

CRCNA – Next Gen Resilient Orchards

Welcome and project overview

CRCNA

Queensland Government

Next Generation Resilient Orchards – Workshop

09.00 – Welcome and Sign-in

Project summary/update – Yan Diczbalis

Effect of trellis treatments on jackfruit and cocoa growth and development - Yan

Transforming Orchard Futures – Dale Bennet/Geoff Dickinson

Jackfruit propagation by cuttings – Massimo Bianco

Preliminary Jackfruit post-harvest disease management trial results – Massimo/Yan

10.30 – Morning Tea

11.00 – Field walk

Next Gen Resilient Orchard Overview

- Project commenced in July 2021
- Funded by the Cooperative Research Centre for Developing Northern Australia

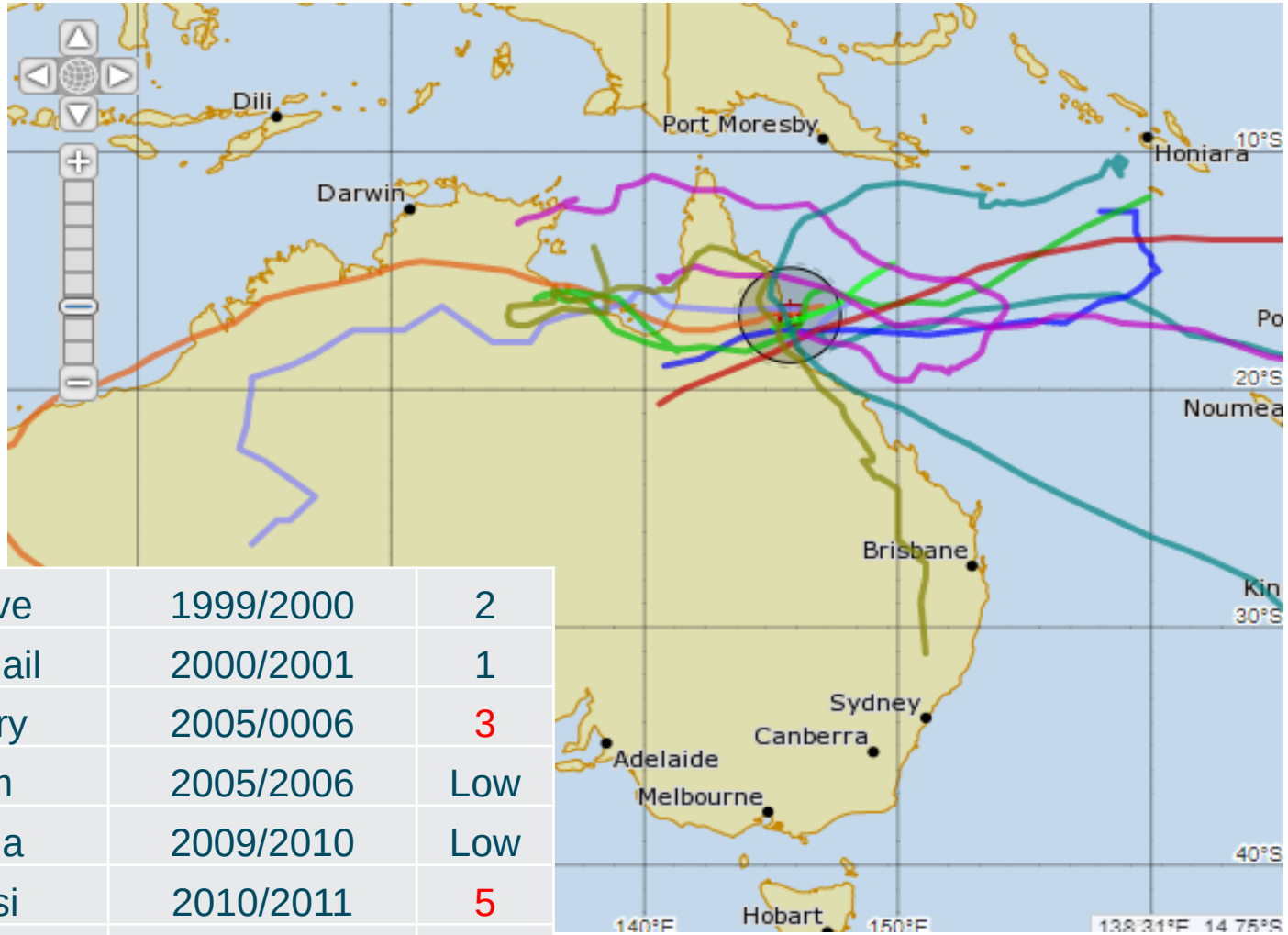
- Qld DAF, WA DPIRD, NT DITT

- Growcom and NT Farmers

- Manbulloo Ltd and Aus-Ex Fruit

Next Gen Resilient Orchard Project Overview

- Traditional low density orchards are highly susceptible to cyclones
- Test orchard designs (trellised and freestanding trees)
- Aim to improve production and cyclone resilience in northern Australia.
- Partner trial sites
    - Carnarvon and Kununurra (WA)
    - Darwin and Katherine (NT)
    - Townsville, Bellenden Ker and Mutchilba (Qld)



Cairns	Steve	1999/2000	2
200 km	Abigail	2000/2001	1
	Larry	2005/0006	3
	Jim	2005/2006	Low
	Olga	2009/2010	Low
	Yasi	2010/2011	5
	Tasha	2010/2011	1
	Jasmine	2011/2012	Low
	Ita	2013/2014	1













Next Gen Resilient Orchard Project Overview

- Principal model crop – Jackfruit
  - Versatile and climatically tolerant
  - High Yielding
  - Increasing Demand (fresh fruit and young immature fruit as a meat replacement)











