

Plantings research: Shaping the future of efficient almond orchards



**AUSTRALIAN ALMOND
CONFERENCE**
13 - 15 OCTOBER
**ADELAIDE CONVENTION
CENTRE 2026**

**Hort
Innovation**

**ALMOND
FUND**

Hort Innovation
Frontiers

 **ALMOND BOARD
OF AUSTRALIA**

 **Bioeconomy
Science
Institute**

 **Flinders
University**

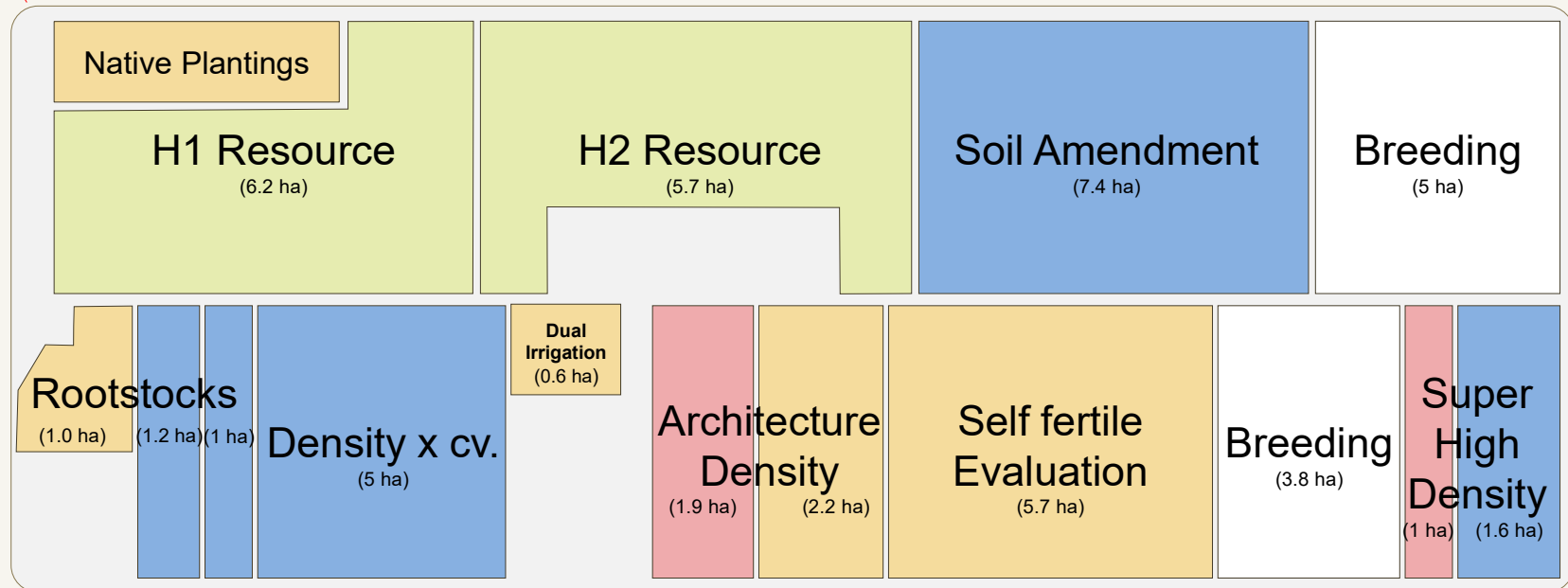
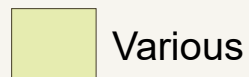

