

NZ Merino forage projects

Lake Heron

Sawdon

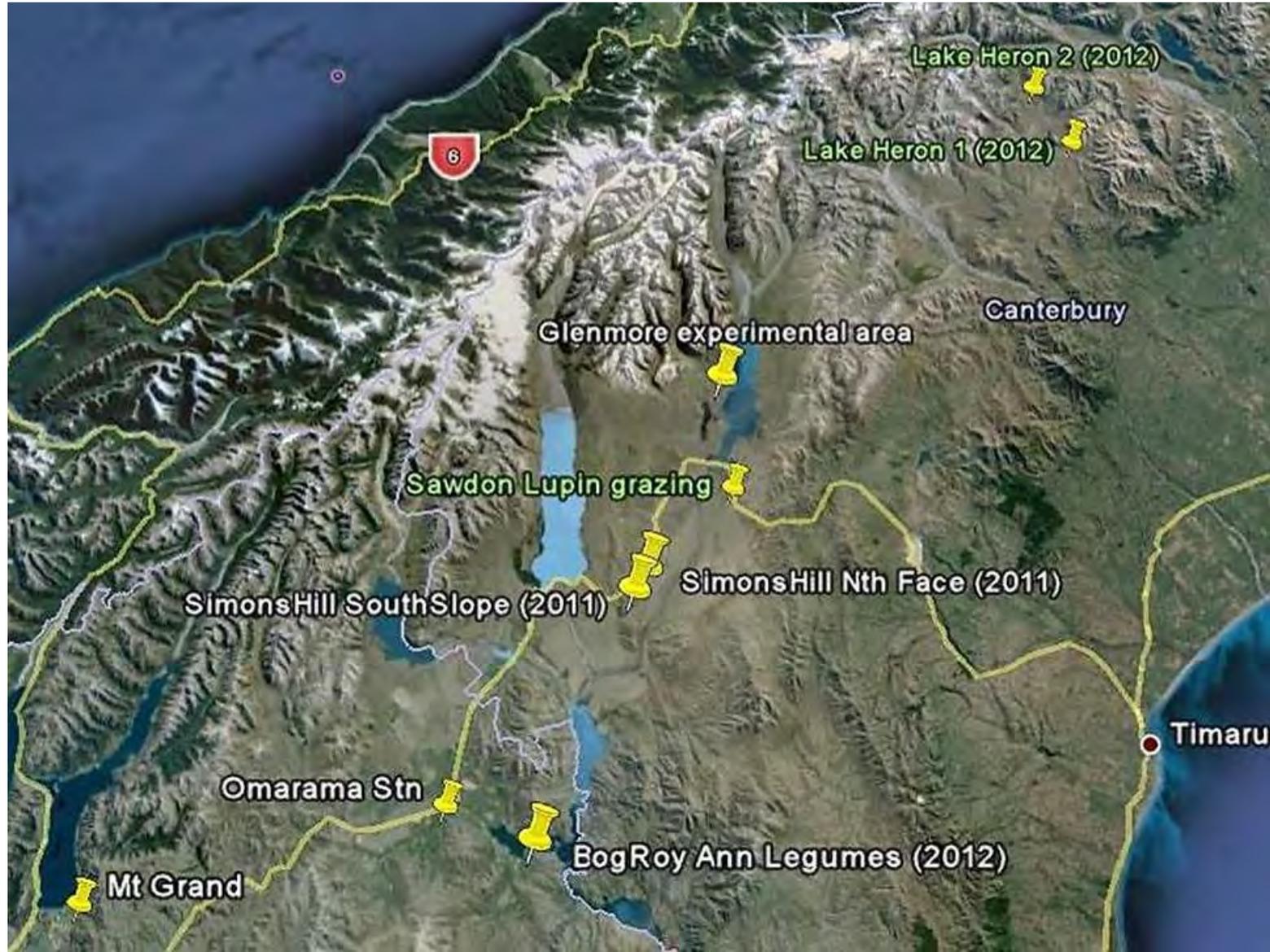
Glenmore

Simon's Hill

Bog Roy

Omarama

Mt Grand



Timaru

The website...

Info on:

- Current projects
- Field day presentations
- Scientific publications
- FAQs
- Postgraduate study

The screenshot shows the Lincoln University website. The header features the university's logo and name, along with a navigation menu. The main content area is titled "Dryland pastures research" and includes a sidebar with a "feedback" button, a list of related links, and detailed information about the research team, projects, and publications.

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Dryland pastures research

Dryland pastures research team:

- [Derrick Moot](#)
- [Dick Lucas](#)
- [Alistair Black](#)
- [Annamaria Mills](#)

Research projects:

Dryland Pastures – Technology Transfer Programme

This SFF funded project investigates strategies for dryland livestock farmers to drought proof their farming systems using different species and develop their properties with guidance from Lincoln University staff. The farmers involved will develop practical messages for other farmers to follow.

- [Marlborough – Technology Transfer](#)
- [MaxClover Grazing Experiment](#)
- [Lucerne research](#)

High country forage improvement

Funded by the New Zealand Merino Company Ltd., 'Survive, thrive and make money from...' three stages of pasture legume research aimed at high country pastures. Lincoln University staff and postgraduates are working with several high country farmers to determine which species survive and how to make them thrive in the unique soils and climatic conditions of the South Island high country.

- [High country stations](#)
- [Lees Valley](#)

Publications

- [Scientific Publications](#)
- [Field Day handouts and presentations](#)

Postgraduate research

- [Postgraduate student programmes](#)

Related Links

- ▶ [Dryland Pastures Blog](#)
- ▶ [Agricultural Sciences](#)
- ▶ [Faculty of Agriculture and Life Sciences](#)

Feedback

- ▼ [Dryland pastures research](#)
- ▶ [Research Projects](#)
- ▶ [Scientific publications](#)
- ▶ [Field Day handouts and presentations](#)
- ▶ [Postgraduate students](#)
- ▶ [Frequently asked questions](#)
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www.lincoln.ac.nz/dryland

Commenced spring 2011

Professor Derrick Moot

Dr Alastair Black - Pastures

Dr Jim Moir - Soils

Mr Dick Lucas – High country

Dr Keith Pollock – Senior Technical Officer

Marie Roux – Field Technician

PhD: Saman Berenji, Travis Ryan-Salter

Honours 2013: Amy Whitley, Monica Schwass,
Alan Harvey, Kate Wilson

Farmer coordinator: Denis Fastier

Glenmore – Will Murray

Can legumes be successfully established through minimal cultivation on previously unimproved land?