Qld Trial sites







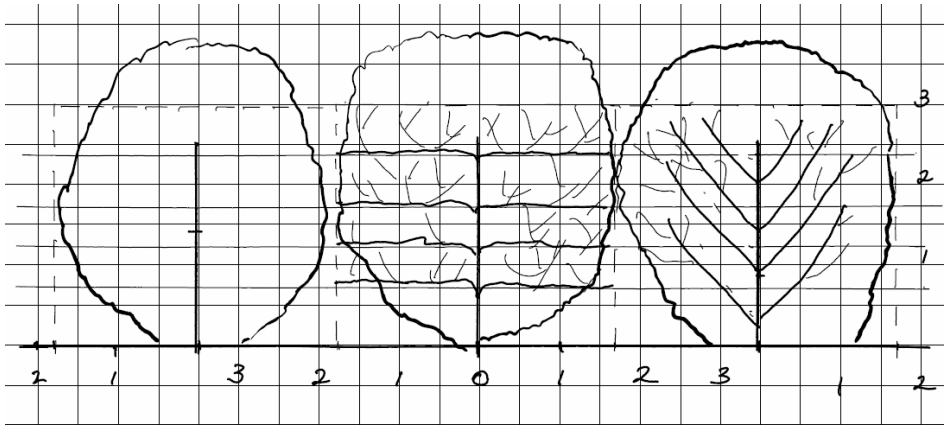


Trial – Bellenden Ker

Treatments

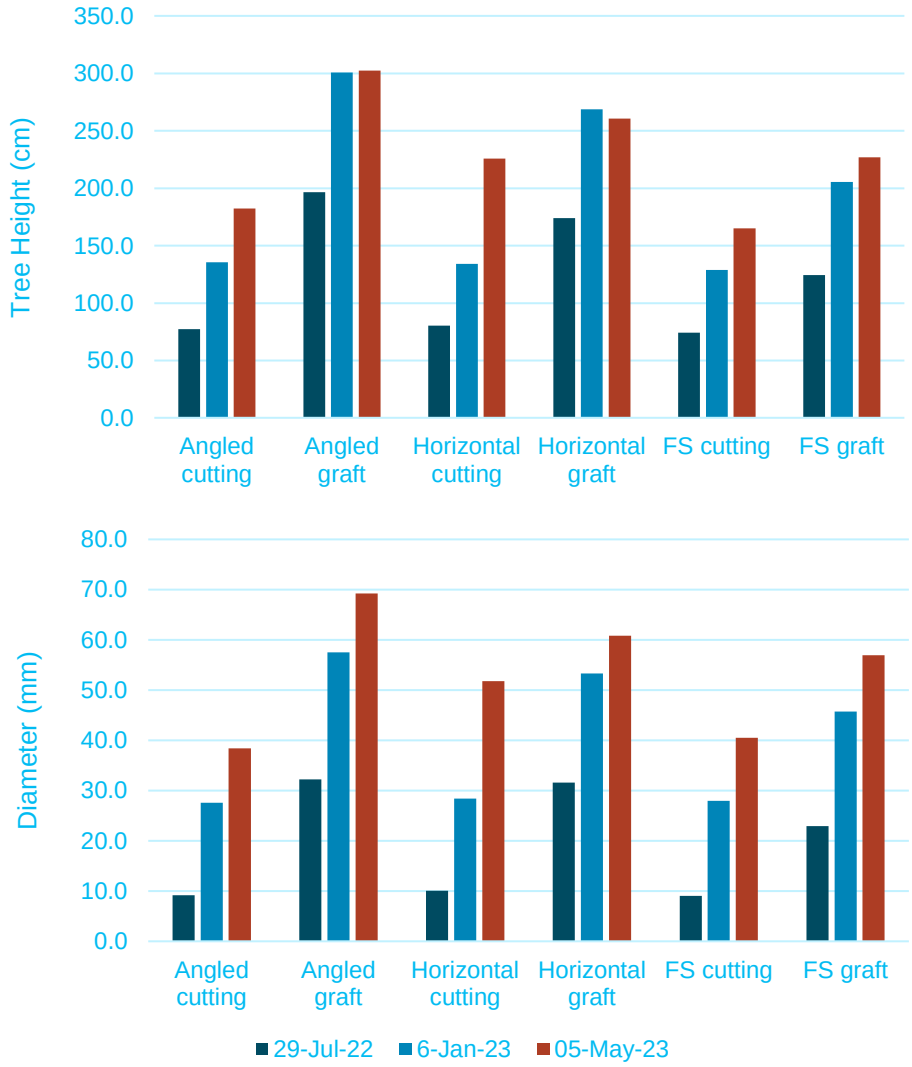
- Orchard Design
  - Trellis angled
  - Trellis horizontal
  - Free Standing

- Propagation
  - Cutting
  - Graft
- Replicates
  - 16 replicate trees per treatment
- Rajang clone



F	F	F	F	F	F	F	F	F	F
G - SWS	G	G	G	G	G	G	G	G - SWS	F
G - SWS	Trel-A	Free	Trel-H	Yans VFHD	Free	Trel-H	Trel-A	G - SWS	F
G - SWS	Trel-A	Free	Trel-H	Yans VFHD	Free	Trel-H	Trel-A	G - SWS	F
G - SWS	Trel-A	Free	Trel-H	Yans VFHD	Free	Trel-H	Trel-A	G - SWS	F
G - SWS	Trel-A	Free	Trel-H	Yans VFHD	Free	Trel-H	Trel-A	G - SWS	F
G - SWS	Trel-A	Free	Trel-H	Yans VFHD	Free	Trel-H	Trel-A	G - SWS	F