**Government
of South Australia**
Department of Primary
Industries and Regions

SARDI

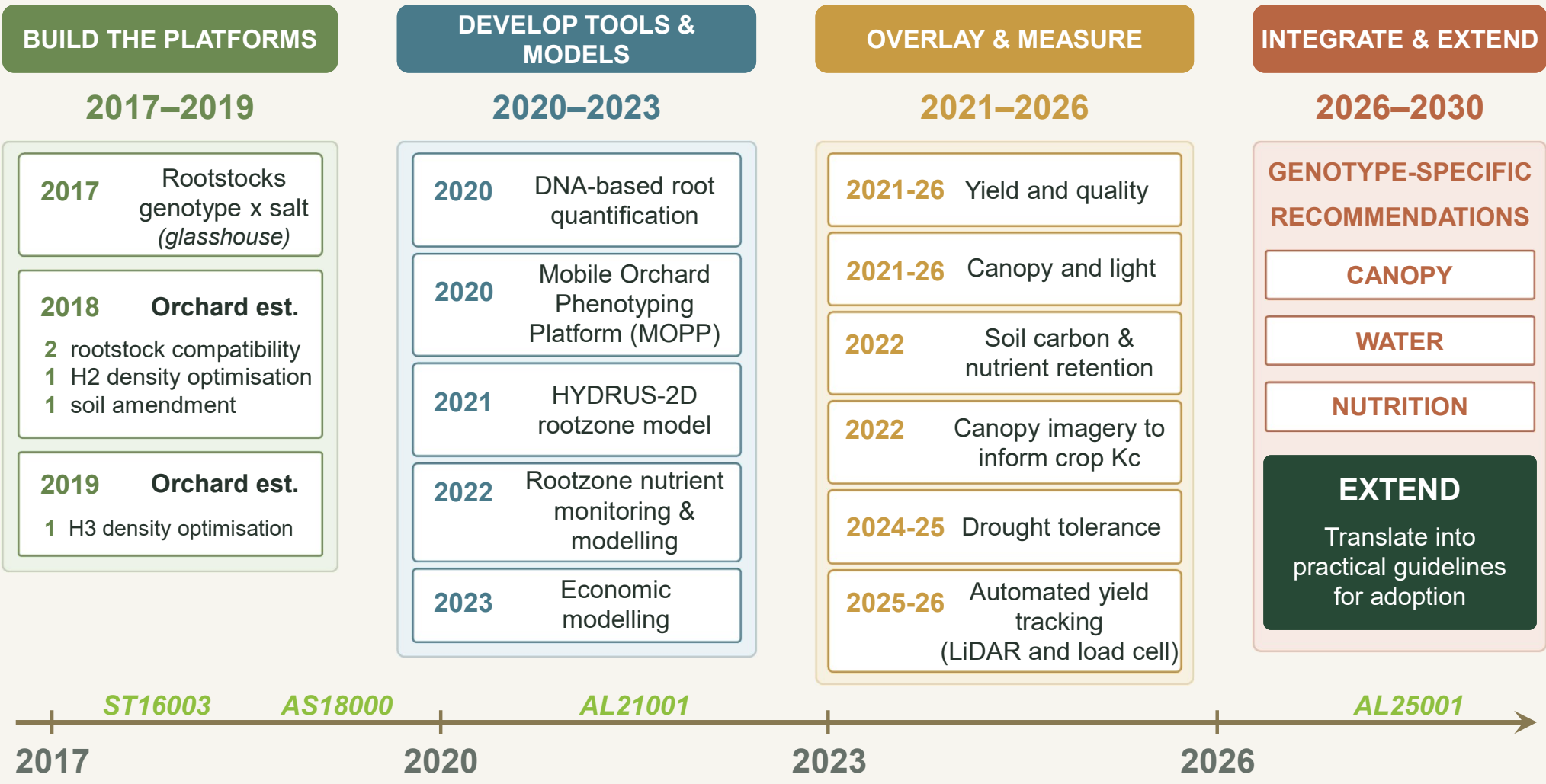
**SOUTH AUSTRALIAN
RESEARCH AND
DEVELOPMENT
INSTITUTE**

Almond Centre of Excellence

60 ha experimental orchard north of Loxton, SA

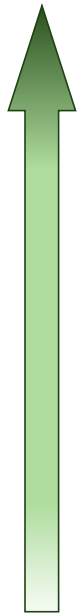


From foundational experiments to the next research program:

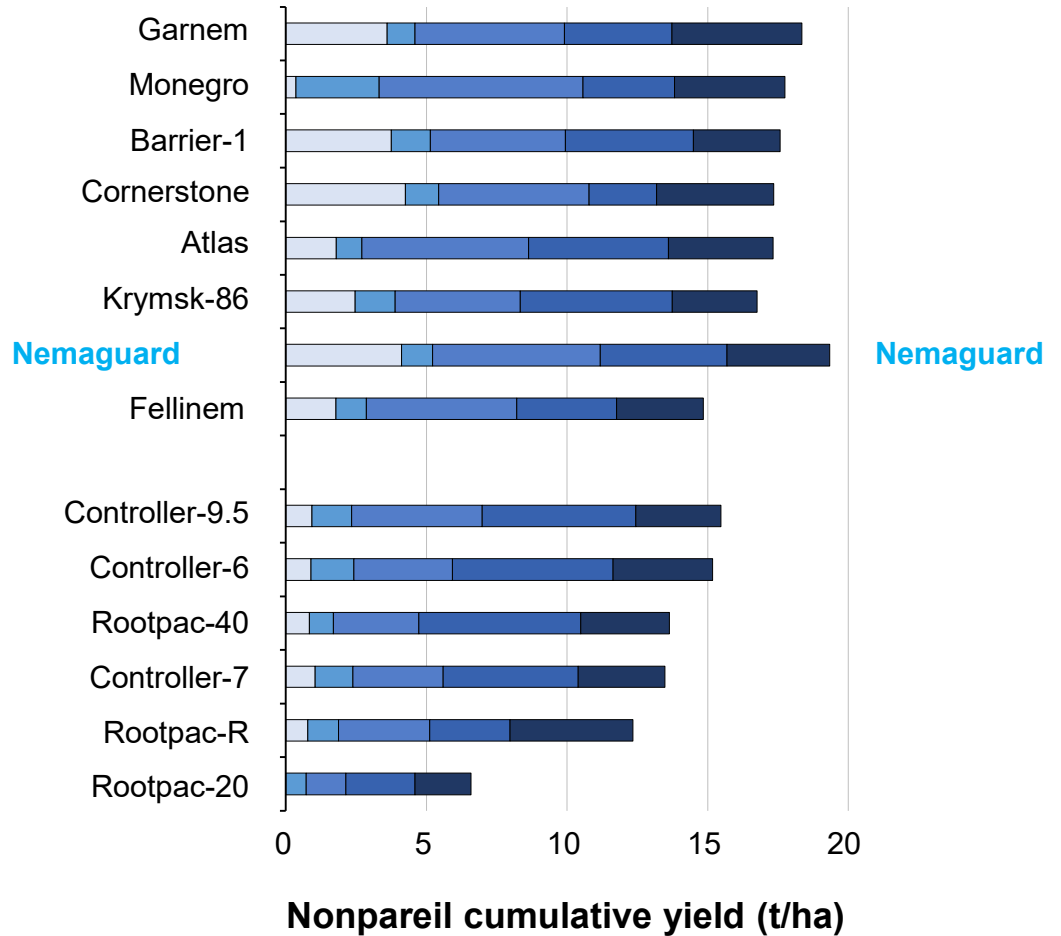


Rootstock influence on production

Higher vigour



Lower vigour



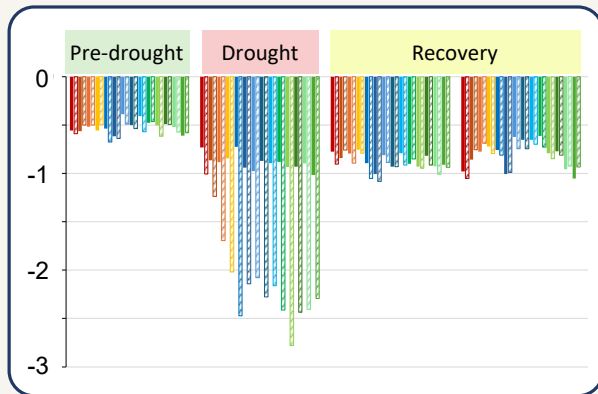
2022 2023 2024 2025 2026

Nonpareil cumulative yield (t/ha)

