5th Australian Almond Research & Development Forum & Field Day

Almond Centre of Excellence Experimental Orchard

SARDI – Irrigated Crops

Government of South Australia
Primary Industries and Regions SA

SARDI
SOUTH AUSTRALIAN RESEARCH AND DEVELOPMENT INSTITUTE

October 30th - 31st, 2019

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SARDI at the ACE experimental orchard

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Hort. Innovation Project ST16003

- Optimising density
- Genotype compatibility & architecture
- Soil management strategies
- DNA assay for quantifying prunus roots
- Other project activities:
  - Irrigation
  - Climate
  - Glasshouse studies
  - Automated orchard assessment

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AGRICULTURE VICTORIA

NSW GOVERNMENT Department of Primary Industries

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Optimising planting density

Two trials testing a continuum of densities:

- Low (H1) to high (H2) **5 ha** 2,160 trees
- High (H2) to super high (H3) **1.6 ha** 1,520 trees

Robust biometric designs:

- Multiple replicates
- Large plots fully buffered
- Comparable N-S and/or E-W

Economics / phenology / resource use

Transition low (H1) to high (H2)

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H1

H2

Densities (trees/ha)	308	*(6.5 x 5.0 m)*
	342	*(6.5 x 4.5 m)*
	385	*(6.5 x 4.0 m)*
	440	*(6.5 x 3.5 m)*
	513	*(6.5 x 3.0 m)*
	615	*(6.5 x 2.5 m)*
Varieties	Nonpareil, Vela, Shasta & Carina	
Rootstock	Garnem	
Replicates	Six	

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Transition high (H2) to super-high (H3)

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H2

Brett Rosenzweig (ABA)

H3

Densities (trees/ha)	635	*(4.5 x 3.5 m)*
	889	*(4.5 x 2.5 m)*
	1481	*(4.5 x 1.5 m)*
Varieties	Shasta & Vela	
Rootstock	Controller-6, Controller-7 & Rootpac-40	
Replicates	Four	

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Genotype compatibility & architecture

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Screen 1

New rootstock genotypes grafted to 'Nonpareil like' varieties

- 513 trees/ha *(6.5 x 3.0 m)*
- 1111 trees/ha *(4.5 x 2.0 m)*

Rootstocks		Scions
Nemaguard	Krymsk 86	Nonpareil
Controller 6	Cornerstone	Vela
Controller 7	Atlas	Shasta
Controller 9	Garnem	Almond 12
Rootpac 20	Felinem	Almond 21
Rootpac 40	Monegro	
Rootpac R		

Screen 2

New scion genotypes grafted to 'best bet' rootstocks

- 513 trees/ha *(6.5 x 3.0 m)*

Rootstocks	Scions	
Nemaguard	Nonpareil	Almond 34
Controller 6	Carina	R32T162
Rootpac 40	Maxima	R36T212
Garnem	Vela	R38T208
	Almond 16	R43T17
	Almond 18	R43T107
	Almond 24	R43T118
	Almond 28	R36T199
	Almond 32	R43T138
	Almond 33	R36T195

Alternate soil management strategies

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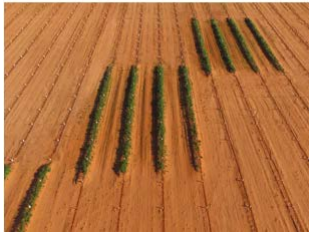

		IRRIGATION		
	OM Treatment	Drip	Sprinkler	D/S
1	zero	x		
2	surface	x		
3	surface (higher rate)	x		
4	surface (rpt annual)	x		
5	inject	x		
6	inject (higher rate)	x		
7	inject (rpt annual)	x		
8	spade	x		
9	surface			x
10	surface		x	
11	supersoil			x
12	supersoil		x	

Alternate soil management strategies

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Farmax spader

- Does not homogenise
- Irregularly cultivates to ~500 mm
- Surface applied OM turned in

Alternate soil management strategies

Subsoil extruder

- Proof of concept machine
- Macerates organic matter into a slurry with water
- Subsoil injection 400-450 mm
- Tines 1.5 m apart
- 10 t/ha single pass
- 50 t/ha double pass

Alternate soil management strategies

Custom built subsoil injection

- Suited to repeat (annual) subsurface applications
- 10 t/ha single pass
- Applied to ~10 cm depth