G - SWS	Trel-A	Free	Trel-H	Yans VFHD	Free	Trel-H	Trel-A	G - SWS	F
G - SWS	Trel-A	Free	Trel-H	Yans VFHD	Free	Trel-H	Trel-A	G - SWS	F
G - SWS	Trel-A	Free	Trel-H	Yans VFHD	Free	Trel-H	Trel-A	G - SWS	F
G - SWS	Trel-H	Free	Trel-A	Yans VFHD	Free	Trel-A	Trel-H	G - SWS	F
G - SWS	Trel-H	Free	Trel-A	Yans VFHD	Free	Trel-A	Trel-H	G - SWS	F
G - SWS	Trel-H	Free	Trel-A	Yans VFHD	Free	Trel-A	Trel-H	G - SWS	F
G - SWS	Trel-H	Free	Trel-A	Yans VFHD	Free	Trel-A	Trel-H	G - SWS	F
G - SWS	Trel-H	Free	Trel-A	Yans VFHD	Free	Trel-A	Trel-H	G - SWS	F
G - SWS	Trel-H	Free	Trel-A	Yans VFHD	Free	Trel-A	Trel-H	G - SWS	F
G - SWS	Trel-H	Free	Trel-A	Yans VFHD	Free	Trel-A	Trel-H	G - SWS	F
G - SWS	G	G	G	G	G	G	G	G - SWS	F