Double sprayed – autumn and spring

Expt 1: 2.5 t/ha lime – lucerne lupins Caucasian clover

Expt 2: 5 t/ha lime – lucerne lupins Caucasian clover

Single spray – spring

Expt 3: - no lime lucerne lupins Caucasian clover

Expt 4: - no spray – 3 species – nothing survived!

Soil testing

- A hole 3 m deep and sampled every 0.5 m.
- pH increases and aluminium decreases after first 0.5 m



Glenmore



**Browntop
dominated pasture**

Also:

Poa pratensis

Haresfoot trefoil

Sweet vernal

Suckling clover

White clover

Hawkweed







Pre-sowing treatment - lupins 45 DAS
(Wangdi *et al.*, 1990)

	Establishment (%)	DM Production (mg/plant)
Herbage treatment:		
Live	26	50
Dead	37	600
Burnt	34	320
SE	4.3	32

Lime x legume experiments sown in Nov 2011 & 2012)

Godley Peaks Road

Plot	Rep	Legume	Experiment 1	Experiment 5	Experiment 3	Experiment 4
			Spring herbicide (sown Nov 2011)	Sown Dec 2012	Autumn & spring herbicide and burn off (sown Nov 2011)	
			No lime	Lime x Legumes	2.5 t lime/ha	5.0 t lime/ha
1	1	Russell lupin				
2	1	Russell lupin				
3	1	Russell lupin				
4	1	Caucasian clover				
5	1	Caucasian clover				
6	1	Caucasian clover				
7	1	Lucerne				
8	1	Lucerne				
9	1	Lucerne				
10	2	Caucasian clover				
11	2	Caucasian clover				
12	2	Caucasian clover				
13	2	Russell lupin				
14	2	Russell lupin				
15	2	Russell lupin				
16	2	Lucerne				
17	2	Lucerne				
18	2	Lucerne				
19	3	Caucasian clover				
20	3	Caucasian clover				
21	3	Caucasian clover				
22	3	Lucerne				
23	3	Lucerne				
24	3	Lucerne				
25	3	Russell lupin				
26	3	Russell lupin				
27	3	Russell lupin				

Trial site – drilled 15 Nov 2011



Glenmore

A range of establishment success

- Kill the browntop
- Species –
sowing rate, growth
form, growth rate,
inoculation
- Drill depth variable
- Variable soil –
yellowing of leaves