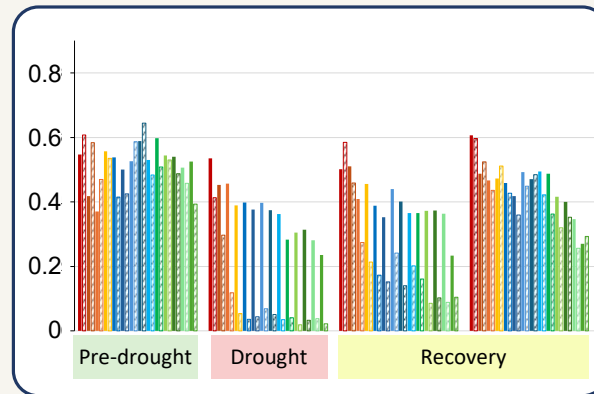
Transient drought tolerance?

42 rootstock x cv combinations / 4 days drought during extreme heat

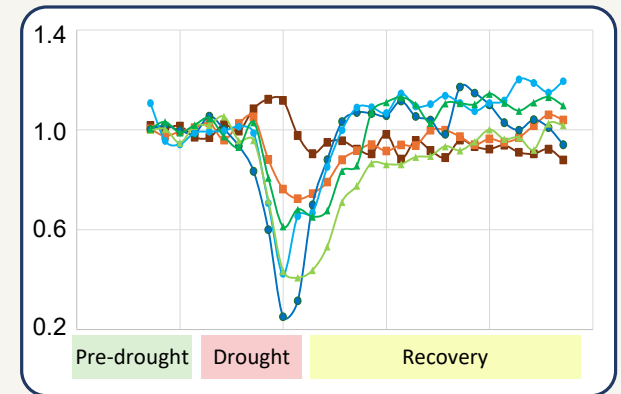
Stem Water Potential
(Ψ_{MD} MPA)



Stomatal Conductance
($\text{mmol m}^{-2} \text{s}^{-1}$)



Sap Flow Ratio
(stress/control)



Rootstock drought response – only subtle differences
Cultivar and tree vigour – more influential

Super-High-Density (H3)

Works in EU for some (*not all*) producers

...not yet suited to Australia



IRTA - Spain



ACE - SA

Medium Density (H1-H2)



