stresses of drought x grazing x competition x Waterlogging)

- Recommendations for sowing SARDI 7 Series 2 and TA37 above pH_{Ca} 4.5 with new strain (to be available from next year) in combination with lime

New Pasture Developments

SARDI

1. Two new subclover cultivars



Mawson

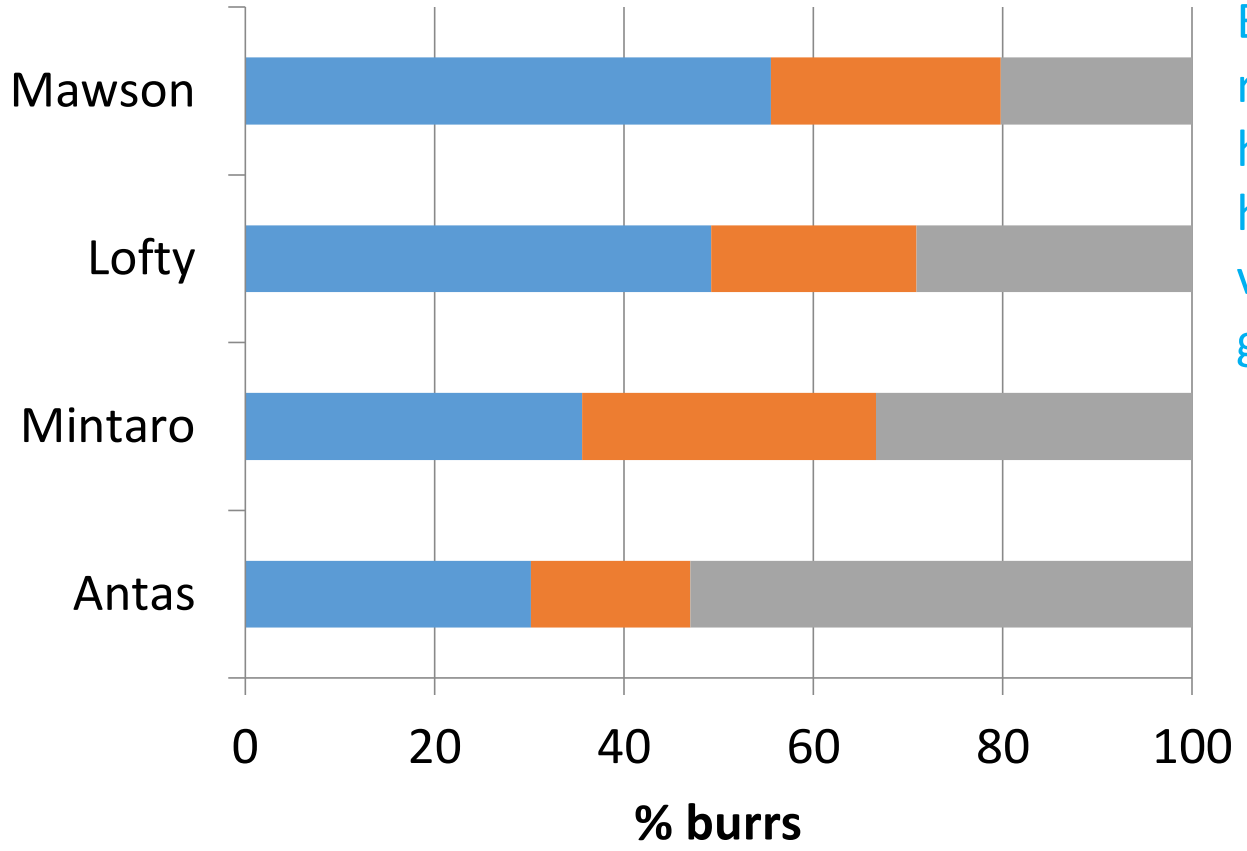
- Early season
- Moderate levels of hardseed (43% cf Antas 30%, Mintaro 58%)
- High winter production

