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Te Whare Wānaka o Aoraki

AOTEAROA • NEW ZEALAND

Lucerne in vineyards? – Central Otago

Professor Derrick Moot

Photo supplied by: Prof Steve Wratten
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Phacelia (Purple tansy) between vines in NZ

Photo supplied by: Prof Steve Wratten
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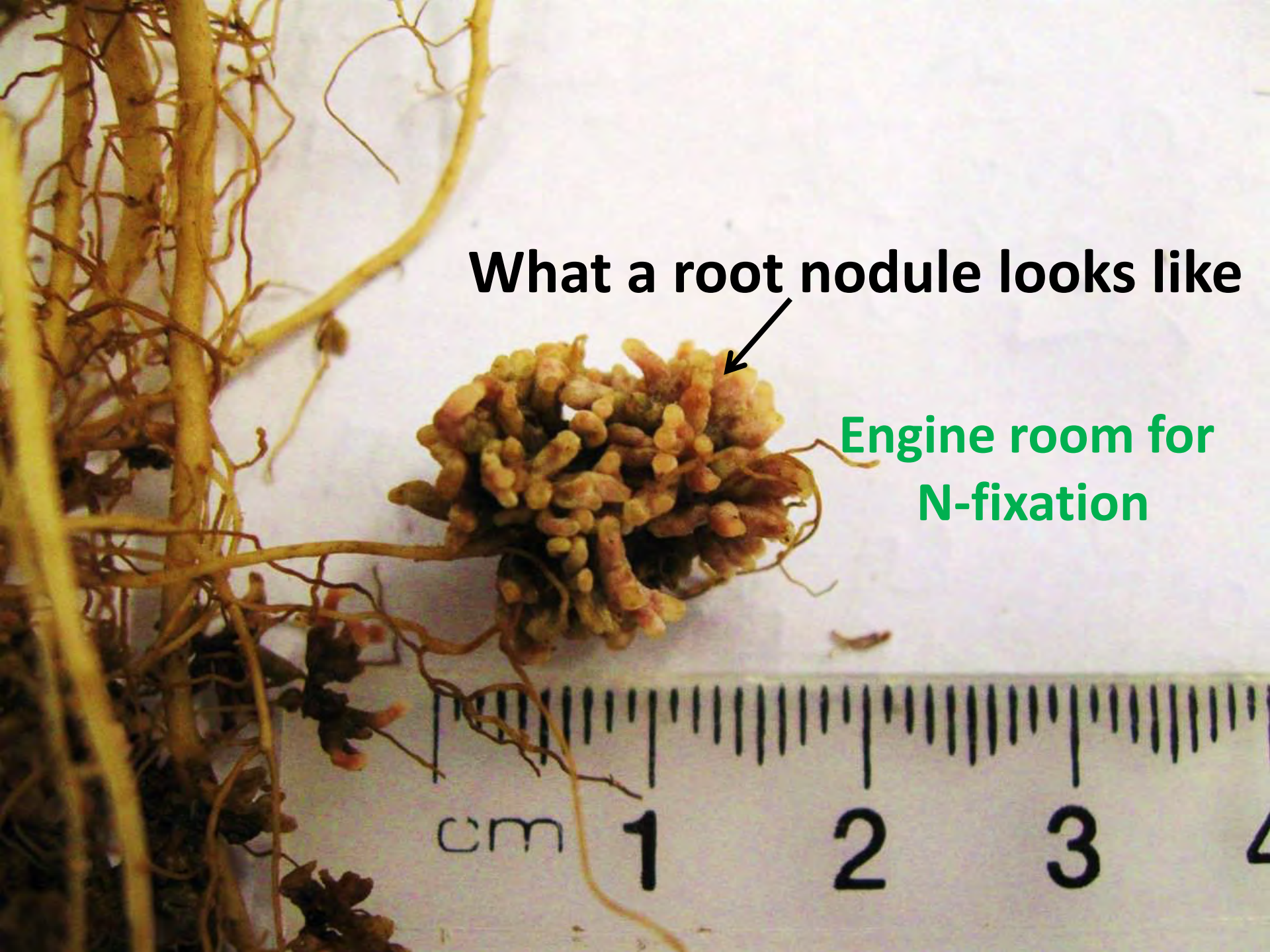
Buckwheat between vines in NZ

Lucerne between Shiraz vines in Australia

Photo: Richard Barnes


What a root nodule looks like
Engine room for
N-fixation
cm
1
2
3

Establishment

Soils - deepest free draining soils
- pH 6.0
- RG/Wc fertility

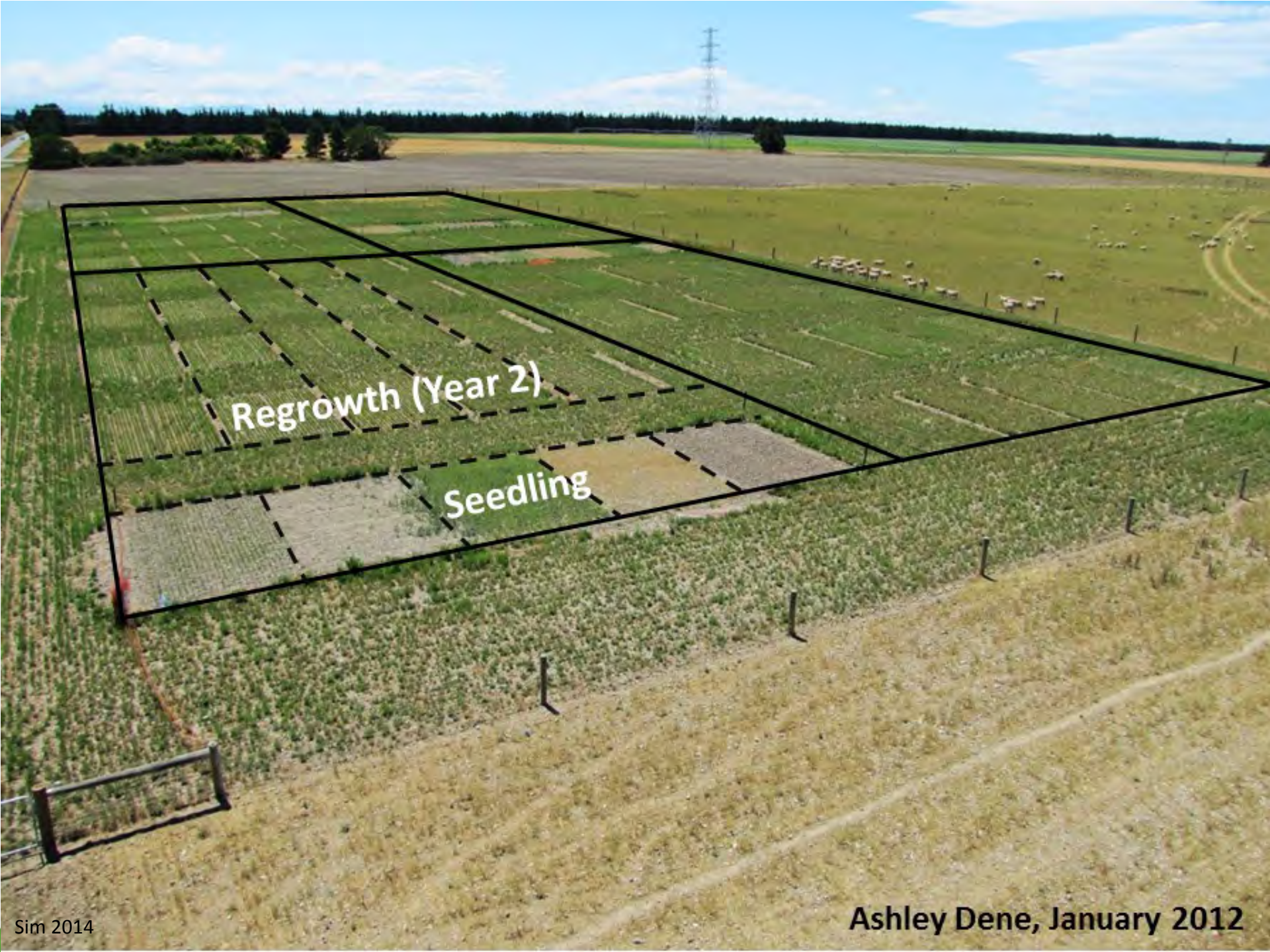
Sowing - 8-10 kg/ha
- 10-25 mm
- peat inoculated 8-10 kg/ha
- ***spring*** *or* ***autumn***
- cultivated/direct drilled (DAP)

