

Plant & Food
RESEARCH

RANGAHAU AHUMĀRA KAI



**Lincoln
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Te Whare Wānaka o Aoraki

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New Zealand's specialist land-based university

Seed potato physiological age and crop establishment

Juliano Oliveira, Derrick Moot, Hamish Brown

Acknowledgements: Lincoln University, Plant & Food Research and Potatoes New Zealand



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Note:

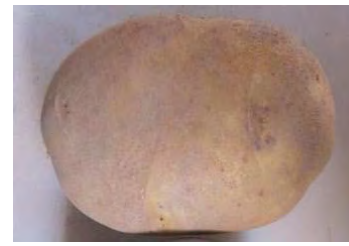
This presentation was made by Prof. Derrick Moot on 6 Nov 2014 in Alexandra at the New Zealand Agronomy Society Annual Conference.

It is associated with the following scientific publication:

Oliveira, J.S., Moot, D.J. and Brown, H.E. 2014. Seed potato physiological age and crop establishment. *Agronomy New Zealand*, **44**, XXX-XXX.



Physiological age



➤ Duration

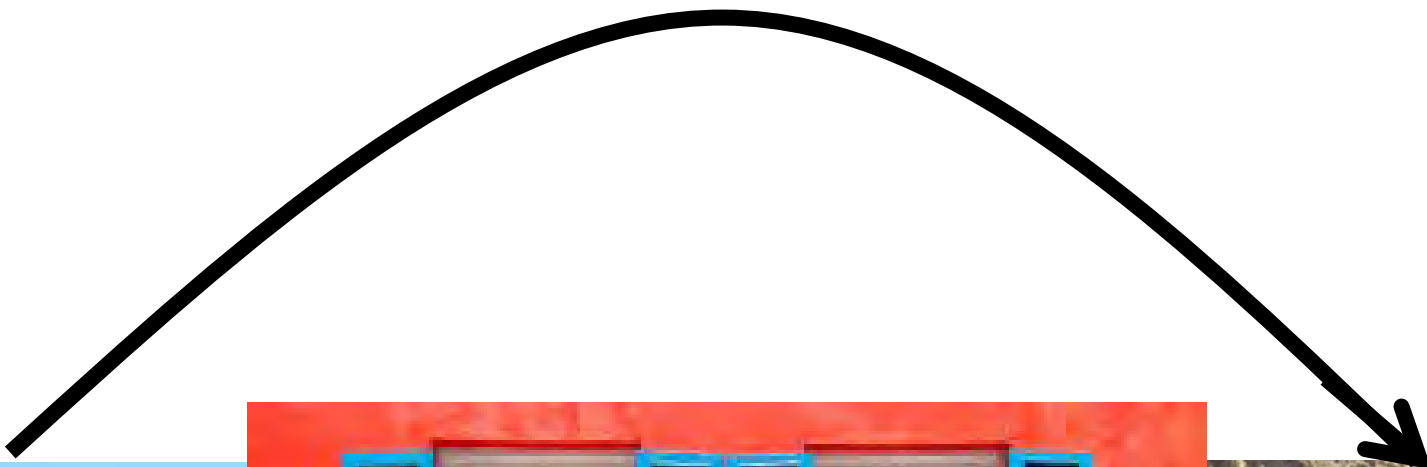
➤ Temperature



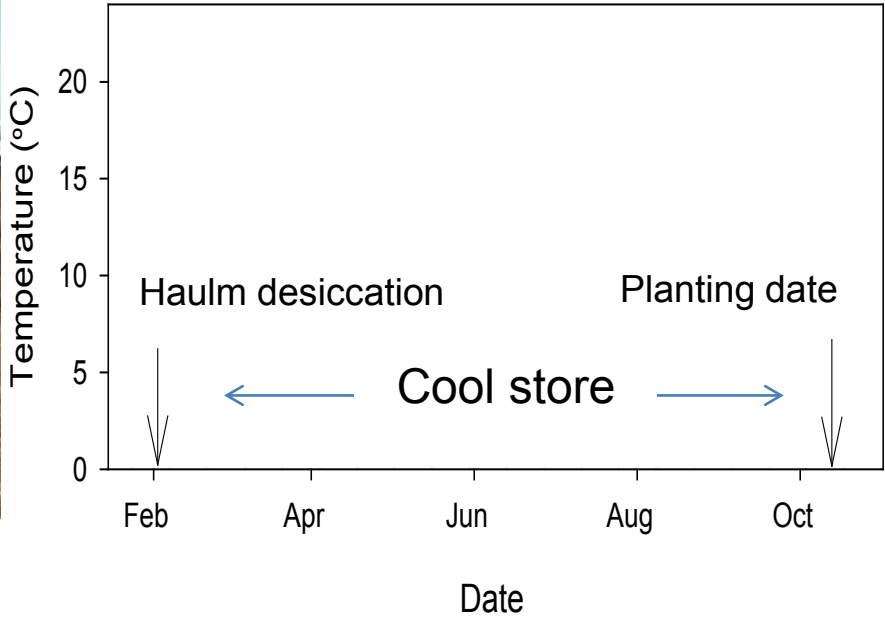