Bellenden Ker – Tree growth



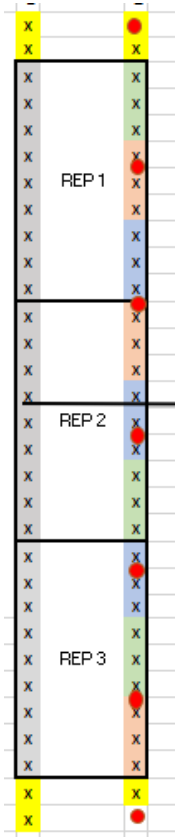






Mutchilba and Townsville – Trials

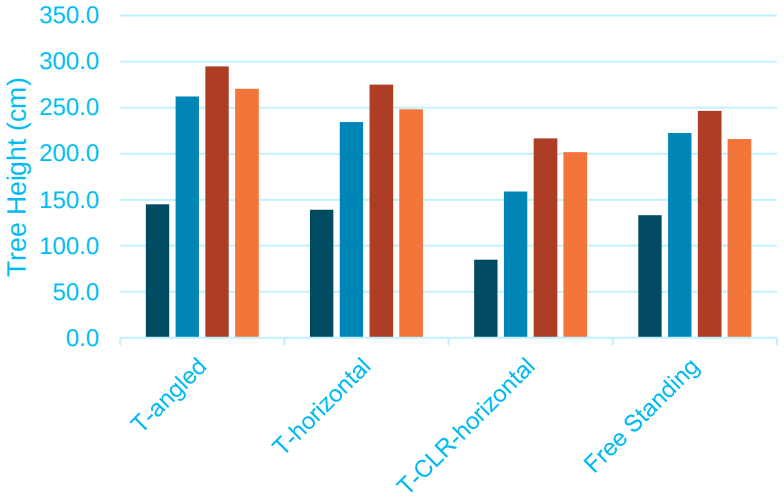
- Treatments
- Orchard Design
  - Trellis angled
  - Trellis horizontal
  - Trellis Central leader removed - horizontal
  - Free Standing
- Replicates
  - 3 blocks
  - 9 trees per trellis treatment
  - 27 free standing trees
- Rajang seedlings