Early response to soil amendments

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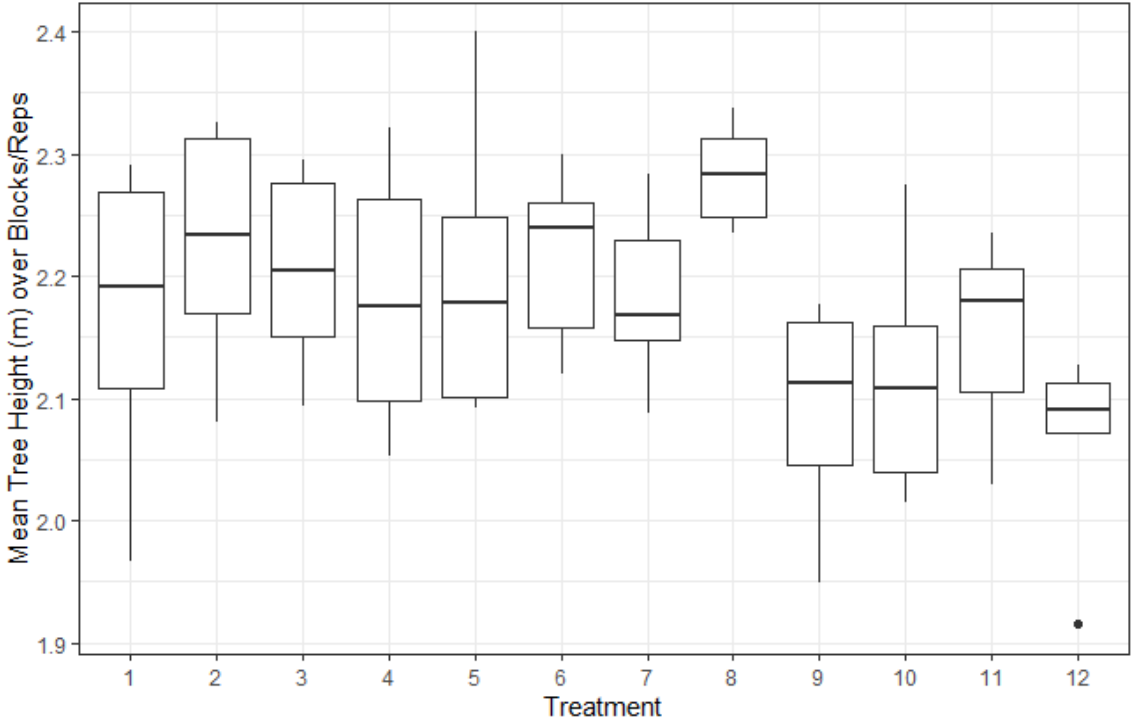
YEAR 1 Canopy height



DNA assay for quantifying prunus roots

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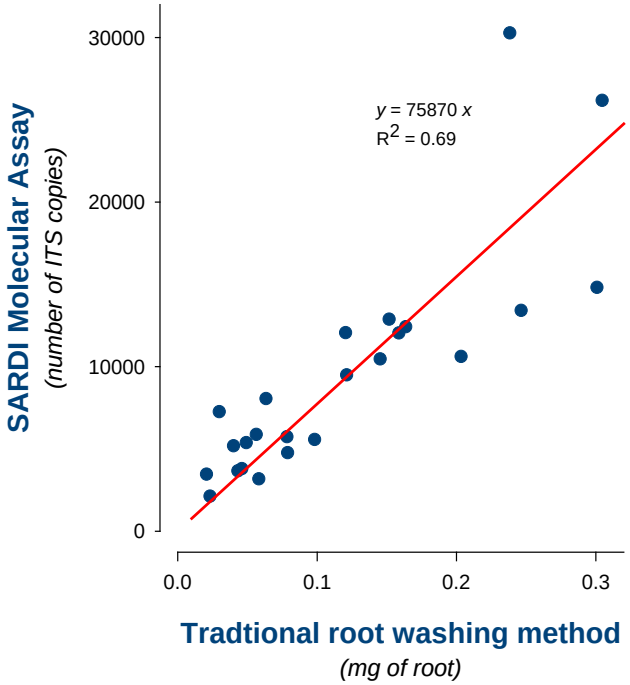
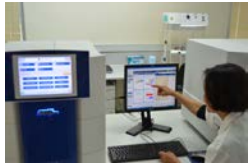
A simple soil test for rapid estimate of root density/distribution

- Recognises 17 rootstock genotypes
- Excludes weeds and non-target crops
- Same sample can report pathogen load





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Other project activities

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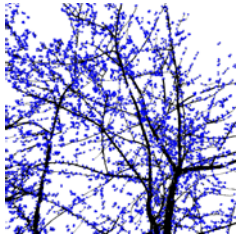
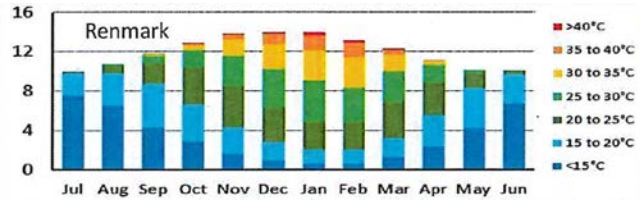
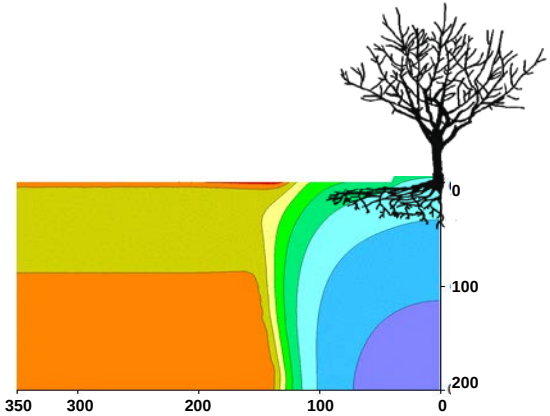
Automated canopy assessment



Climate adaptation



Numerical modelling



Glasshouse studies

Thank you

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SARDI

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