Lucerne root

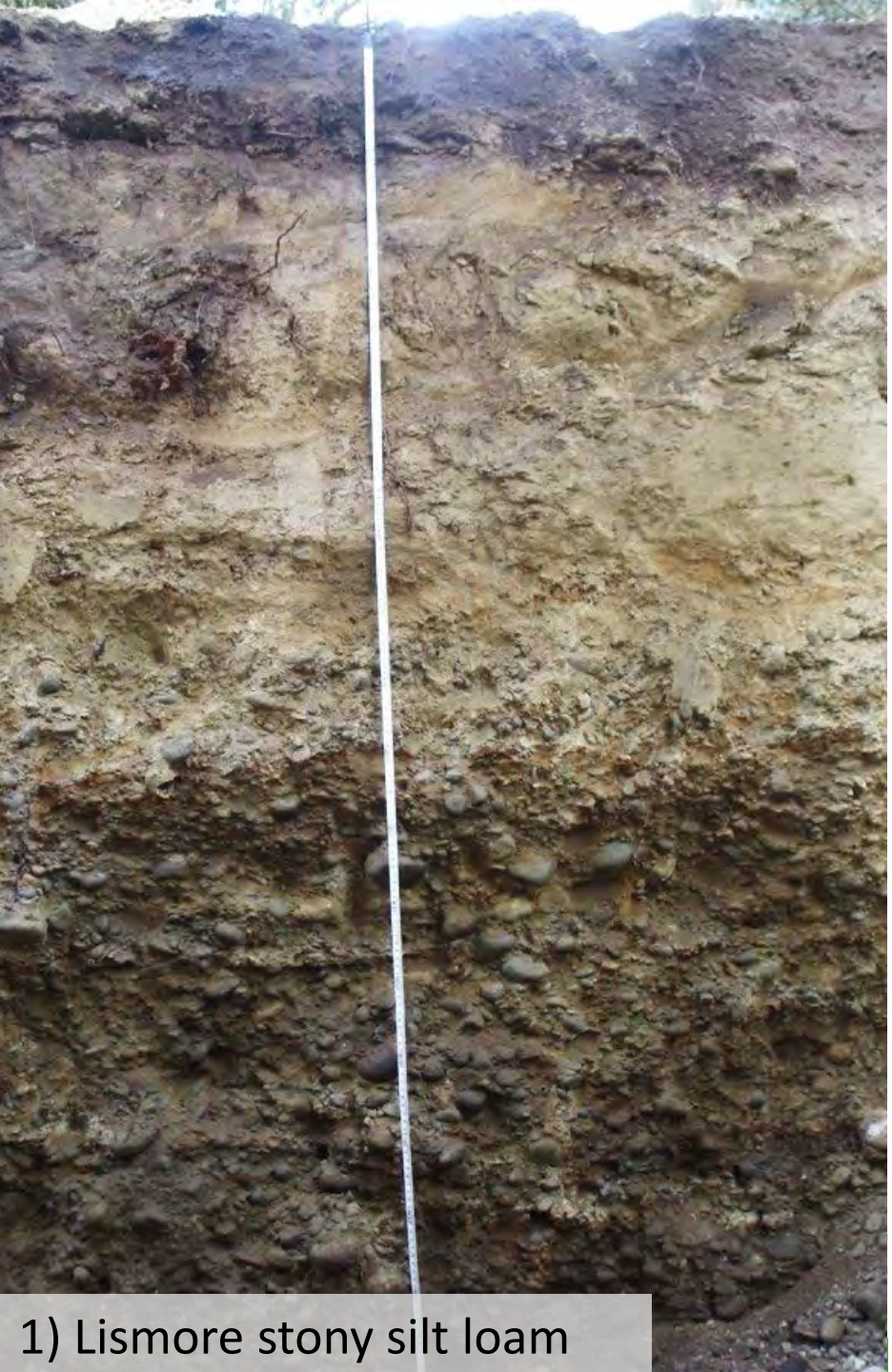
~8 months after sowing

> 1.5 m length

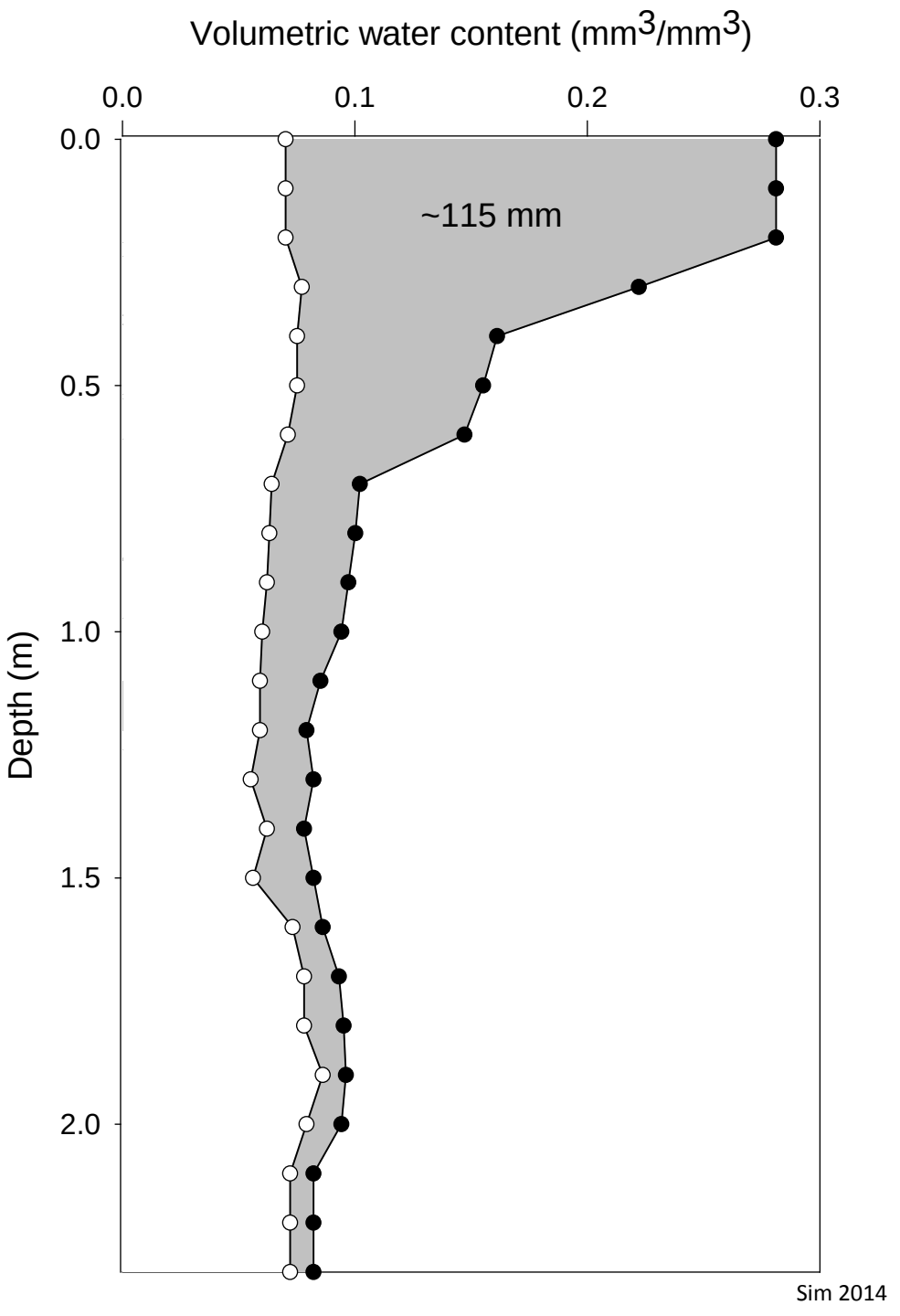
Photo: David Hollander
Lincoln University