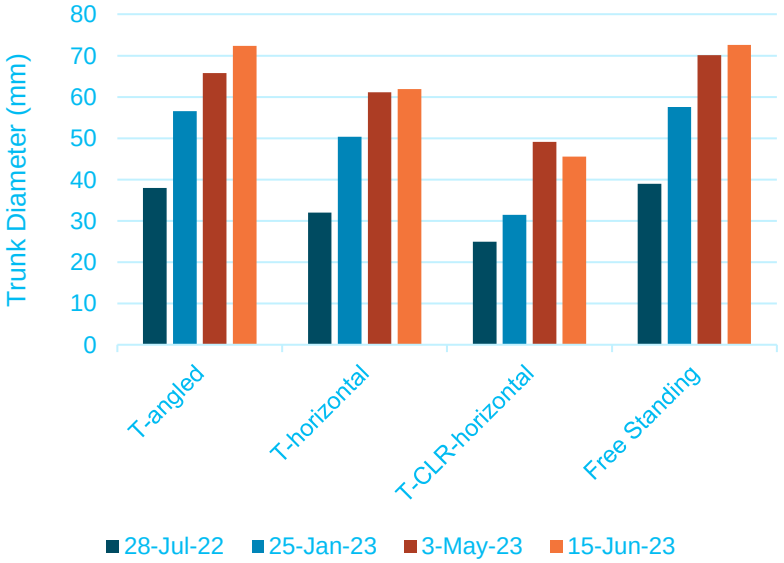




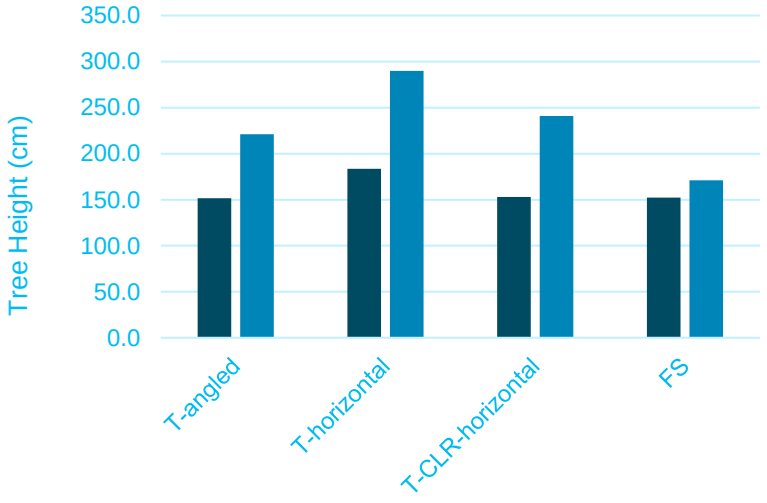


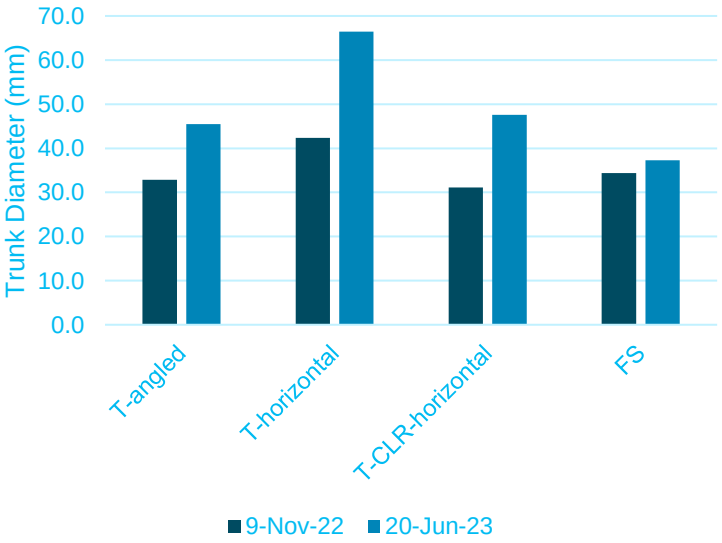
Hill Top - Mutchilba





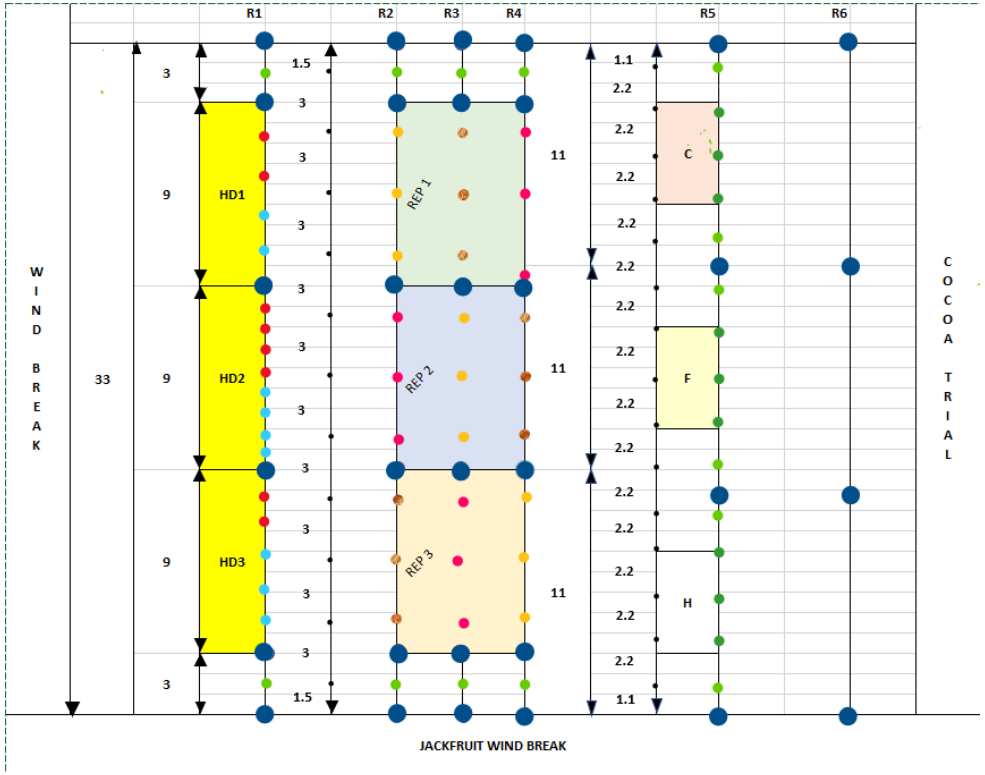
Laudham Park - Townsville





CWTA - South Johnstone

- High Density
  - Single Row 1.0, 1.5 and 1.8 m
  - seedling and cuttings
- Rajang Cutting Training Trial