Desiccation



Planting



Canterbury



Importance for growers and industry

Storage strategies prior to planting

Potato processors



Potato growers



Yield

Importance for growers and industry

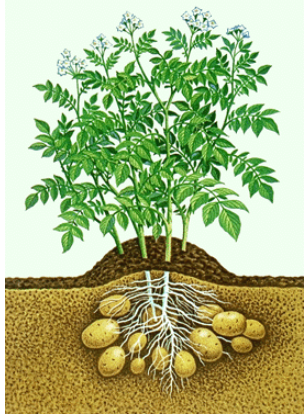
Storage strategies prior to planting

Potato processors



Nº of stems
per seed
potato

Potato growers



Crop establishment

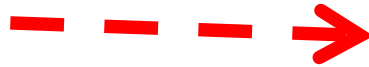
Importance for growers and industry

Storage strategies prior to planting

Potato processors



Potato growers



Objectives

1. Decouple chronological and thermal effects on physiological ageing.
2. Assess the impact of different storage regimes on crop establishment.
3. Assess the possibility of manipulating the number of stems emerged (potato size).

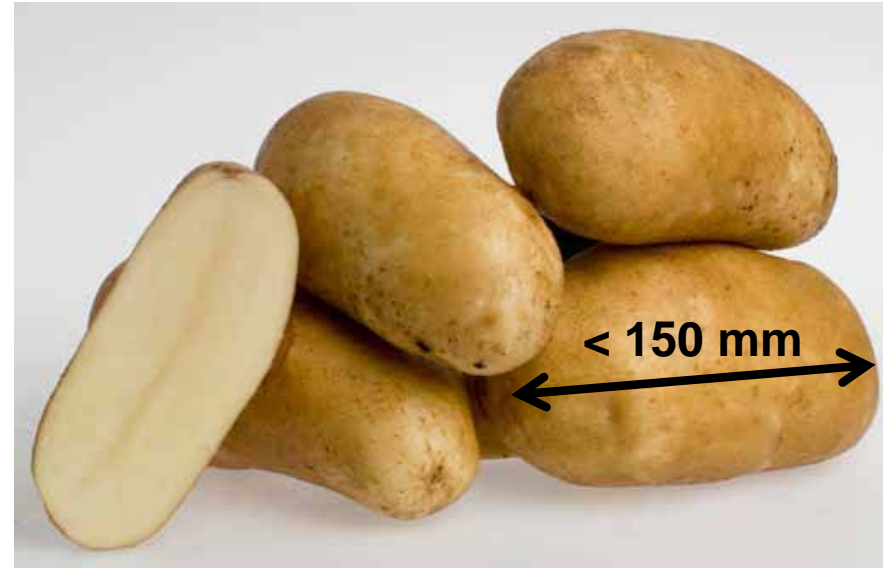
Materials and Methods

Cultivars

‘Bondi’ (‘French fry’)

High yields

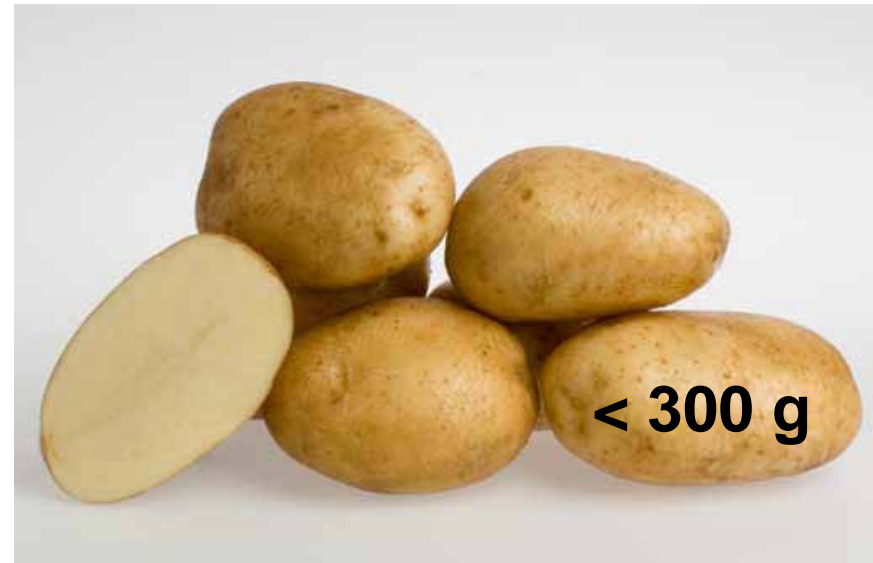
Tubers “too large” for processing



‘Fraser’ (‘Crisps’)