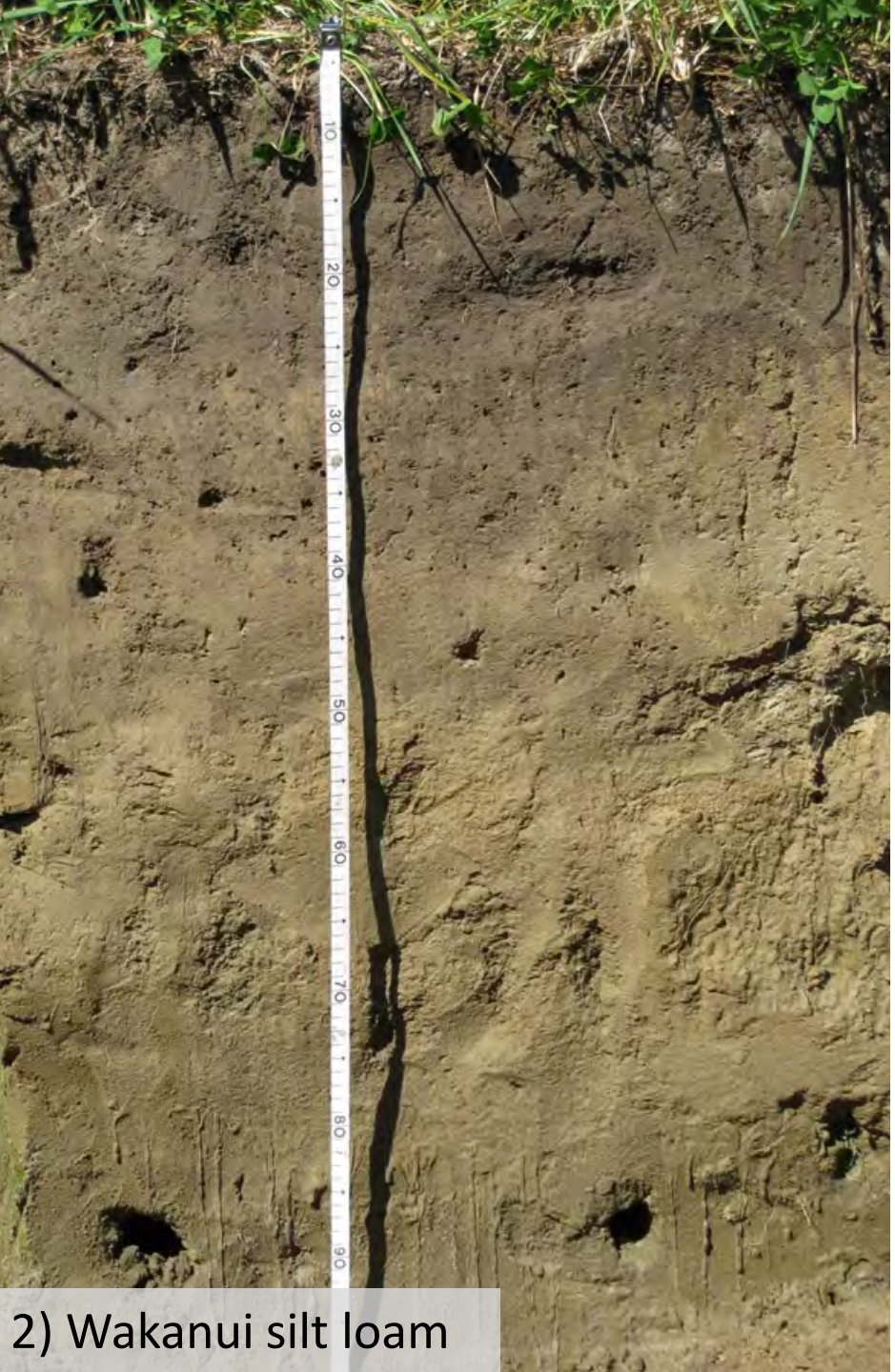


Sim 2014

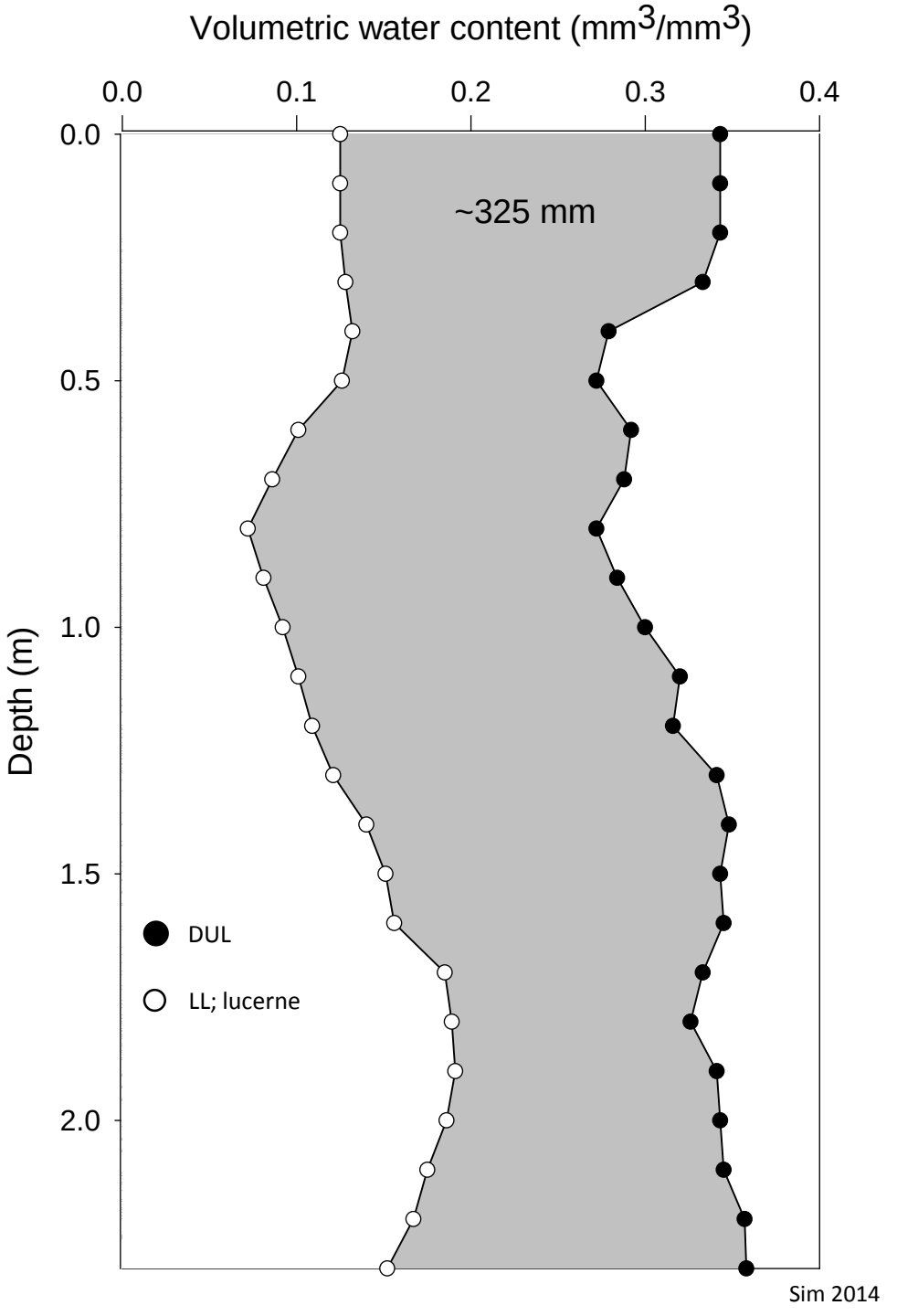


1) Lismore stony silt loam

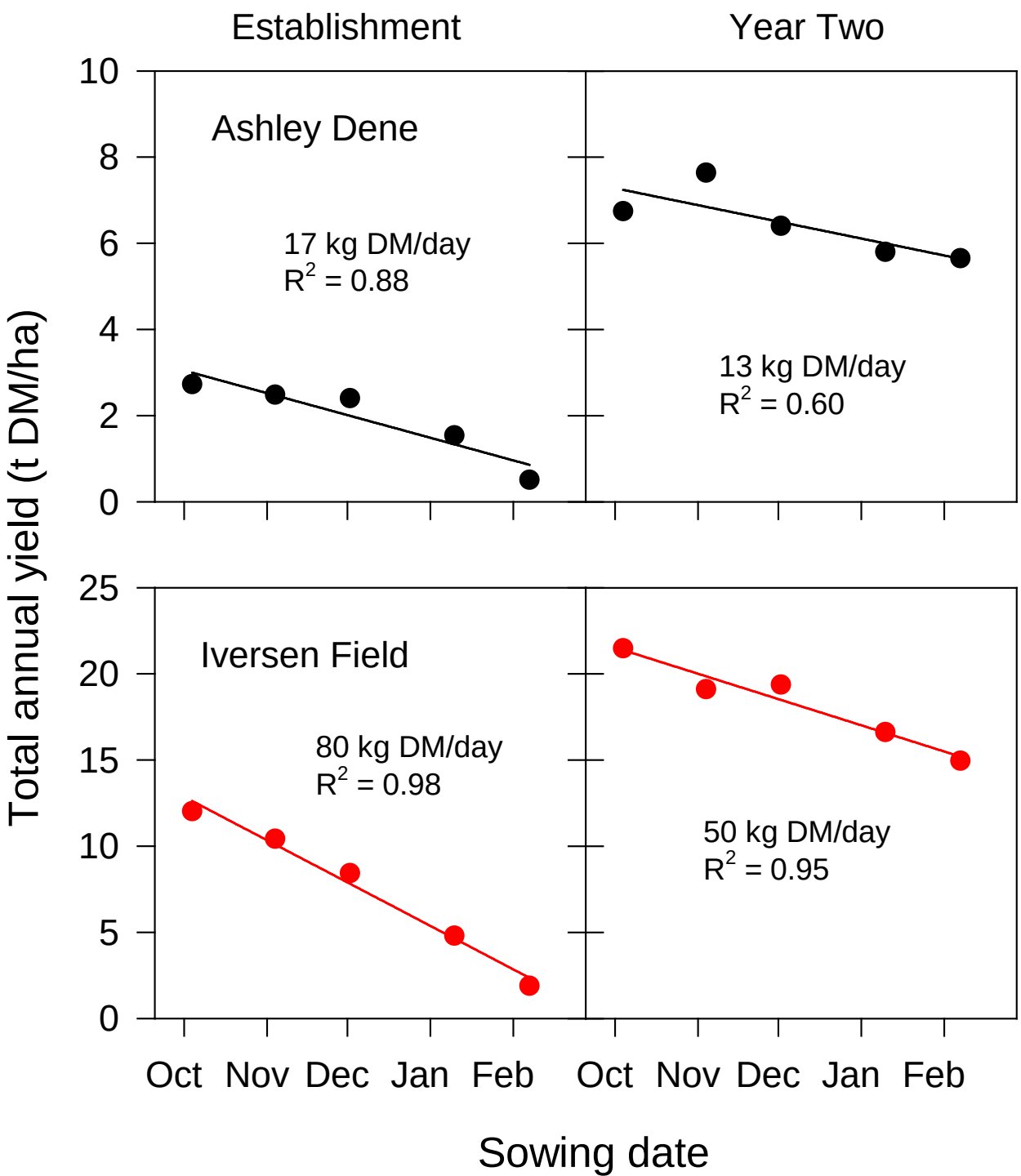




2) Wakanui silt loam