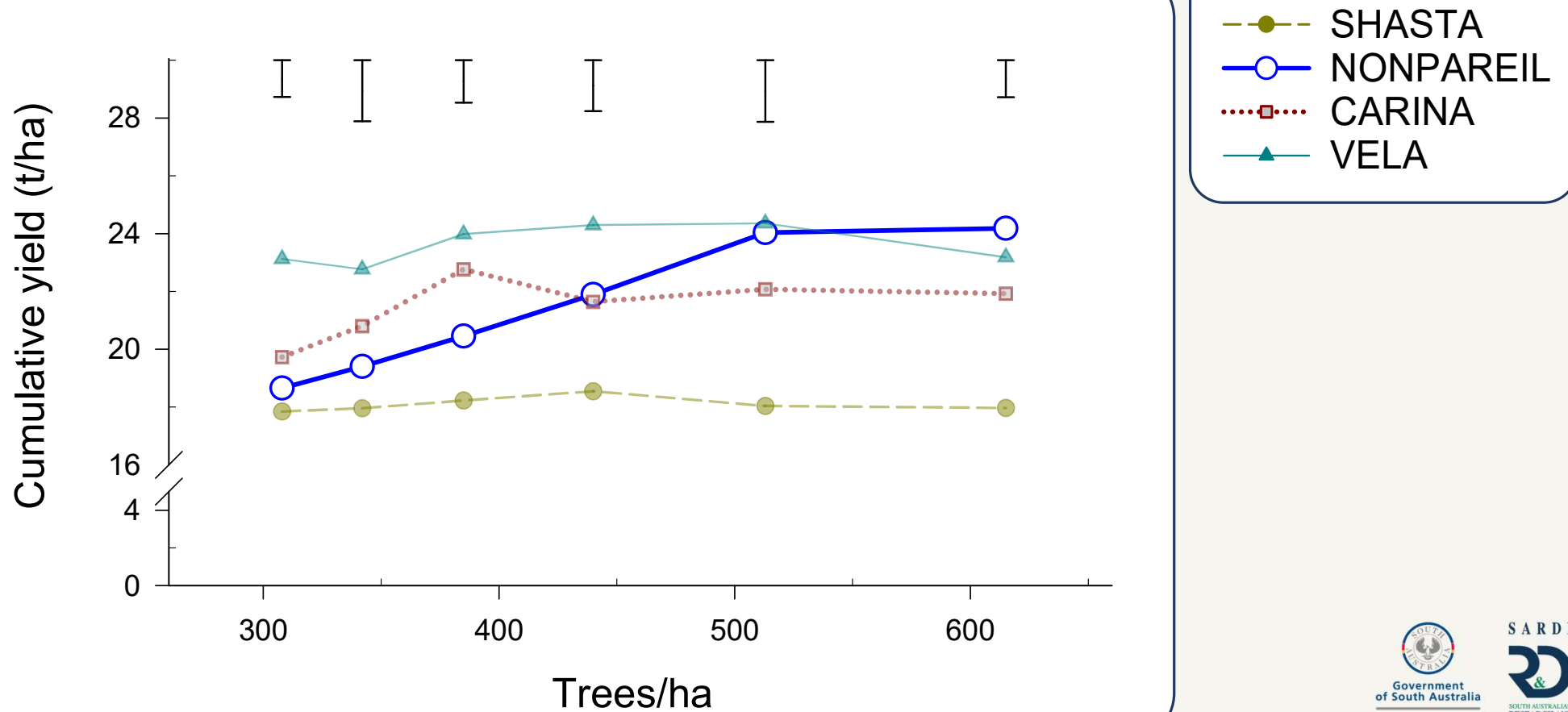
6.5 x 5 m (**308 trees/ha**)