Low yield

Resistant to cold sweetening



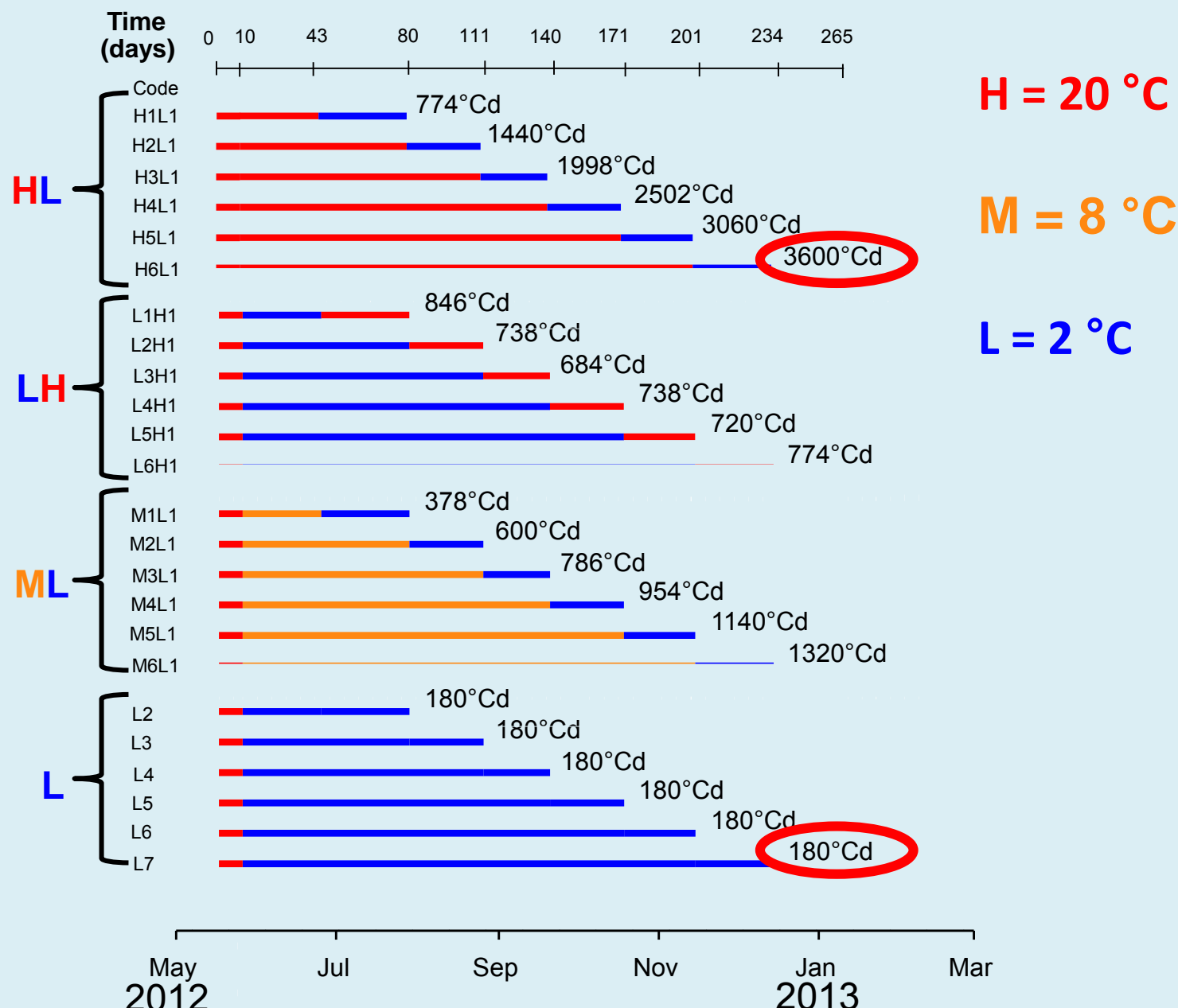
Experimental design

- 2 cultivars
- 4 combinations of storage temperatures
- 6 planting dates

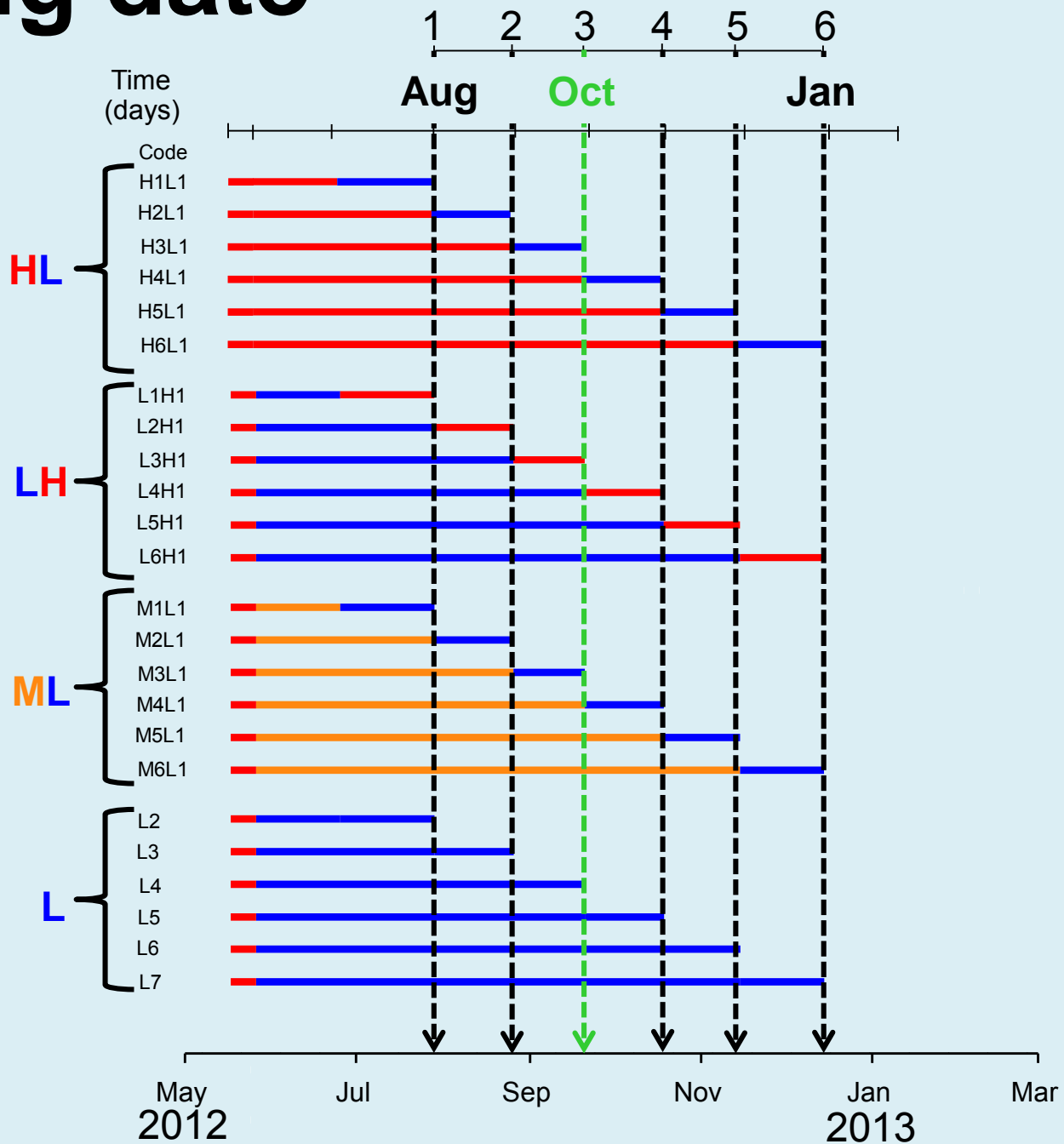


- 4 replicates

Storage Regime



Planting date





All spouts removed prior to planting

At each sowing:

Potatoes were grown at **20°C**
in the dark
for ~4 weeks



then harvested

Time of emergence (days)

Cultivar	Treatment	Planting dates					
		7/8/2012	7/9/2012	5/10/2012	5/11/2012	5/12/2012	7/1/2013
'Bondi'	HL	—	18	15	16	16	NIL
	L	—	20	17	14	14	15
	LH	—	15	15	13	14	14
	ML	—	19	16	17	15	16
	Mean		18	16	15	15	15
'Fraser'	HL	—	19	16	18	21	NIL
	L	—	25	21	18	16	18
	LH	—	19	16	17	15	15
	ML	—	23	17	18	15	16
	Mean		22	17	18	16	16
Cultivar		P<0.02					
Temperature treatments		ns					
Planting date		P<0.02					
LSD		2.0					

Time of emergence (days)

Effect of cultivar:

- 'Bondi' emerged about 2 days earlier than 'Fraser'

Effect of planting date:

- Later planting dates = Earlier emergence
- No emergence for the tubers which accumulated 3600°Cd during storage (HL)

Temperature:

- Storage temperature had no effect on potato emergence

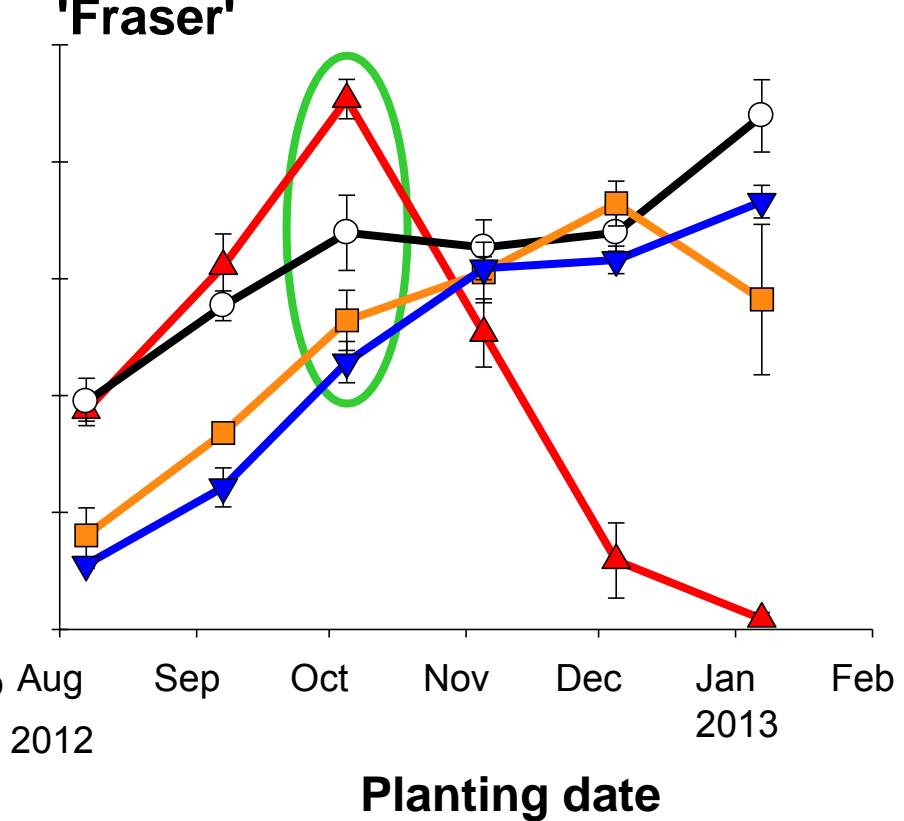
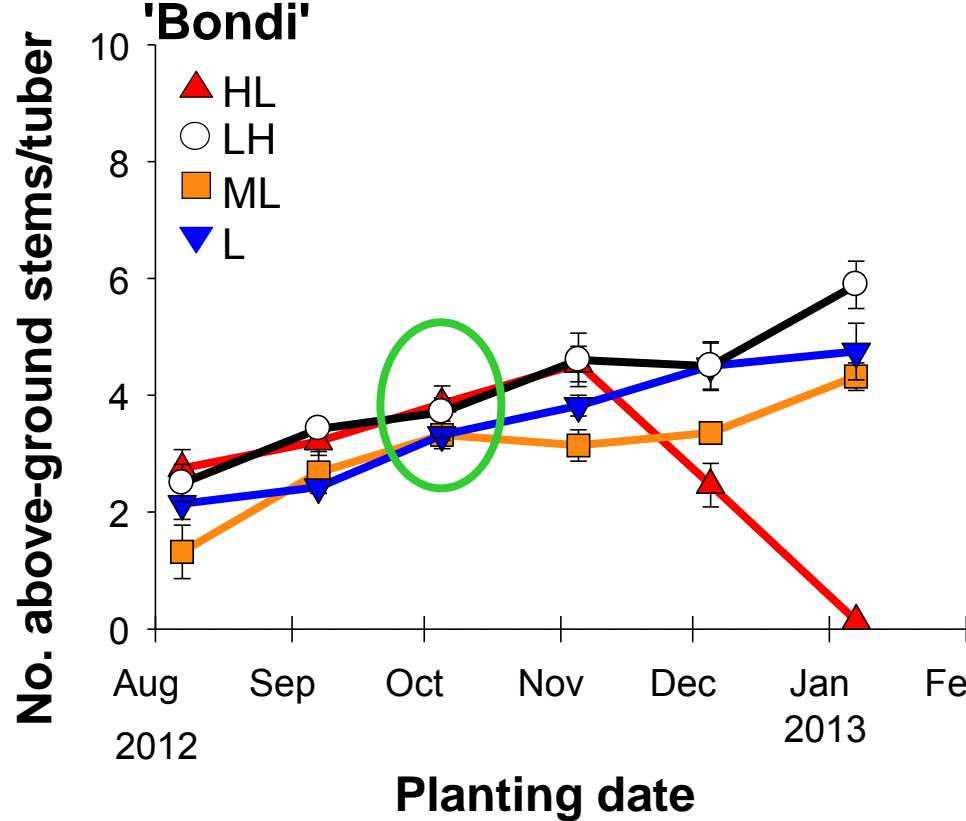
Number of stems emerged

'Bondi'

At the commercial sowing date stem number was unaffected by storage regime (200-2000°Cd)

'Fraser'

At the commercial sowing date stem number was able to be manipulated by pre-planting storage conditions