Large variation- lucerne



No Lime - Lucerne







Caucasian clover



Lupins





25 Sept 2012



25 Sept 2012



25 Sept 2012



31 Oct 2012



31 Oct 2012



9 Nov 2012



9 Nov 2012

Caucasian clover



10 Dec 2012

Lupin 0 t lime/ha



10 Dec 2012

Lucerne 2.5 t lime/ha



11 Dec 2012

2.5 & 5.0 t lime/ha



31 Jan 2013
2.5 & 5.0 t lime/ha



1 Feb 2013 Lupin 2.5 t lime/ha

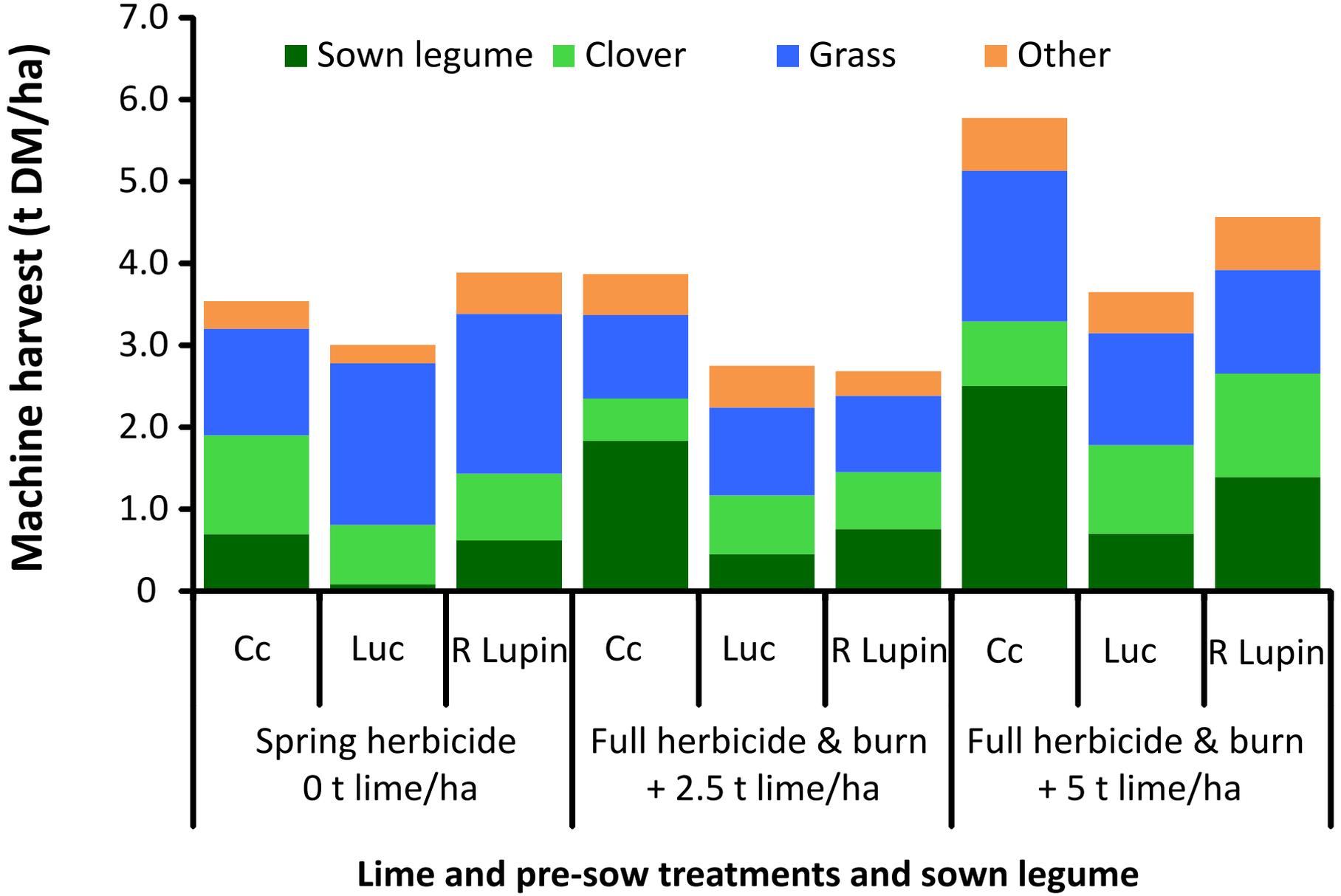


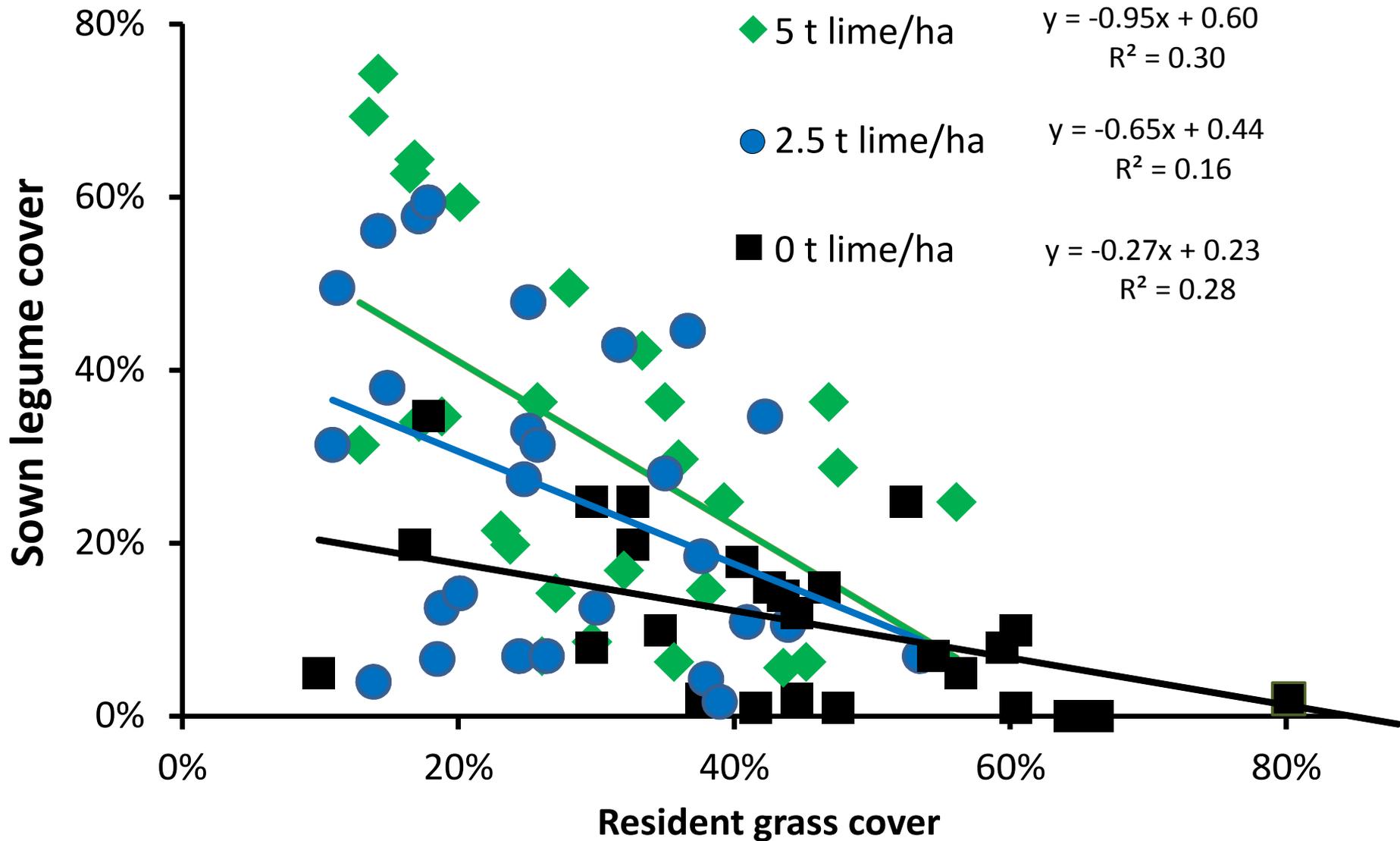
1 Feb 2013 Caucasian 5.0 t lime/ha



7 Mar 2013







Glenmore – 2012

Success - but can we get more consistency?





2013 research

- **Monitor 0 2.5 and 5 t lime effects.**
- **Spray (autumn 2012) new area –**
- **lucerne, lupin and Cc with different lime rates (0, 0.5, 1, 2, 4 t/ha)**
- **Different species – lotus (pH<5.2), balansa (water logging)**
- **Lupin sowing (2, 4, 8, 12, 16, 32 kg/ha)
Expt. 6a 6b**

Experimental paddock Glenmore

Goodley Peaks Road



100 m



Preparation for sowing – spring 2012

Lupin establishment 45 DAS

(Wangdi *et al.*, 1990).