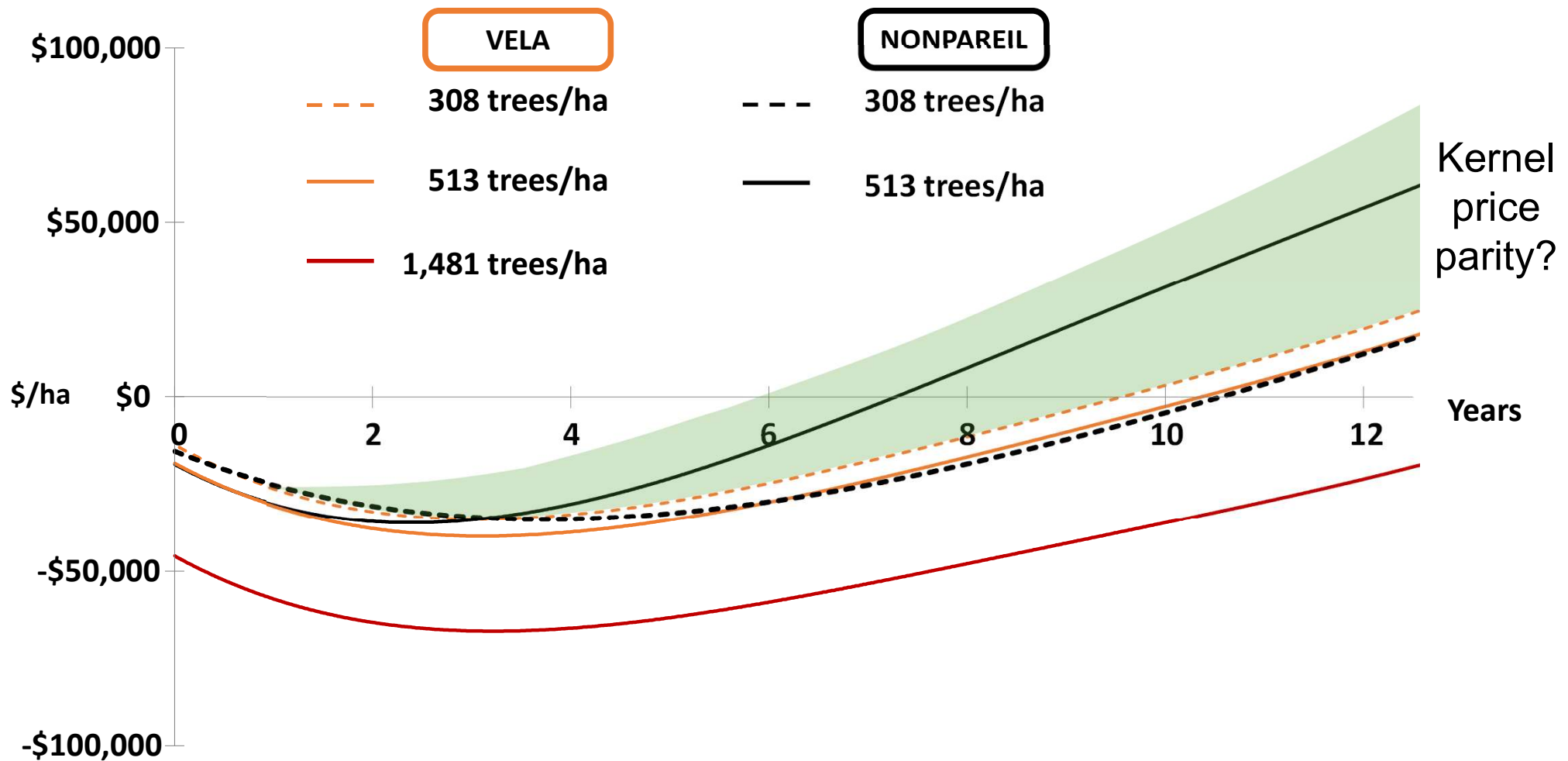
6.5 x 2.5 m (**615 trees/ha**)

H1-H2 Trial: six step density transition

8th Leaf Cumulative Yield (H1-H2)



SHD vs Medium Density ROI



Bringing key components together



AL25001: Efficient Orchard Systems



Tree vs Area-based inputs
Shasta & Vela / Nem

Overlay on ACE
orchards

Nutrient timing & extent
Shasta & Vela / C6 & R40

Tree balance studies
Carina / Garnem, Lindsay Point
Hedging **vs** **Standard practice**

New experimental
orchards

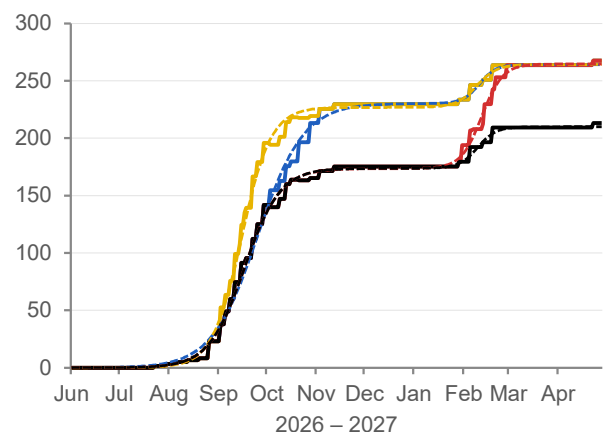
Genotype specific management
New 5ha planting at ACE
5 × **2** × **4** × **6**
Cultivars Canopy Inputs Reps