Lofty – Antas replacement 2018

- Mid season
- Moderate levels of hardseed (38%)
- High winter production

Mawson and Lofty (brachy.) have improved burr placement

Seed industry & persistence issue



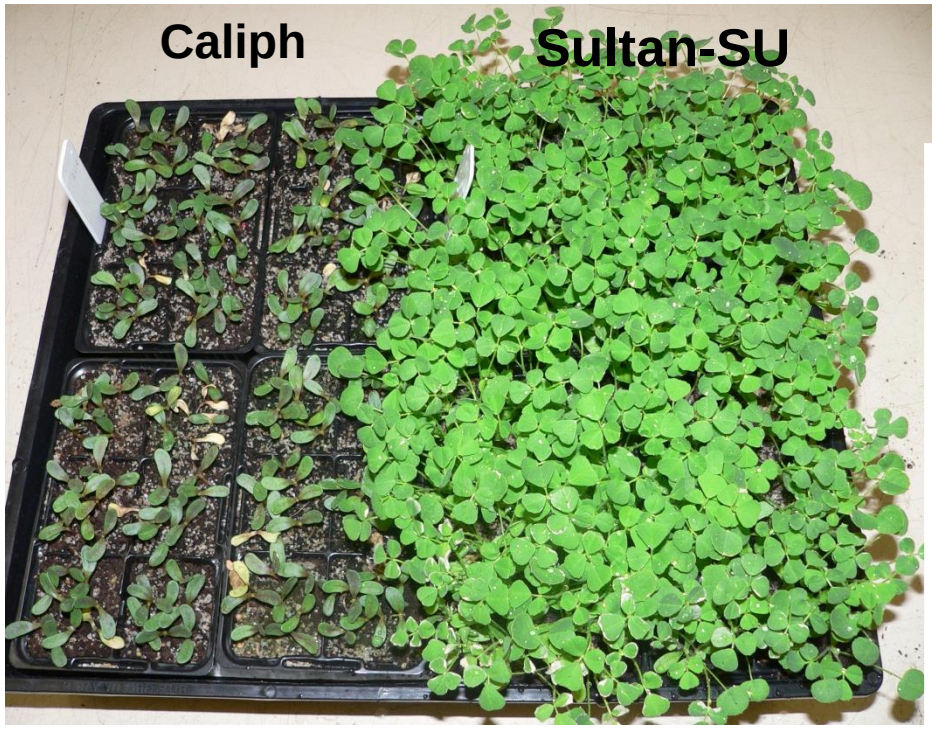
Burrs in residues are harder to harvest and vulnerable to grazing

SU tolerant medics

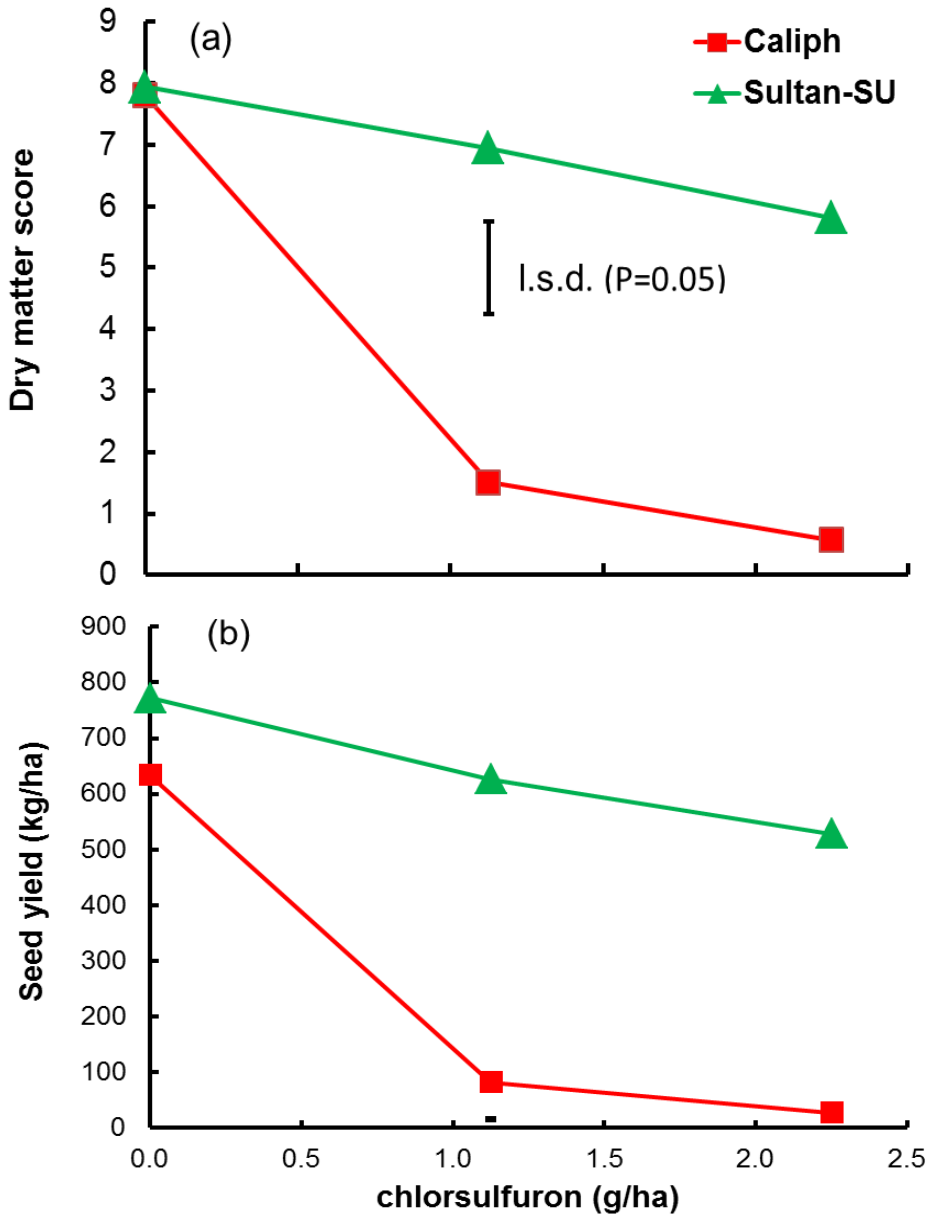
Sultan- Early season

- **Aphid resistant and boron tolerant**
- **Jester – Mid season, available 2019**