Iversen 12, January 2012
Seedling
Regrowth (Year 2)
Sim 2014



Delayed sowing cost yield

Sown: February - October

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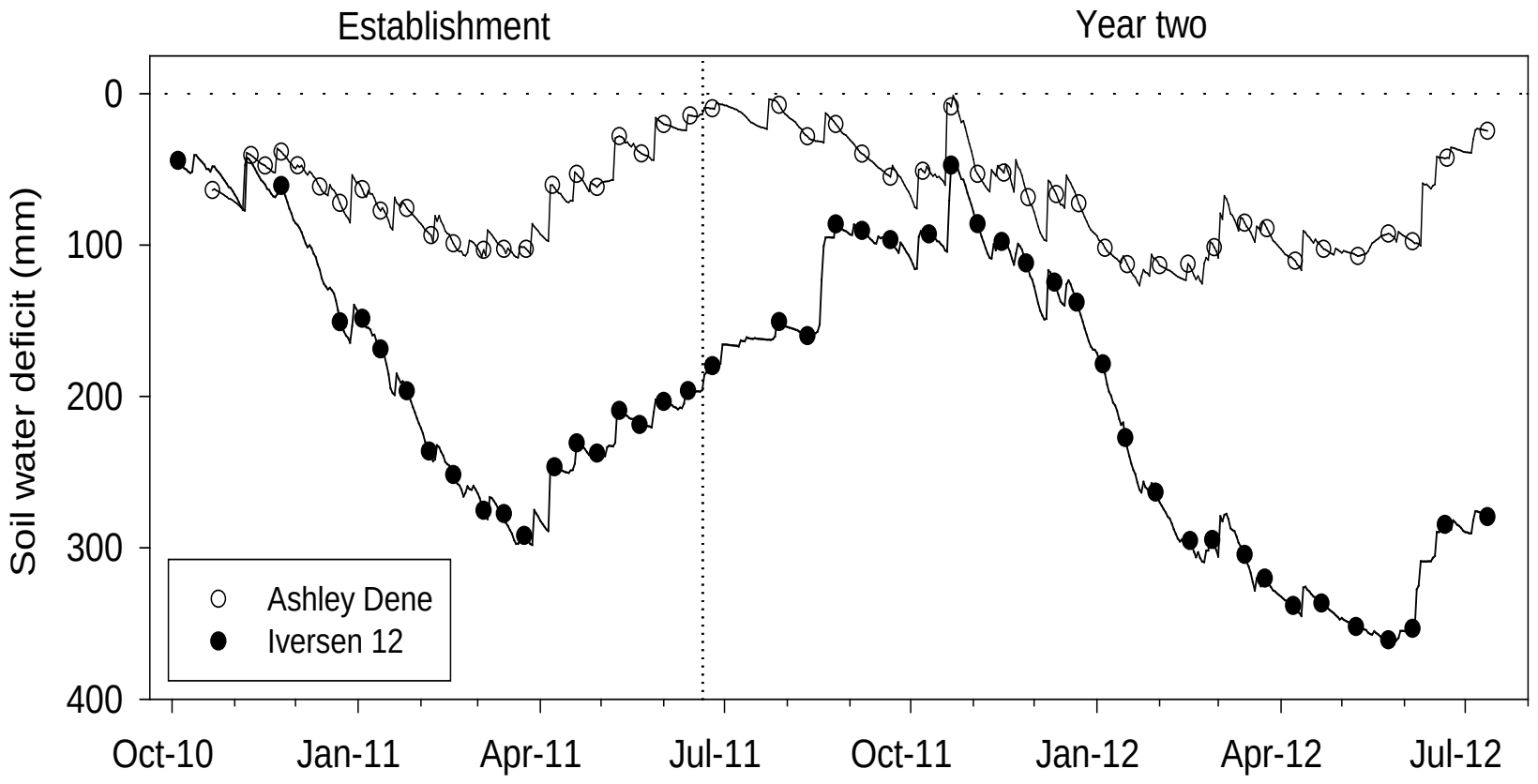
Taproot mass

Sampled: June

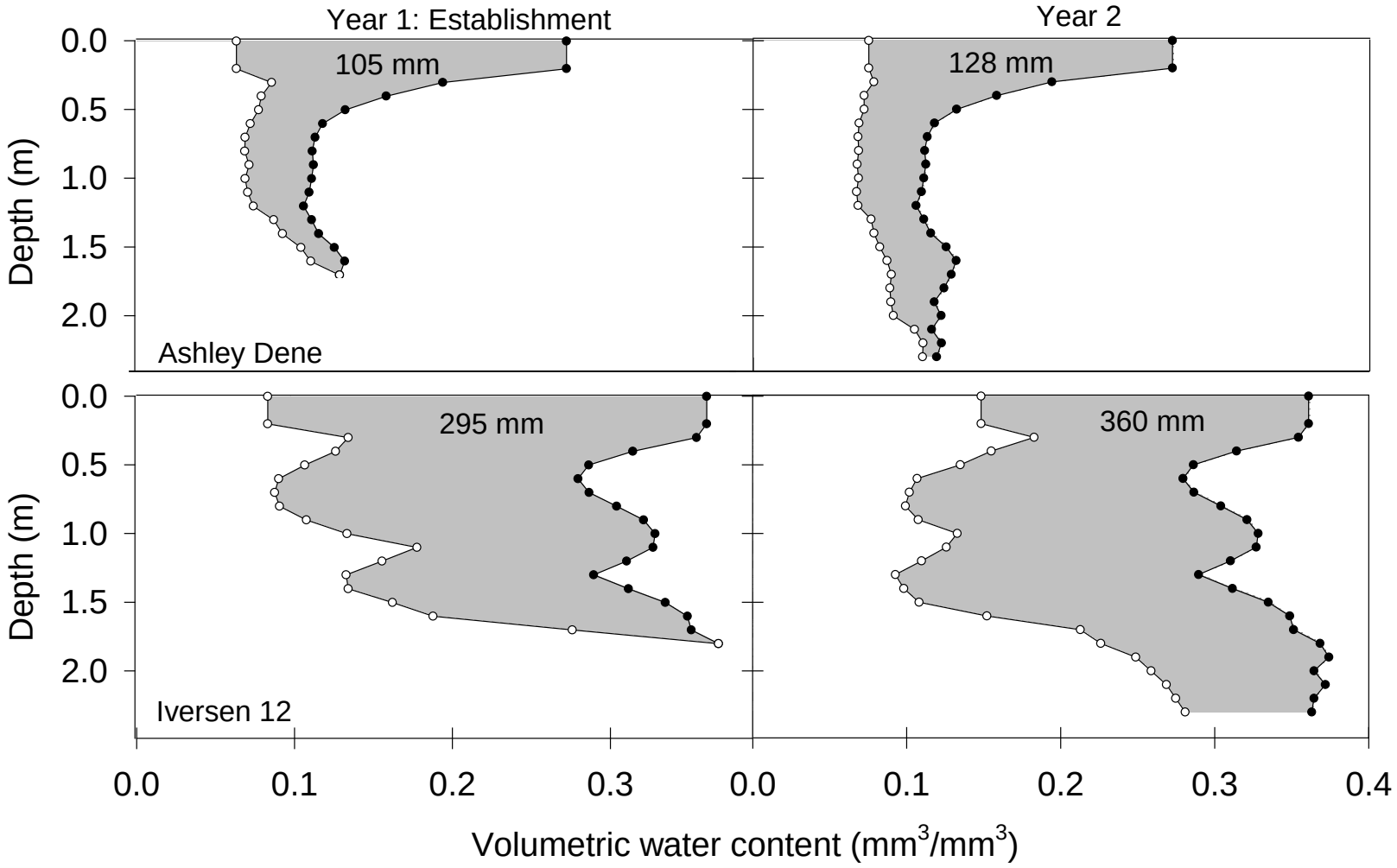
- Neutron probe (2.3 m)
- Seedling vs. regrowth lucerne
- The influence of soil type