  - fan, candelabra and horizontal
  - 3 replicates of 3 trees
- Single rows
  - Durian seedlings
  - Grafted rambutan

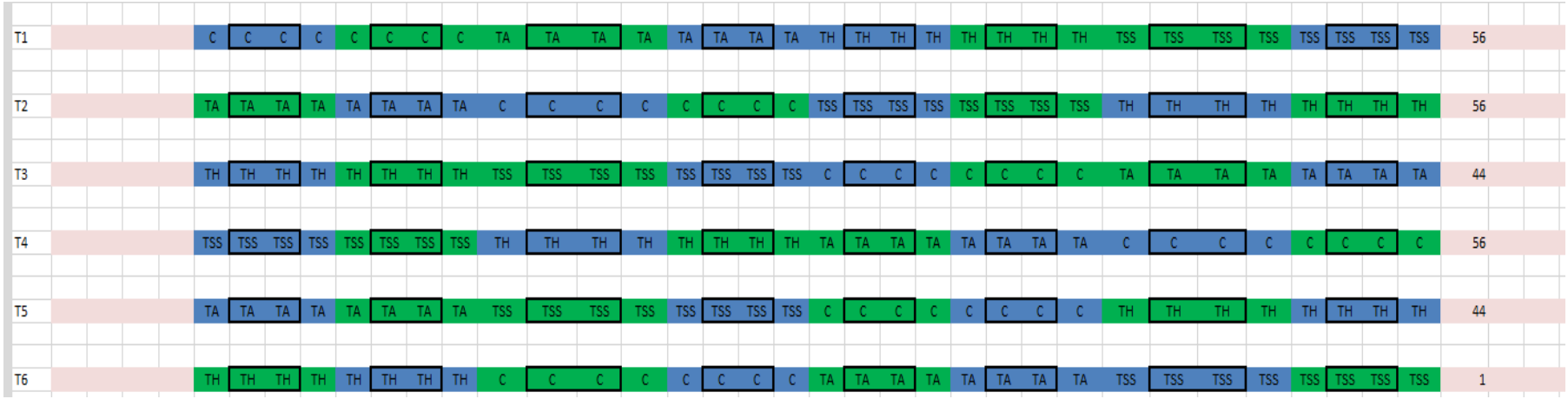


Cocoa trellis trial

- Established Feb/Mar 2018
- 3.5 years when Next-Gen project commenced.
- Currently 5.5 years
- Productive example of a next generation high density orchard