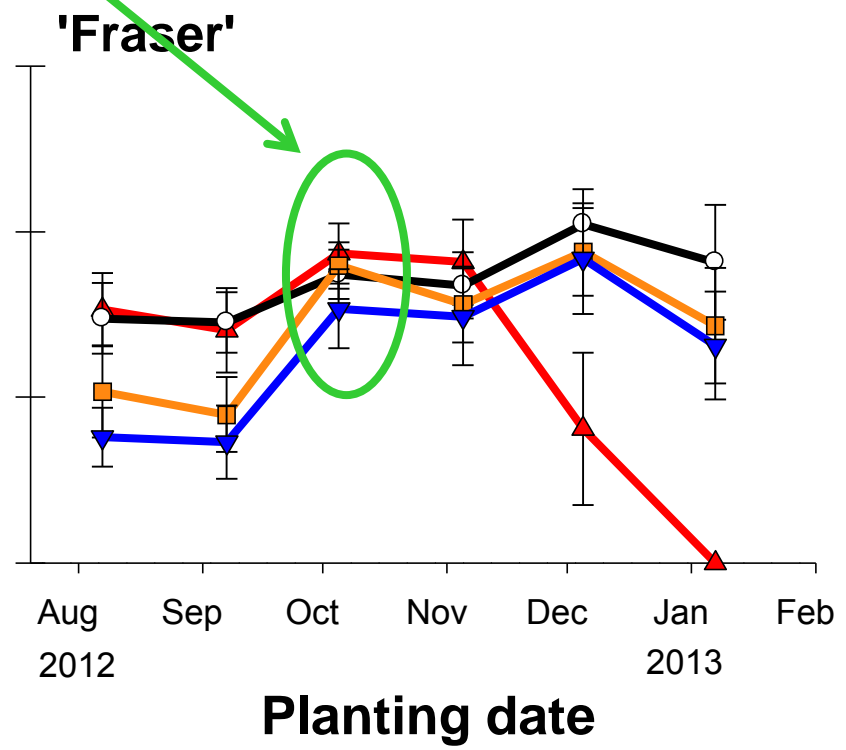
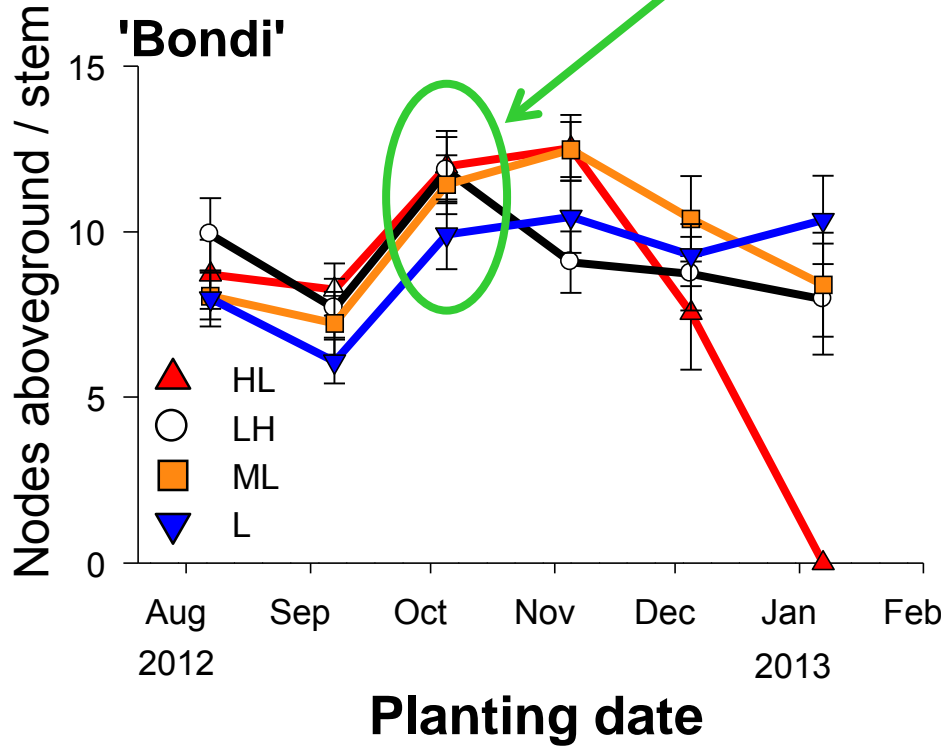


Number of nodes formed (Development)

Why was there no effect of storage regime on node number at the October sowing?