	Establishment	DM Production
	(%)	(mg/plant)
Sowing depth (cm):		
0	25	330
1	35	350
2	40	300
3	29	310
SE	5	37

10 Dec 2012 - Flexiseeder





10 Dec 2012 Flexiseeder in action

7 Feb 2013



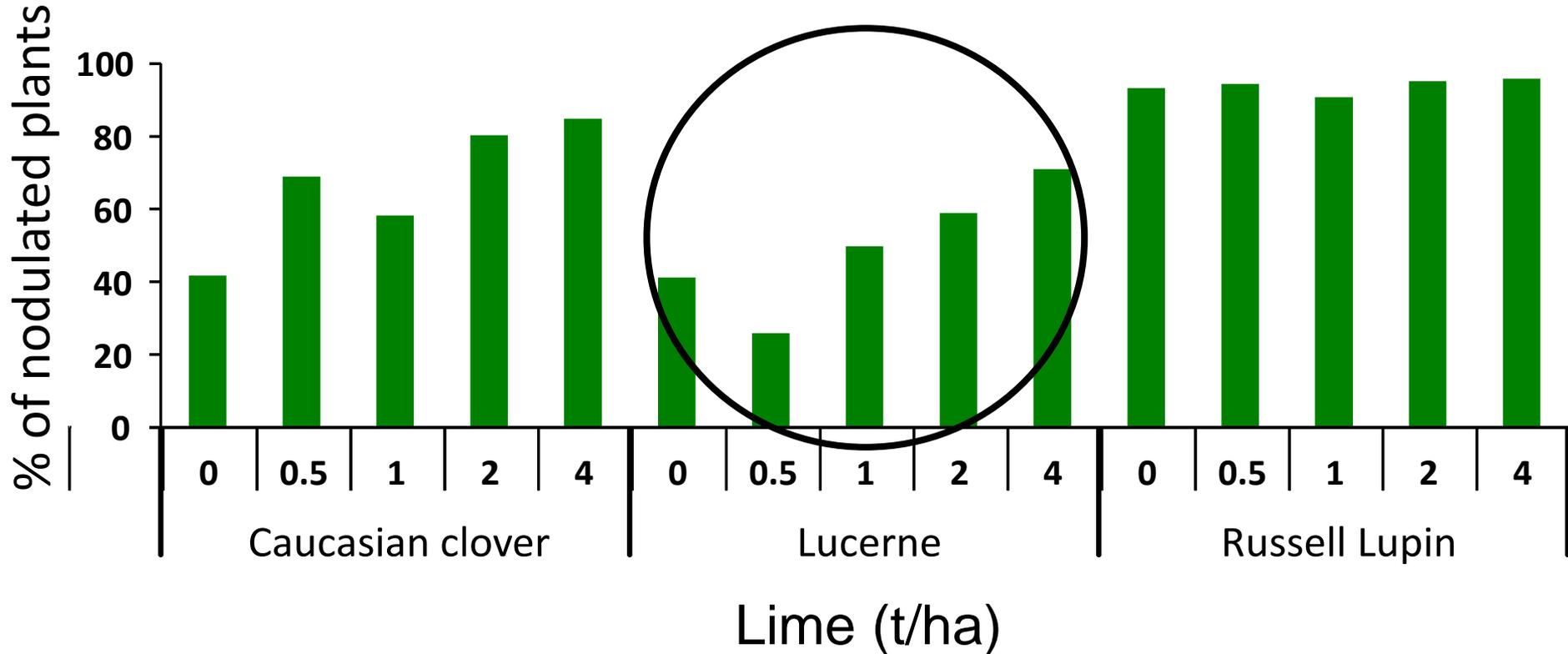
7 Feb 2013 Lucerne & Lupin sown Dec 2012



7 Mar 2013 Lucerne and lupin sown Dec 2012



Legume x lime 2012 experiment



Data collected on 7/03/13, three months after sowing-
lime improved lucerne and clover nodulation ($P \leq 0.002$)

Legume x lime 2012 experiment

2 t lime/ha



2 t lime/ha



1 t lime/ha



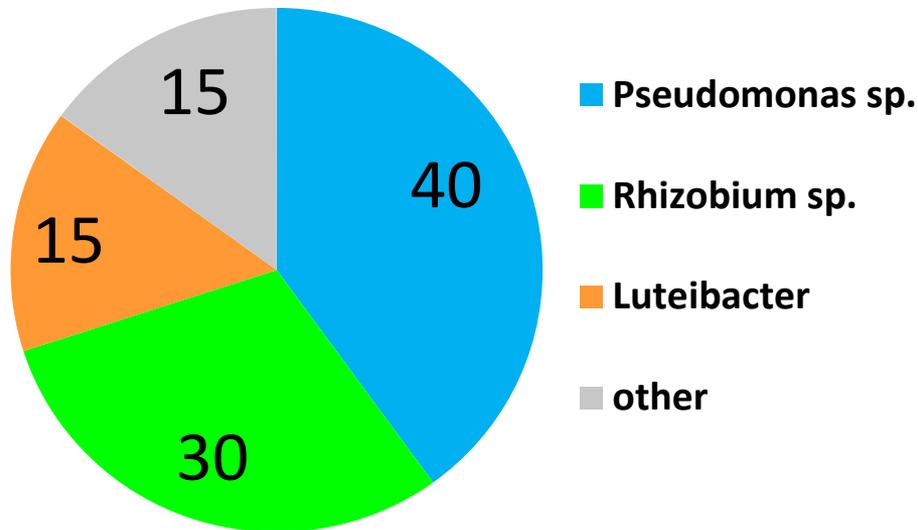
Photo taken 10/03/13 - three months after sowing

Genotyping the isolated bacteria from Russell lupin nodules



- Genotypic characterization was conducted on the 60 bacteria isolated from the lupin nodules (from both inoculated and bare seed)
- 20 different genotypes were identified

Genotype frequency (%) of the isolated bacteria from lupin nodules



Next step:

What is the activity?

Do they fix N?