Nutrient timing & extent (ACE 2026/27)

Proof-of-concept
VELA & SHASTA

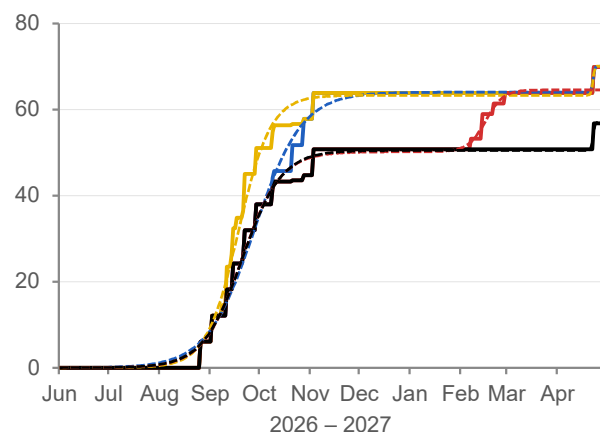
Early Control Late -20% NPK fitted

N Nitrogen (kg/ha)



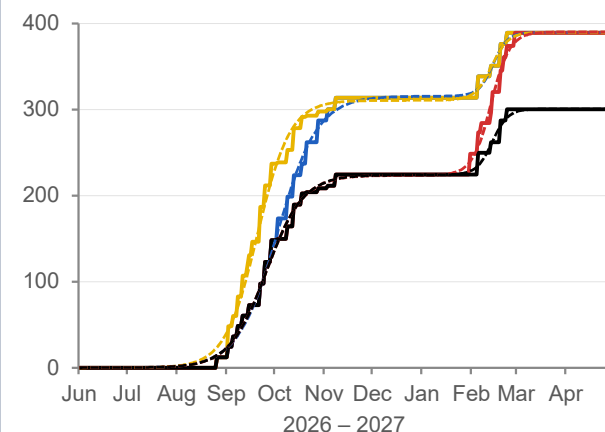
	Phase 1		Phase 2	
Treatment	Phase 1	Phase 2	Season	50% ph. 1
Early	227	37	268	15 Sept
Control	230	34	268	25 Sept
Late	174	91	268	17 Sept
-20% NPK	174	36	213	17 Sept

P Phosphorus (kg/ha)



	Phase 1		Phase 2	
Treatment	Phase 1	Phase 2	Season	50% ph. 1
Early	63	7	70	18 Sept
Control	64	6	70	28 Sept
Late	50	14	70	20 Sept
-20% NPK	51	7	57	20 Sept

K Potassium (kg/ha)



	Phase 1		Phase 2	
Treatment	Phase 1	Phase 2	Season	50% ph. 1
Early	311	79	389	20 Sept
Control	316	74	389	3 Oct
Late	224	166	389	26 Sept
-20% NPK	224	77	300	26 Sept

Phase 1 / Phase 2 = kg/ha supplied spring–summer / postharvest (fitted) | Season = total kg/ha planned for the season | 50% ph. 1 = date half of phase 1 is applied

Biphasic logistic: $Y = A1/(1+e^{-(K1(X-M1))}) + A2/(1+e^{-(K2(X-M2))})$ (X = days after 1 Jul 2026) | $R^2 \geq 0.994$ for all curves

Genetics (G) × Canopy (C) × Resources (R)

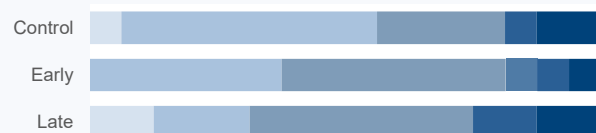
ACE, Loxton | Treatment means | Sept 2026