Water extraction – understanding yield

Seasonal soil water deficit



Water extraction



Water extraction

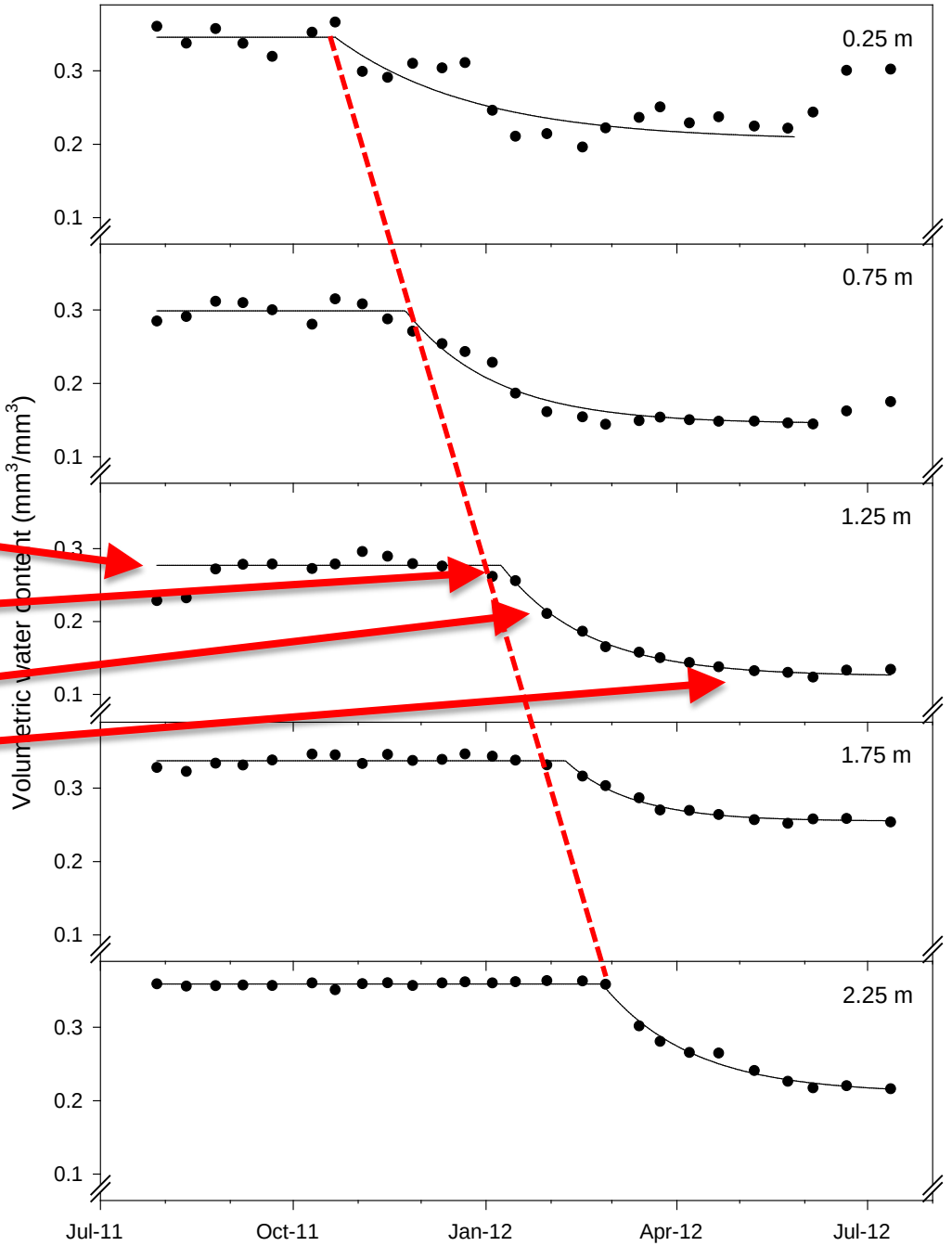
Field capacity

Start of extraction

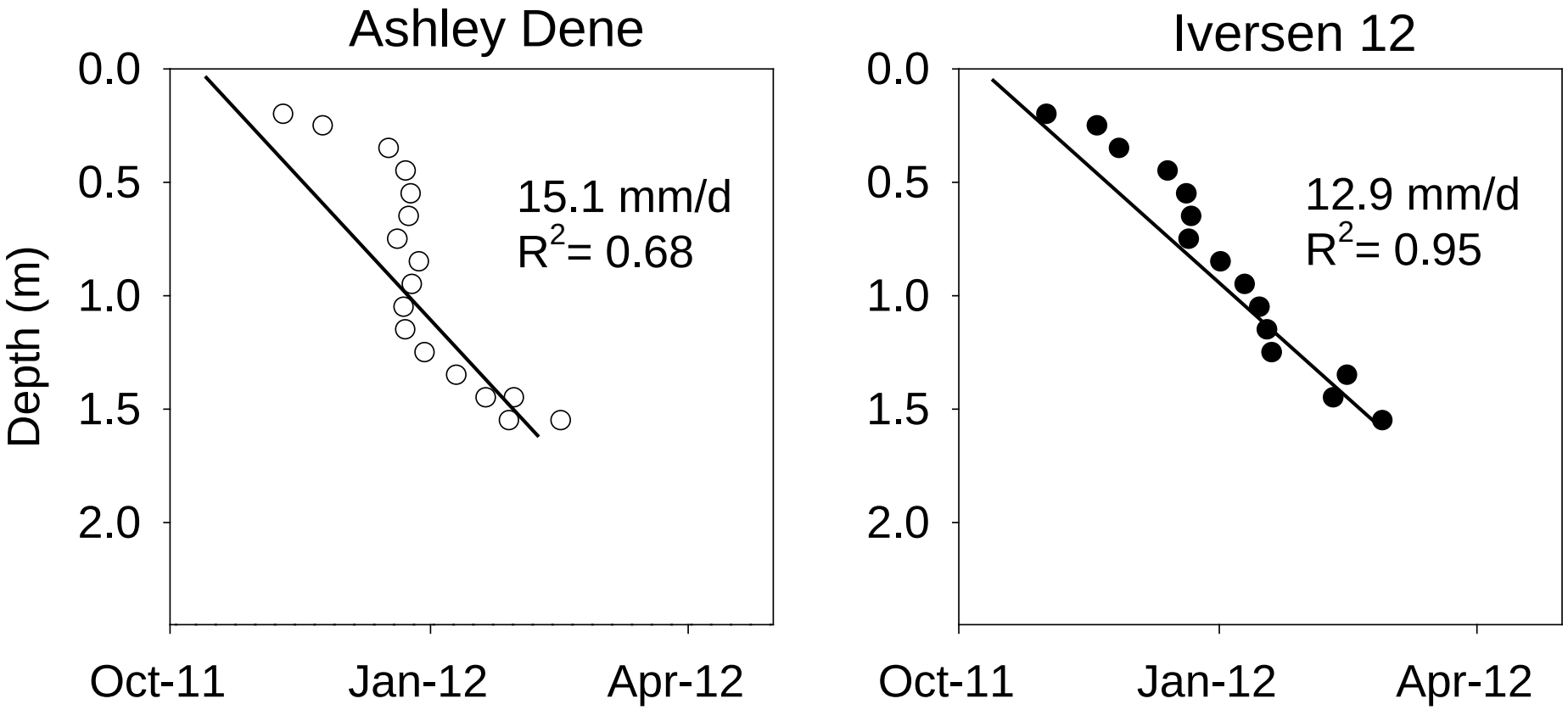
Rate of extraction

Lower limit

Extraction front velocity

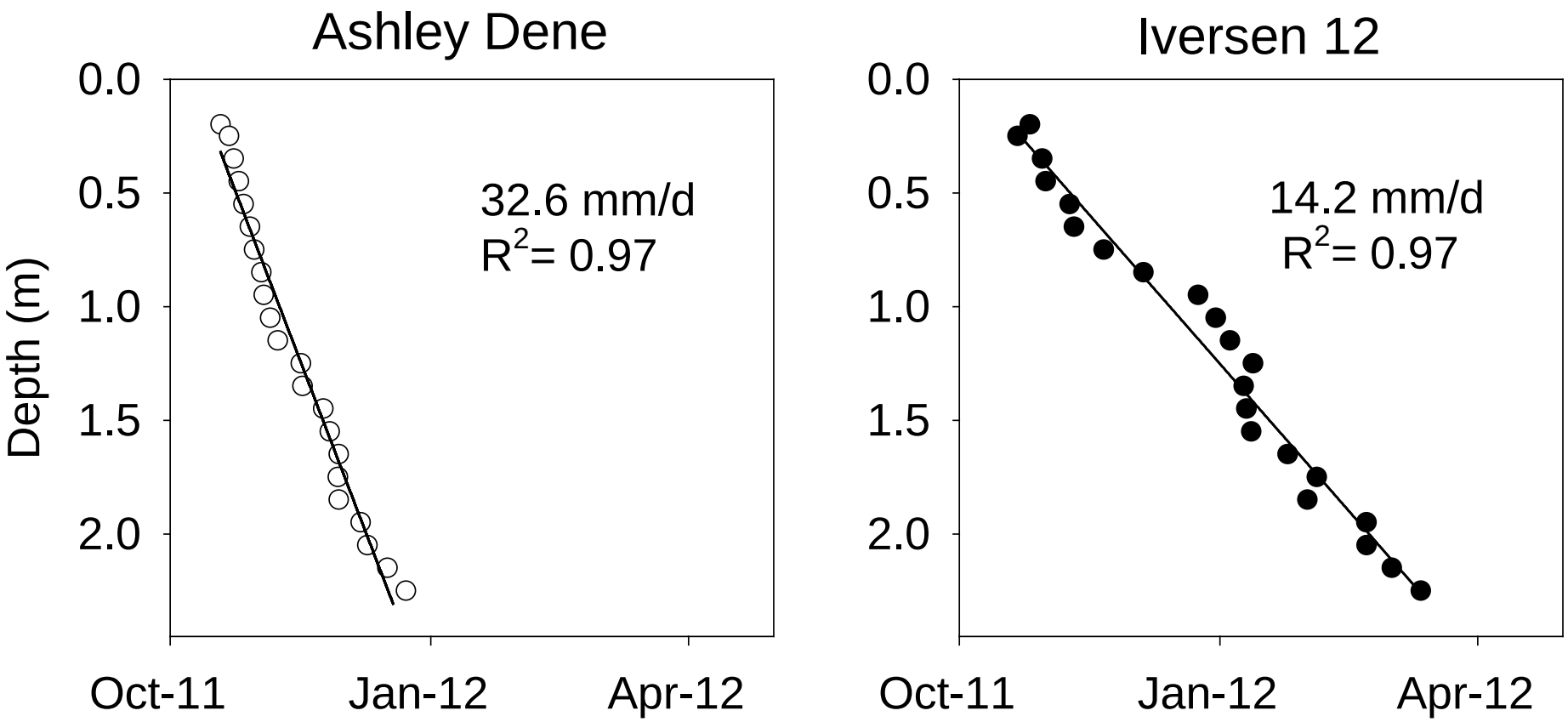