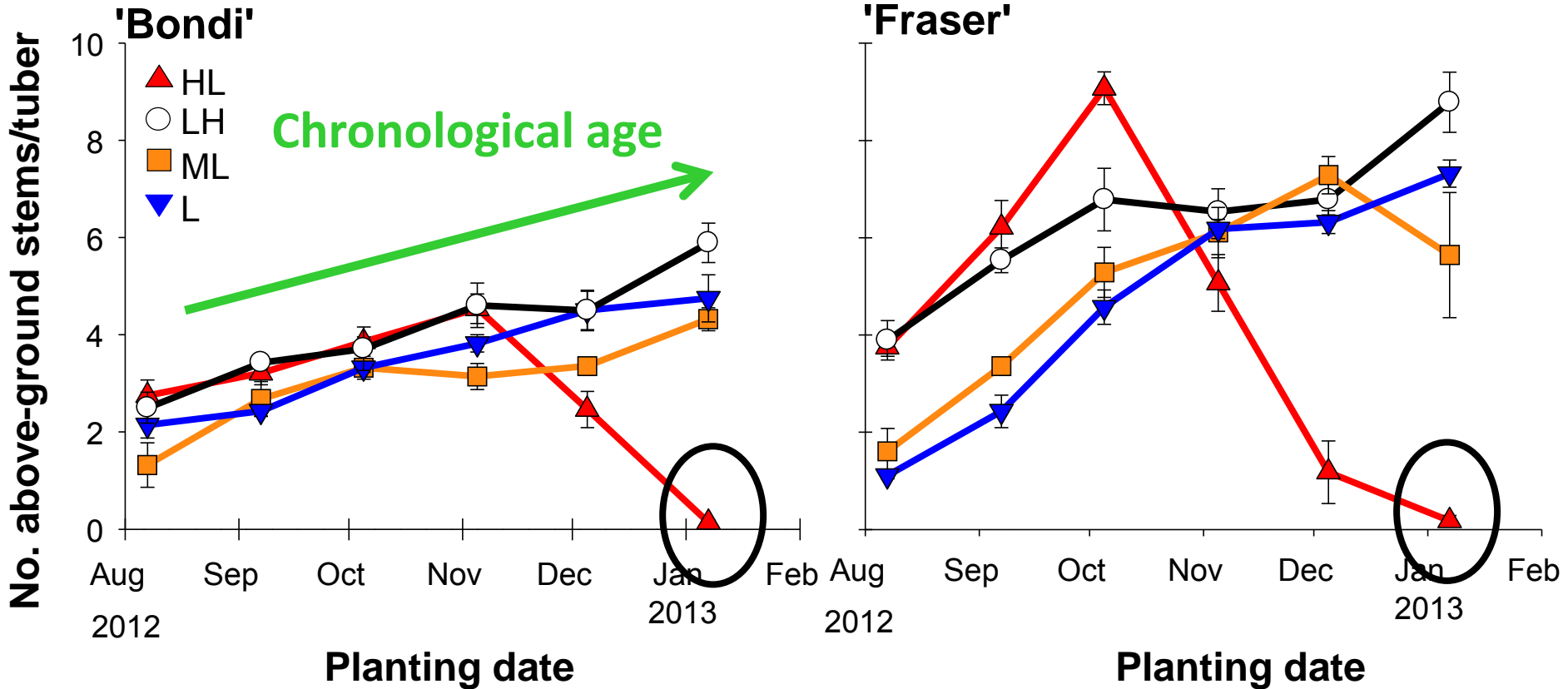


200-2000°Cd



Number of stems emerged

Why didn't the tubers stored for 3600°Cd emerge?