Experiments 6a & 6b

Lime x sow rate x lupin variety

plot	Rep	Sow Rate	Lupin	3 t lime/ha	0 t lime/ha
1	1	32	Blue	1	37
2	1	32	Russell	2	38
3	1	12	Russell	3	39
4	1	12	Blue	4	40
5	1	16	Blue	5	41
6	1	16	Russell	6	42
7	1	4	Blue	7	43
8	1	4	Russell	8	44
9	1	2	Russell	9	45
10	1	2	Blue	10	46
11	1	8	Russell	11	47
12	1	8	Blue	12	48
13	2	12	Russell	13	49
14	2	12	Blue	14	50
15	2	2	Russell	15	51
16	2	2	Blue	16	52
17	2	16	Blue	17	53
18	2	16	Russell	18	54
19	2	8	Blue	19	55
20	2	8	Russell	20	56
21	2	32	Blue	21	57
22	2	32	Russell	22	58
23	2	4	Blue	23	59
24	2	4	Russell	24	60
25	3	12	Russell	25	61
26	3	12	Blue	26	62
27	3	32	Russell	27	63
28	3	32	Blue	28	64
29	3	4	Russell	29	65
30	3	4	Blue	30	66
31	3	8	Russell	31	67
32	3	8	Blue	32	68
33	3	16	Blue	33	69
34	3	16	Russell	34	70
35	3	2	Blue	35	71
36	3	2	Russell	36	72

7 March 2013

SR 2 kg/ha

Plots 15-16 (Rep 2)



7 March 2013

SR 4 kg/ha

Plots 29-30 (Rep 3)



7 March 2013
SR 8 kg/ha
Plots 11-12 (Rep 2)



7 March 2013

SR 16 kg/ha

Plots 17-18 (Rep 2)