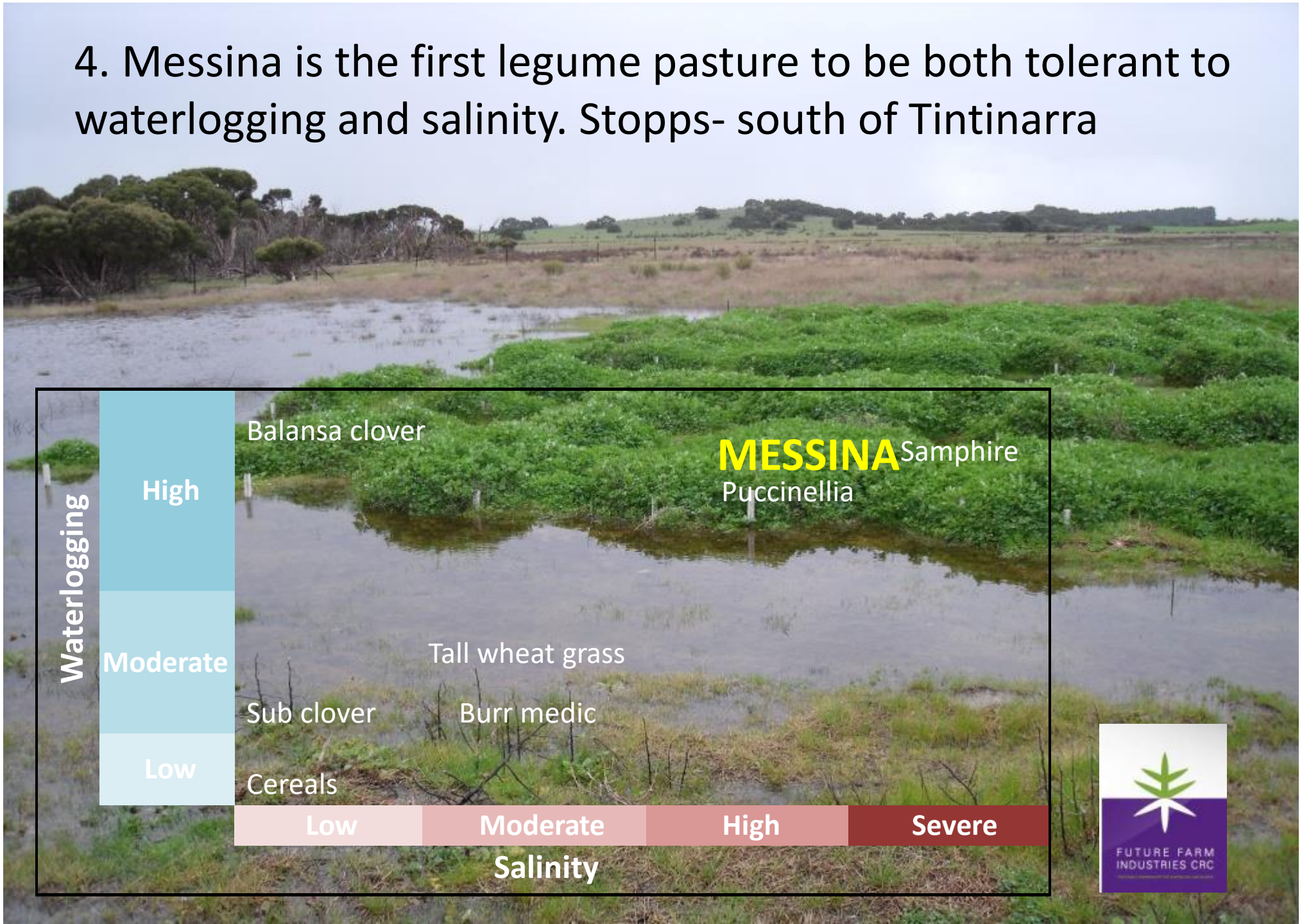
Glasshouse Screen



Field study



4. Messina is the first legume pasture to be both tolerant to waterlogging and salinity. Stopps- south of Tintinarra



2. Resistance to RLEM

Phil Nichols (DAFWA)

Annual medic germplasm obtained from APG

- 150 lines from 11 species

- Barrel medics
  - Cultivars have 44% to 72% damage
  - Best line has 13% damage

- Burr medics
  - Cultivars have 59-88% damage
  - Best line has 2% damage

6. New Proposal: Productive feedbase options – complex systems, simple solutions.

- Submitted in December 2016
- Field based research *driven* by issues identified by each producer groups targeting;
  - New pasture options that reduce feed-gaps.
  - How to manage the pastures and get the most out of them for livestock production.
  - The impact of improved forages on meat quality
  - Farm systems analysis to understand implications of profitability and risk.

- Vic., SA and Tasmania
- Locally: BIGG, Mackillop, AgKI, Limestone coast grasslands, FPAg.

Thank you

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