Number of stems emerged

3600°Cd seed

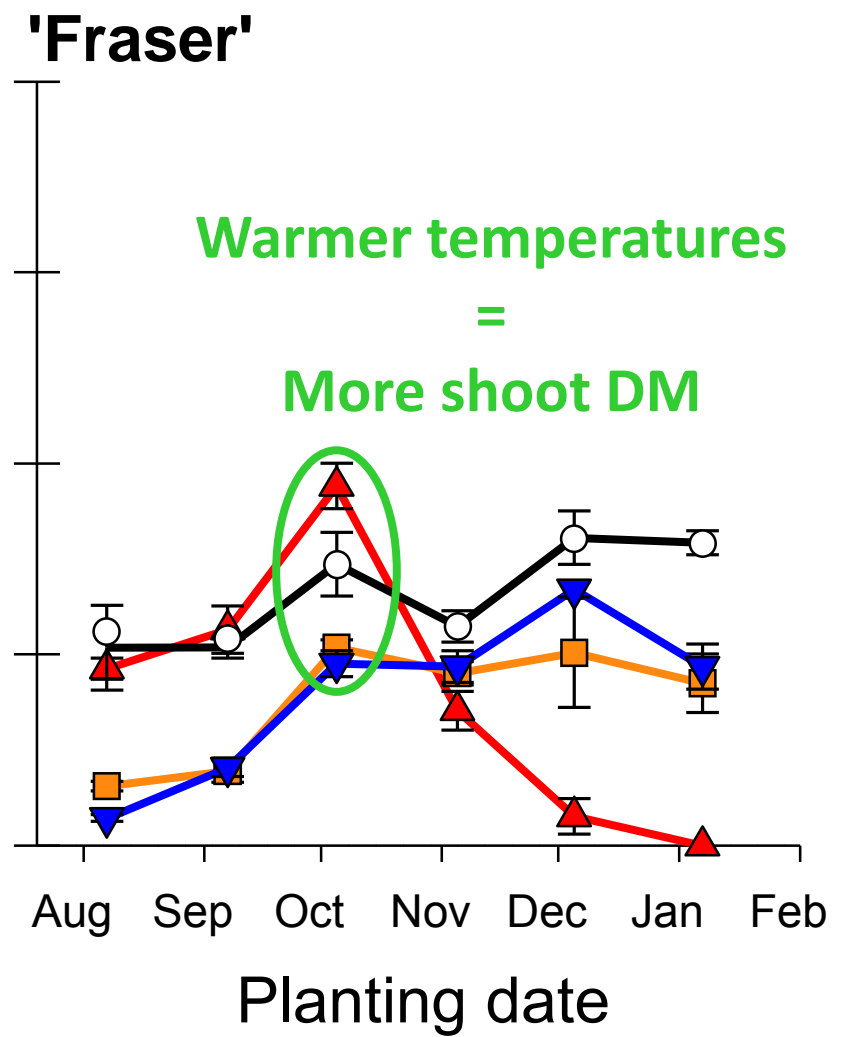
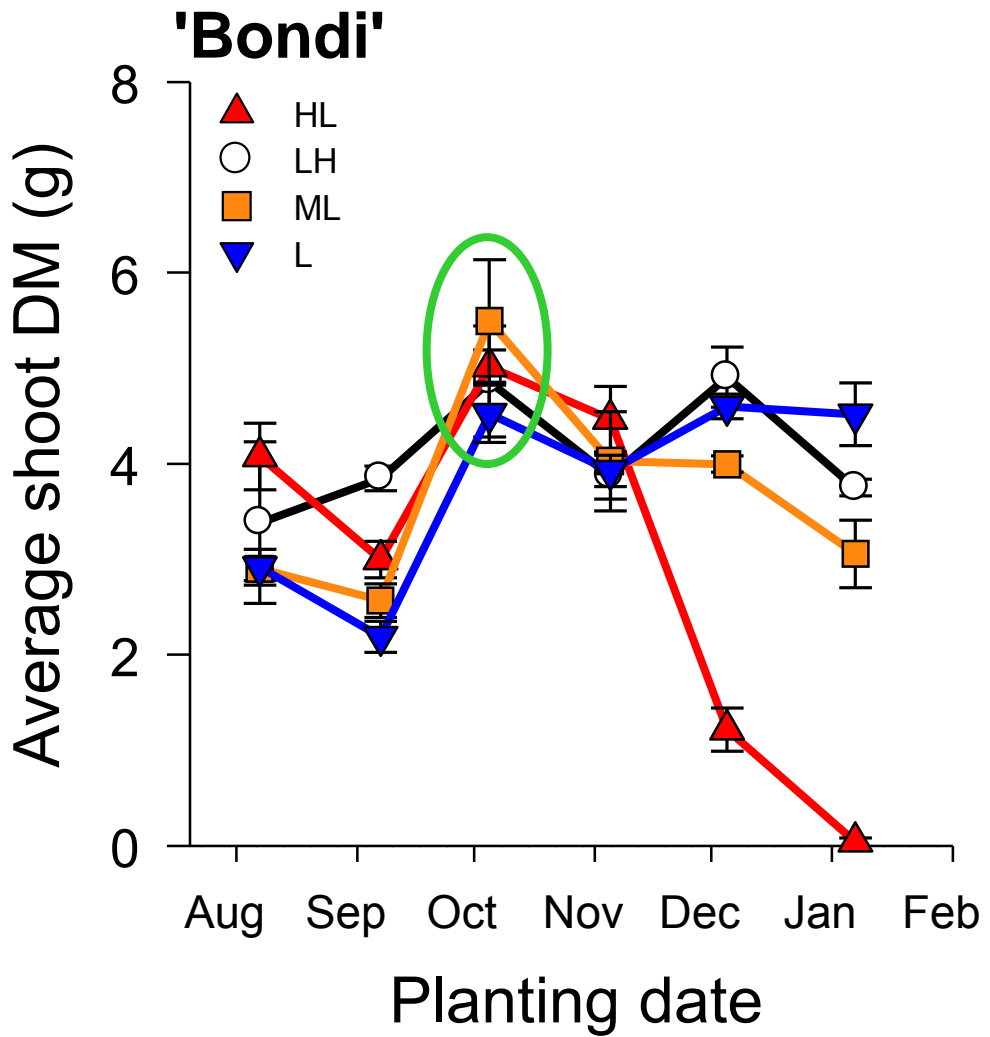
After storage (pre-sprout removal)



After harvest (4 weeks after planting)



Shoot DM after 4 weeks (Growth)



Conclusions

- High storability plasticity was found for the two main crops.
- ‘Bondi’ 2400 °Cd
- ‘Fraser’ 1500 °Cd
- The number of stems emerged per seed can be manipulated during storage.
- *‘Bondi’ = Chronologically*
- *‘Fraser’ = Chronologically and Thermally*
- No need to use refrigerated storage.