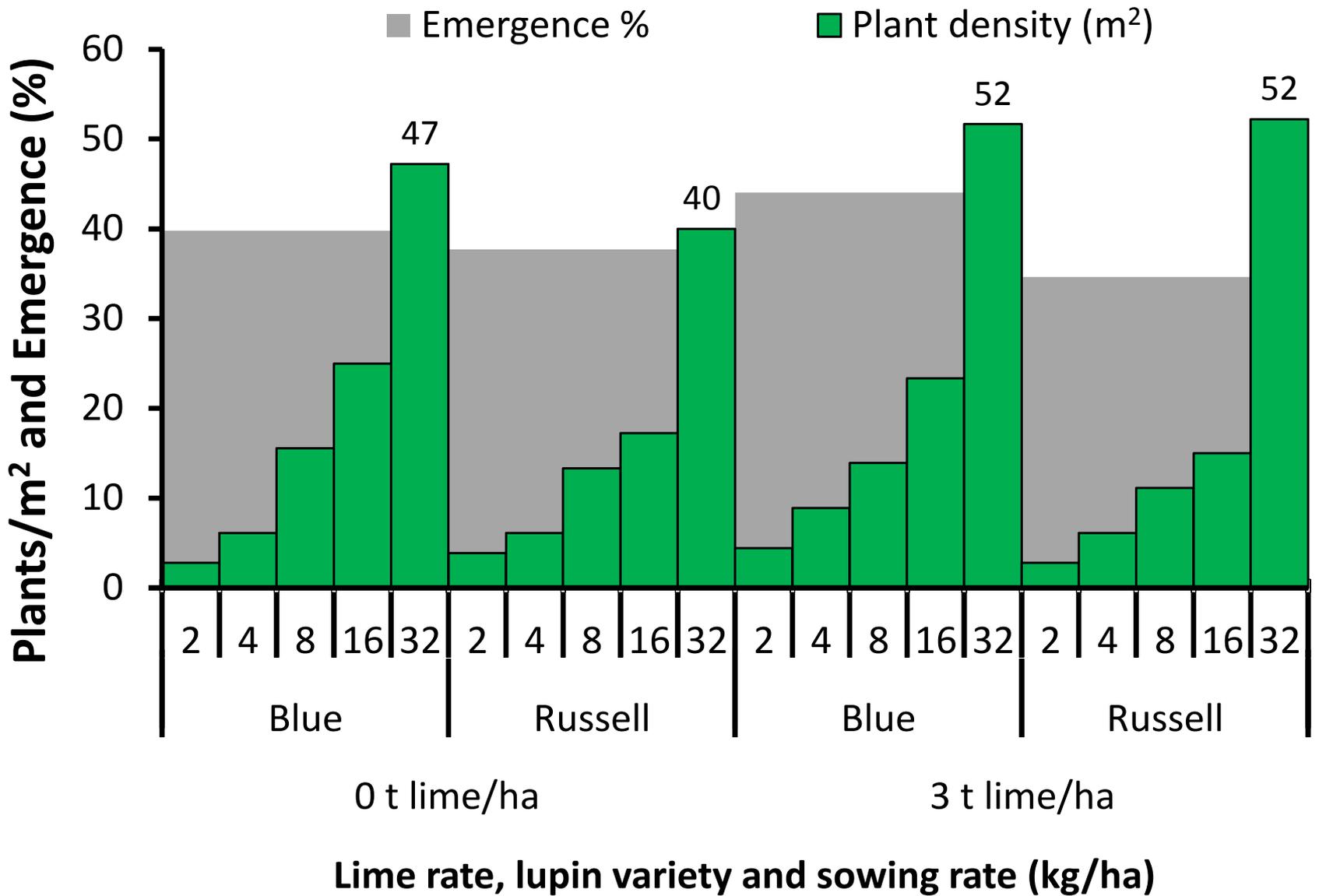


7 March 2013

SR 32 kg/ha

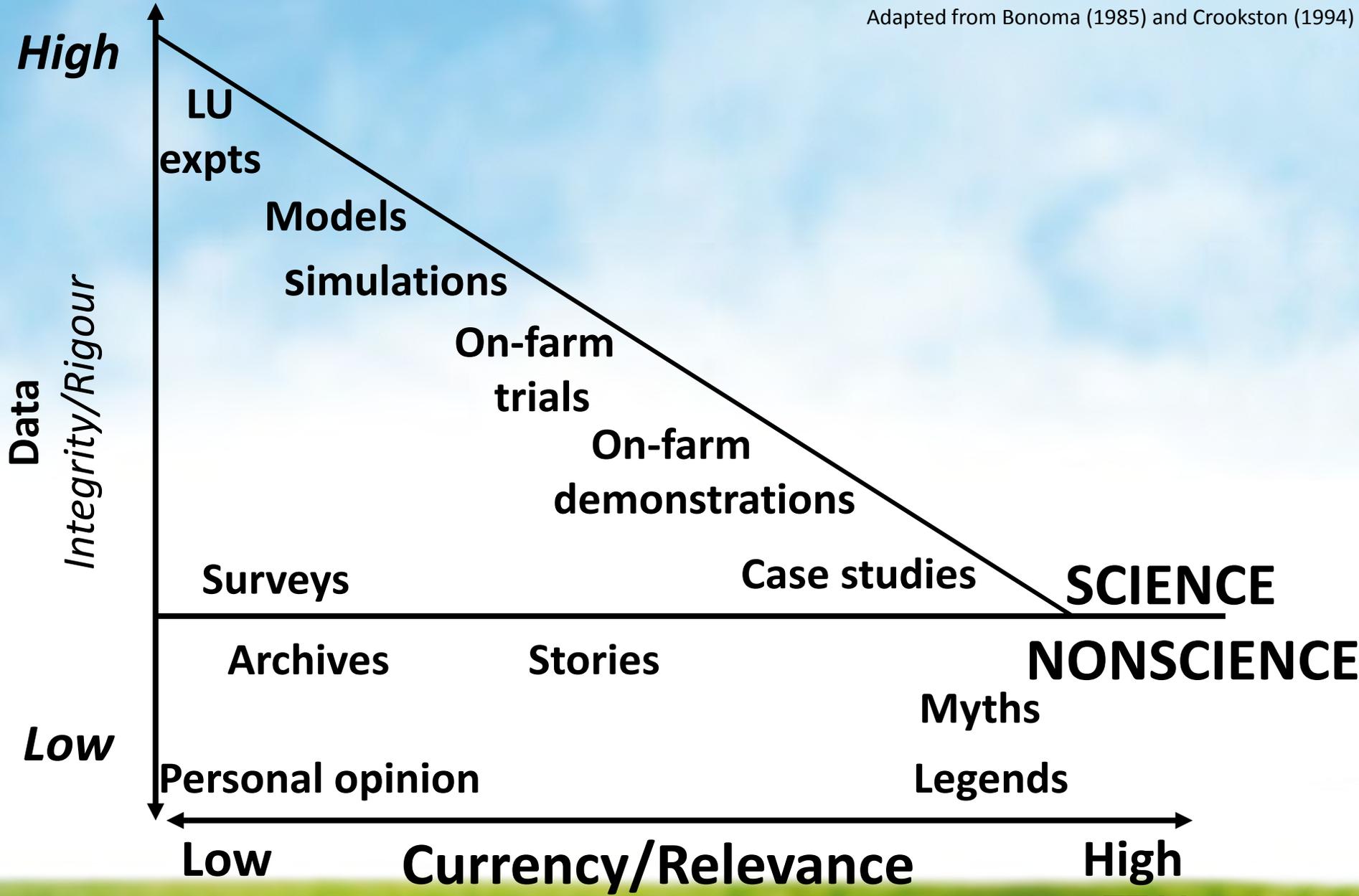
Plots 27-28 (Rep 2)





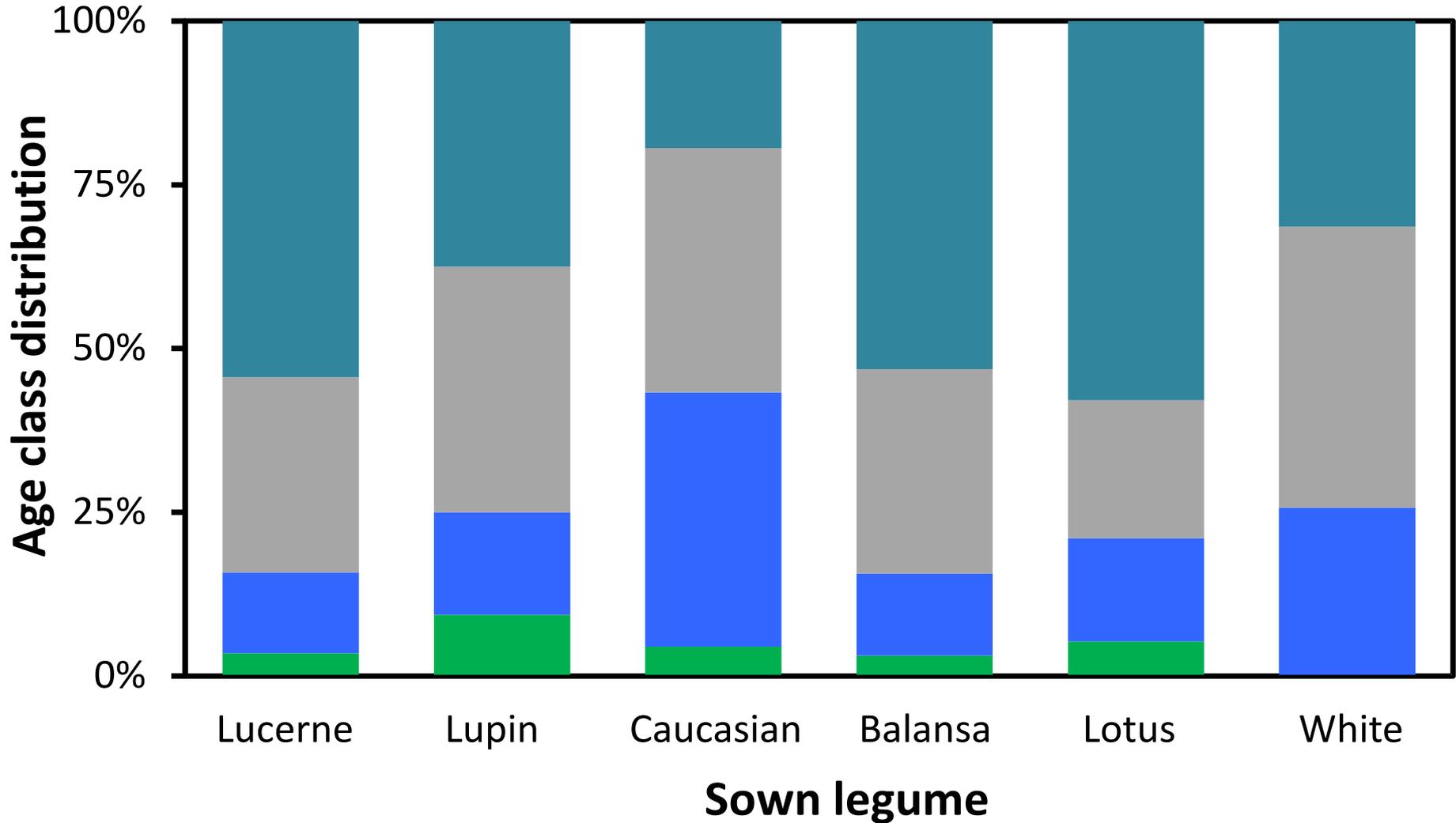
Lupins - to date

- *Autumn and spring herbicide (burn)*
- *Sow in warm soil temperatures after fallow (December)*
- *Sow at 10 – 20 mm depth*
- *Sow at 8 kg/ha with cocksfoot + Cc*
- *Inoculate*
- *Fert 50 kg ha S Super/yr*
- *Graze in establishment year (post-flowering)*