Proof-of-concept
VELA & SHASTA

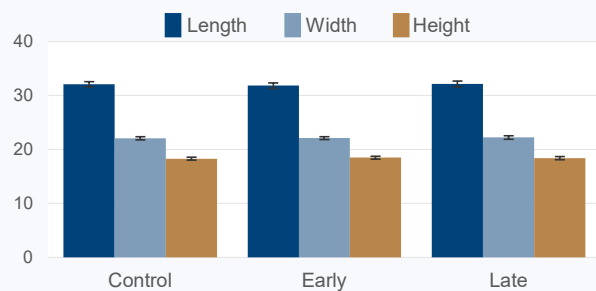
R Nutrient timing

Vela - Shasta | C6 - R40

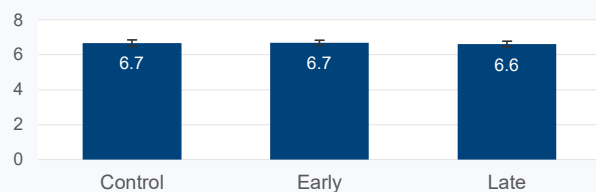
PHENOLOGY STAGE (BBCH, % trees)



FRUIT SIZE (mm)



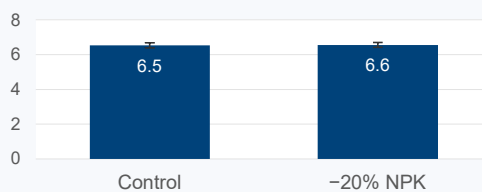
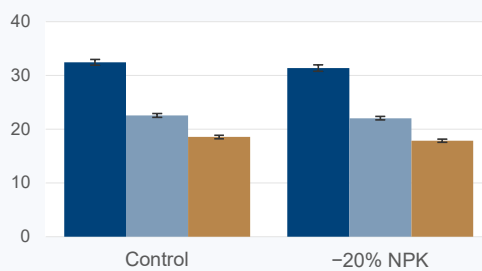
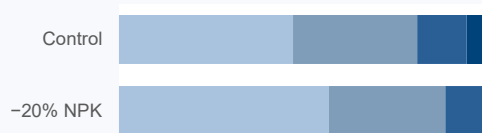
LEAF DEVELOPMENT



R Nutrient deficit

Vela - Shasta | C6 - R40

74 75 76 77 78 79



New ACE field experiment (2027)

5ha / 6reps

5 Cultivars

- Nonpareil
- Carmel
- Yorigane
- Independence
- *Aurora-B*

Nemaguard

X

2 Canopy

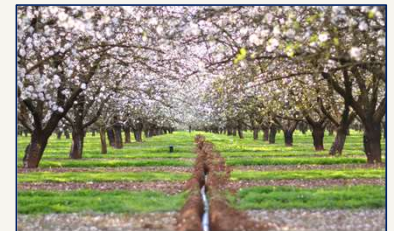
Minimal prune (USA / Aus)



Hedging (Spain)

X

4 Resource



ACE Plantings Research



2017-2019 | Platform established:

Rootstocks, varieties, soil & densities



2020-2026 | Expand evidence base:

Canopy and root metrics, drought stress, production and resource-use efficiency



Future direction | Managing by variety

- ACE evidence + commercial insight
- Integrated field experiments
- Variety specific recommendations

Acknowledgements

SARDI

Ariel Ferrante (Plant physiology)
Nigel Fleming (Remote sensing & soils)
Darren Graetz (Genotype compatibility)
Paul Petrie (Program manager)
Vinod Phogat (Numerical modelling)

Tim Pitt (Project lead)
Kavitha Shanmugam (Field & lab technician)
Mark Skewes (Irrigation)
Dane Thomas (Climate & physiology)

BSI (formerly PFR-AU)

Ken Breen (Plant physiology)
Roberta De Bei (Project lead)

Wayne Kiely (Field & lab technician)
Jill Stanley (Plant physiology)

Further information

SARDI Loxton Research Centre +61 8 8595 9100
SARDI Waite Campus +61 8303 9400
tim.pitt@sa.gov.au