Extraction front velocity - establishment




Ashley Dene
Iversen 12
Sown 10 October
Emerged 18 October
200 plants/m²
Sim 2014

Extraction front velocity – Yr 2



Growth:

is dry matter accumulation as a result of light interception and photosynthesis

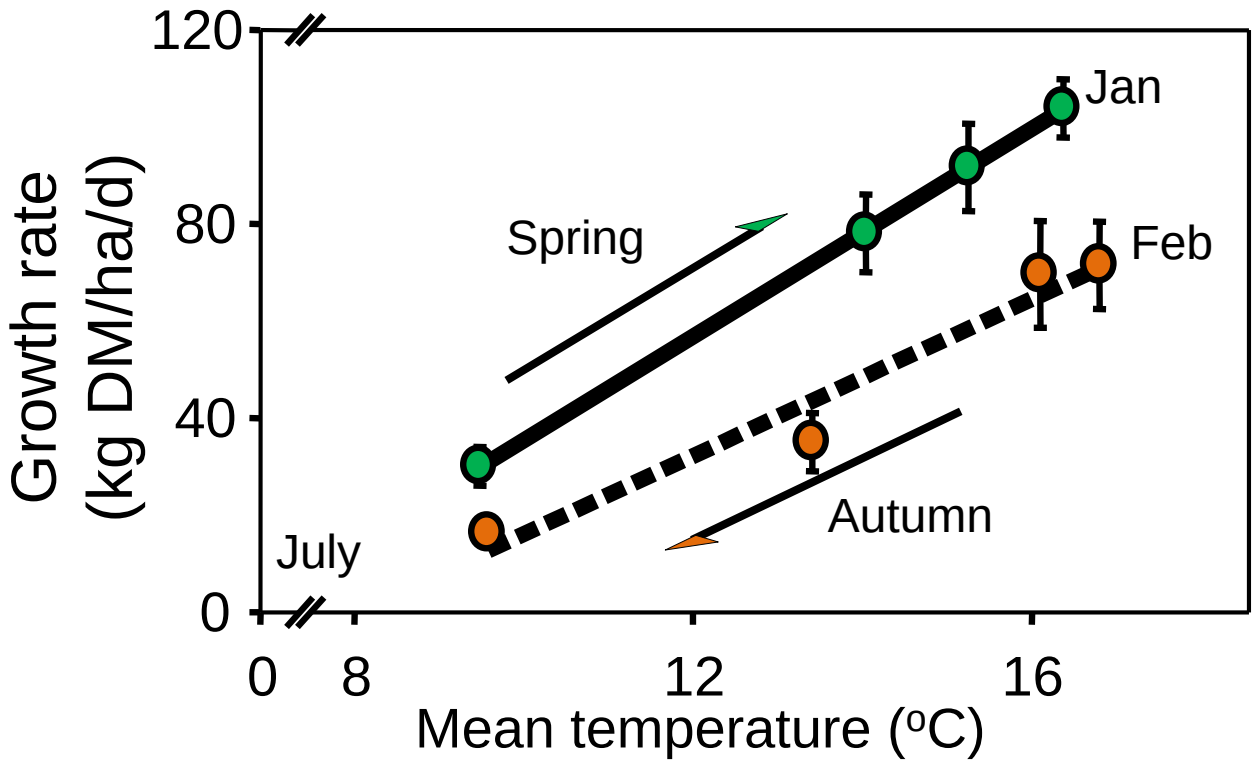
Development:

is the ‘age’ or maturity of the regrowth crop e.g. leaf appearance, flowering

Growth and **development** are both influenced by environmental signals

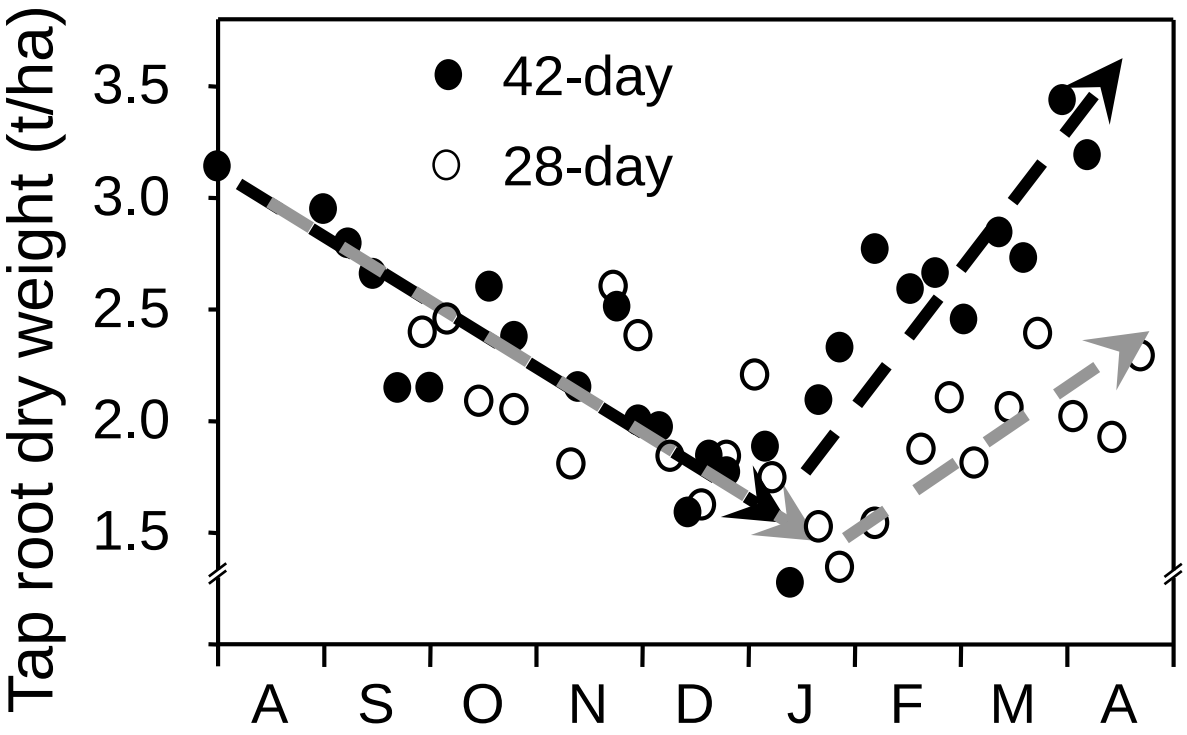
The canopy: the energy capture device

Vegetative growth



Moot *et al*. 2003

Partitioning to roots



Moot *et al*. 2003

Lucerne management

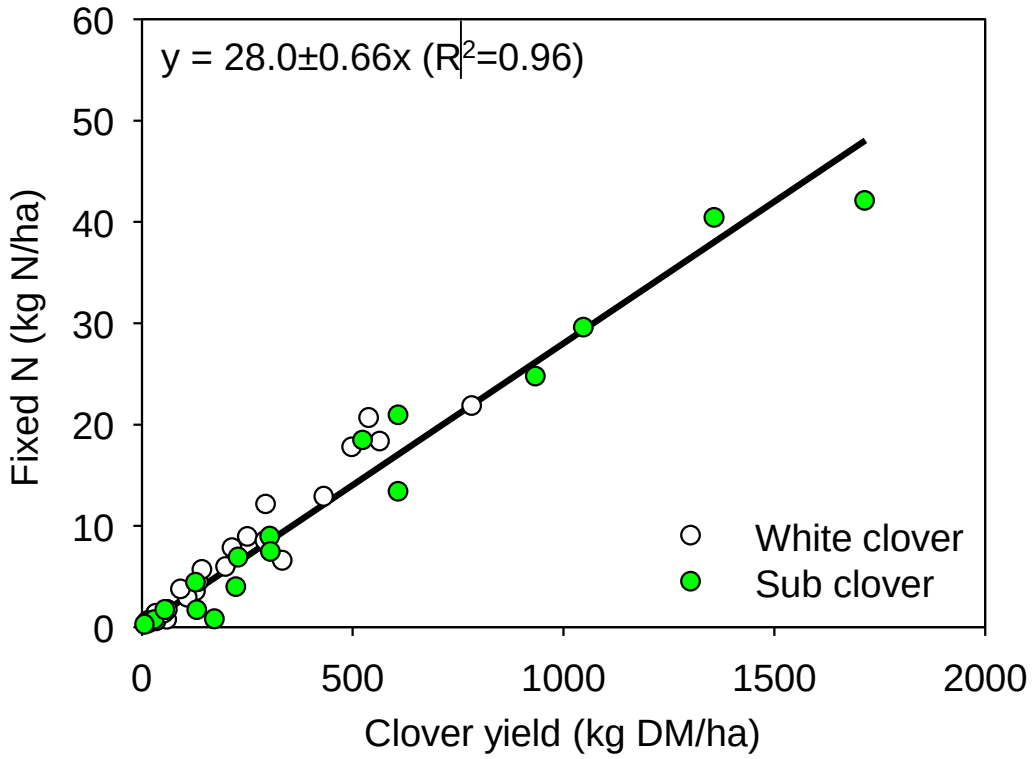
- Spring is rapid canopy expansion and remobilisation
- Summer water extraction rate depends on soil type and canopy cover
- Autumn requires recovery for underground reserves
- Winter- no growth

Balansa clover

Photo: DP Monks
Lincoln University

Gland clover

Biological N fixation



Lucas *et al.* 2010

Conclusions

- Fixes N from that atmosphere
- Deep tap root that competes for water
- Remobilizes reserves in spring
- Stores CHO and N below ground in autumn
- Establish in spring
- Ecosystem services include beneficial insects
- Cut and carry and grazing options

References

Lucas, R. J., Smith, M. C., Jarvis, P., Mills, A. and Moot, D. J. 2010. Nitrogen fixation by subterranean and white clovers in dryland cocksfoot pastures. *Proceedings of the New Zealand Grassland Association*, **72**, 141-146.

Moot, D. J., Brown, H. E., Teixeira, E. I. and Pollock, K. M. 2003. Crop growth and development affect seasonal priorities for lucerne management. *In:* D. J. Moot (ed). Legumes for Dryland Pastures Proceedings of a New Zealand Grassland Association Inc Symposium held at Lincoln University, 18-19 November, 2003. Christchurch: New Zealand Grassland Association, 201-208.

Sim, R. E. 2014. Water extraction and use of seedling and established dryland lucerne crops. PhD thesis, Lincoln University, Lincoln, Canterbury. 264 pp.