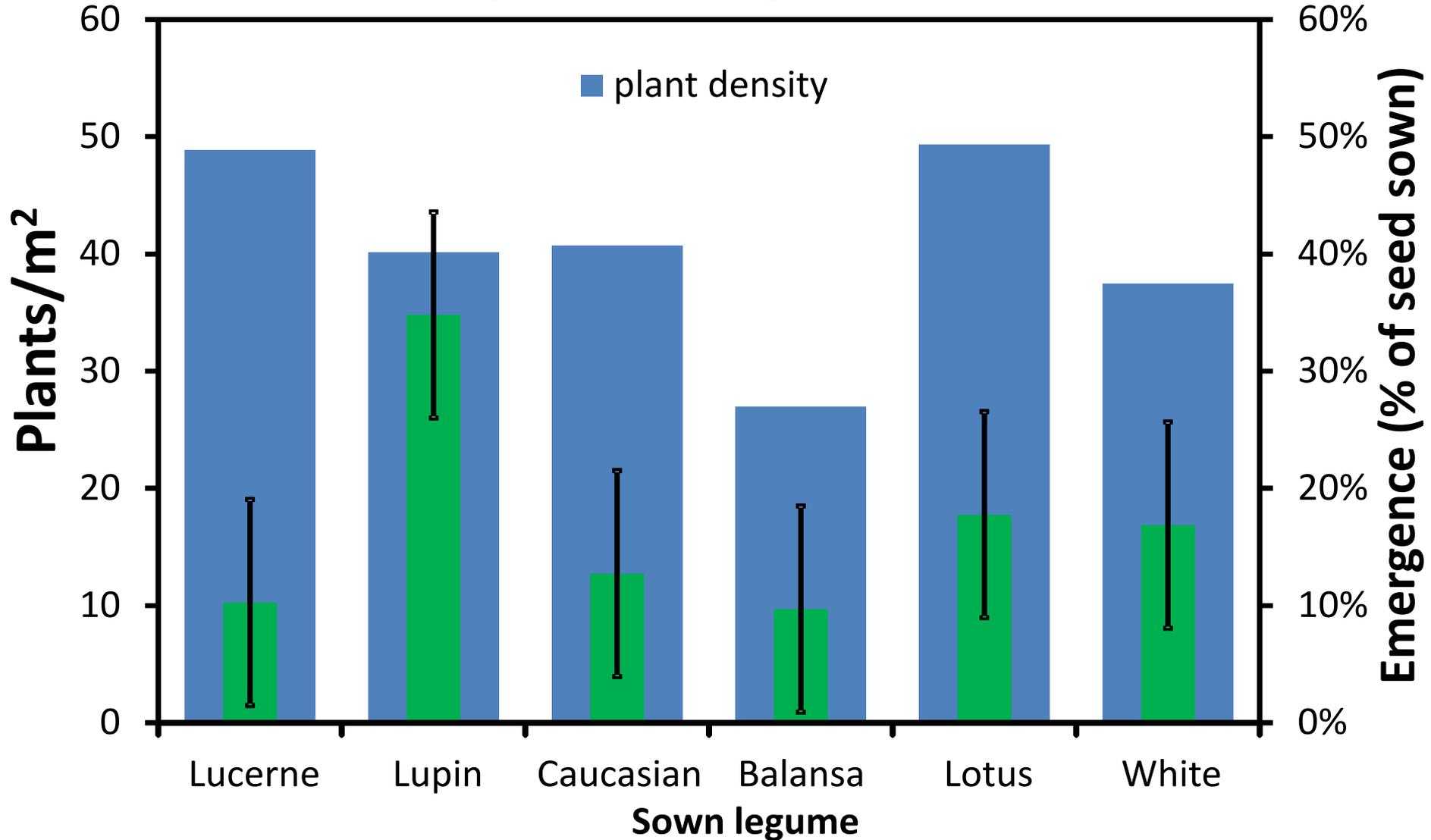


Seedling maturity

■ cotyledon_spade leaf ■ one true leaf ■ 2-4 leaves ■ 5+ leaves

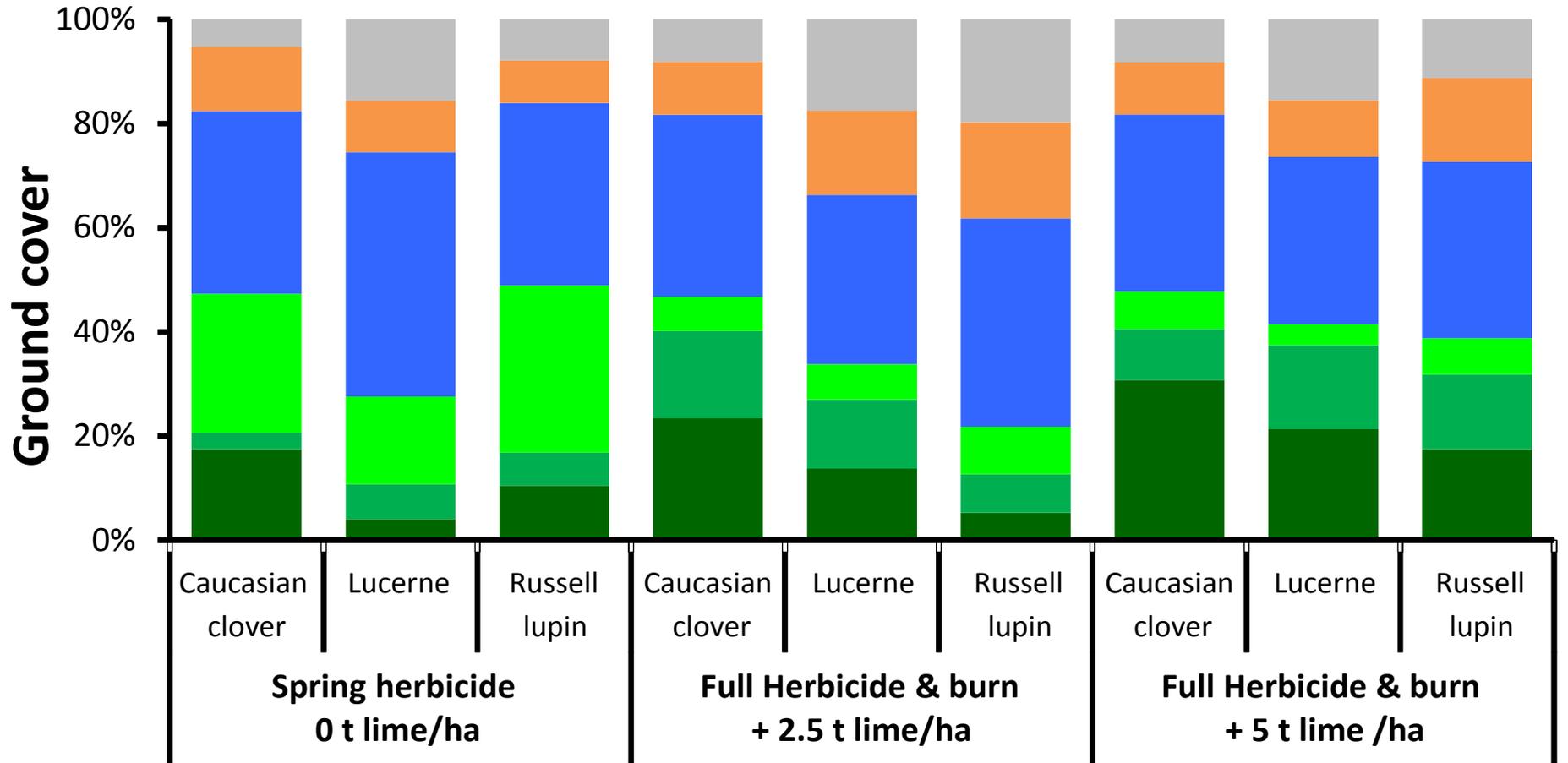


Plant density and % emergence of seed sown



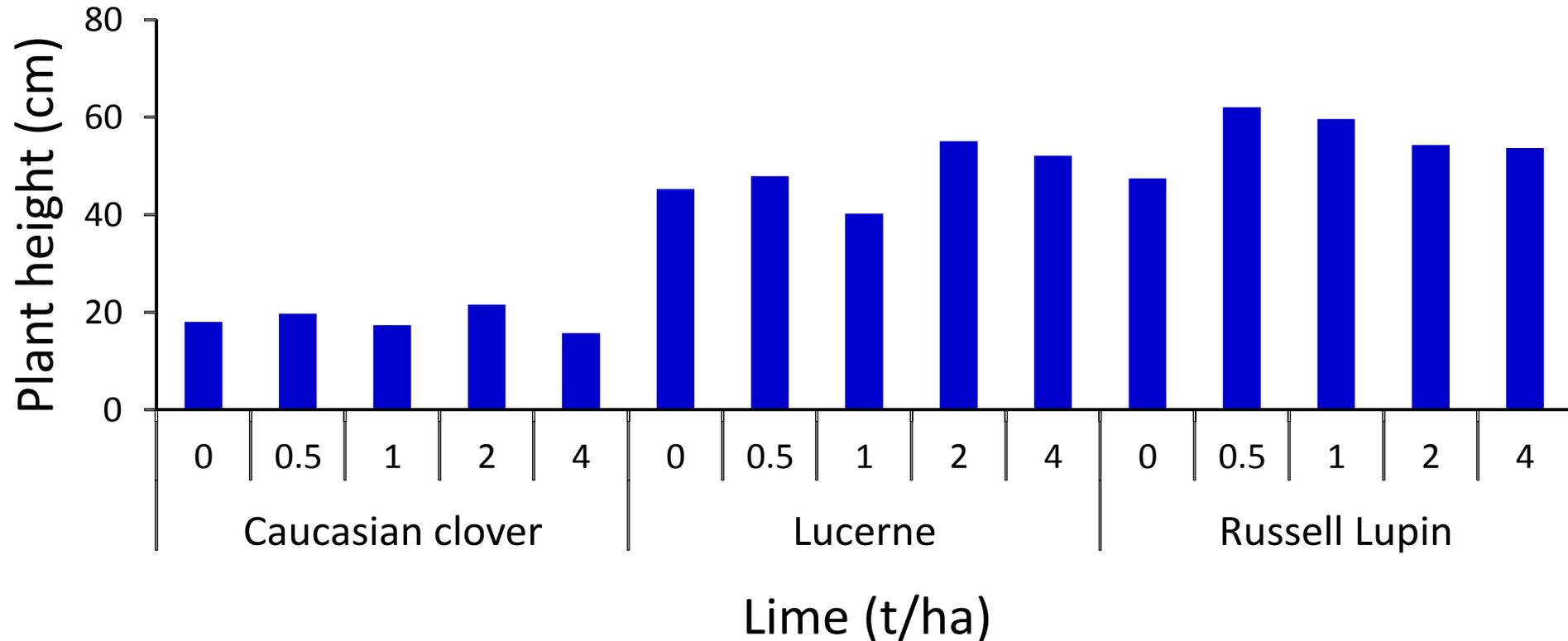
Error bars are $l_{sd(0.05)}$ for the legume effect on % emergence)

Sown legume
 White clover
 Advent clovers
 Grass
 Other
 Bare



Lime Pre-treatments and sowing treatments

Legume × lime 2012 experiment



Data collected on 7/03/13, three months after sowing

Interaction effect of species × lime on sown legumes height ($P \leq 0.001$)

References

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- Wangdi, K., McKenzie, B.A., and Hill, G.D. (1990). Field establishment of Russell lupin. *Proceedings of the Agronomy Society of New Zealand* **20**, 29–36.