- 4 main treatments (trellising)
- 2 sub plots
- 2 sub-sub plots (cv 44 and 56)
- 6 replicate blocks

Treatment Code		
C	Control	1.8 m spacing – 1,100 t/ha
TA	Trellis Angled	1.8 m spacing – 1,100 t/ha
TH	Trellis Horizontal	1.8 m spacing – 1,100 t/ha
TSS	Trellis Single Spindle	1.2 m spacing – 1,667 t/ha

	Heavy Prune
	Light Prune

Pod Yield tonnes/hectare				
Year	Control	TH	TA	TSS
2019-20	3.9	4.1	4.7	4.8
2020-21	13.2	16.5	15.4	19.2
2021-22	17.6	20.6	18.9	21.1

Pod number/hectare				
Year	Control	TH	TA	TSS
2019-20	10637	10428	11616	12819
2020-21	35860	42812	41063	51127
2021-22	41525	47663	44506	49593

Tonnes of dry bean/ha				
Year	Control	TH	TA	TSS
2019-20	0.5	0.5	0.5	0.6
2020-21	1.7	2.0	1.9	2.4
2021-22	1.9	2.2	2.1	2.3

Pod Index
44 – 17.6
56 - 25.3
Av. – 21.5

10 Dec 2018



2 May 2021



Field Days









Jackfruit Propagation

Resilient Orchards & Business

- Dependent on availability of proven clonal material
- Problem - lack of replacement clonal material
    - TC Larry and Yasi
    - New Growers

Seedling Evaluation





Fruit Maturity

- Jackfruit is a climacteric fruit
- It reaches physiological maturity while still unripe “hard green”. Fruit ripens after picking.
- Commonly used maturity indicators

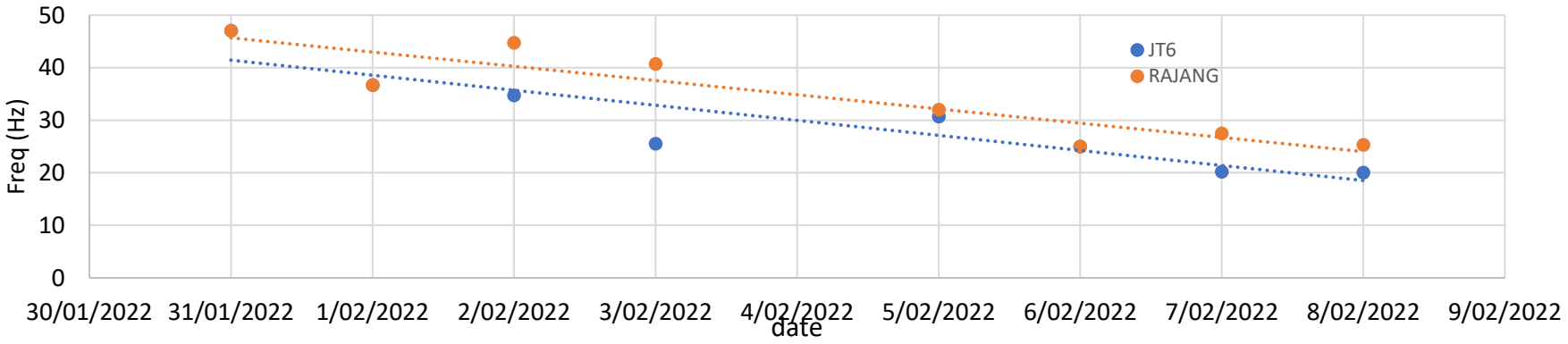
  - calendar days (approx. 120 from stigma presentation)
  - fruit colour change (dark to light green/yellow)
  - changes in the density and separation of the fruit spines
  - reduction in the latex flow on the fruit stalk
  - Acoustic response to tapping

Acoustic measurement – Preliminary Investigation. In conjunction with Forestry colleagues.

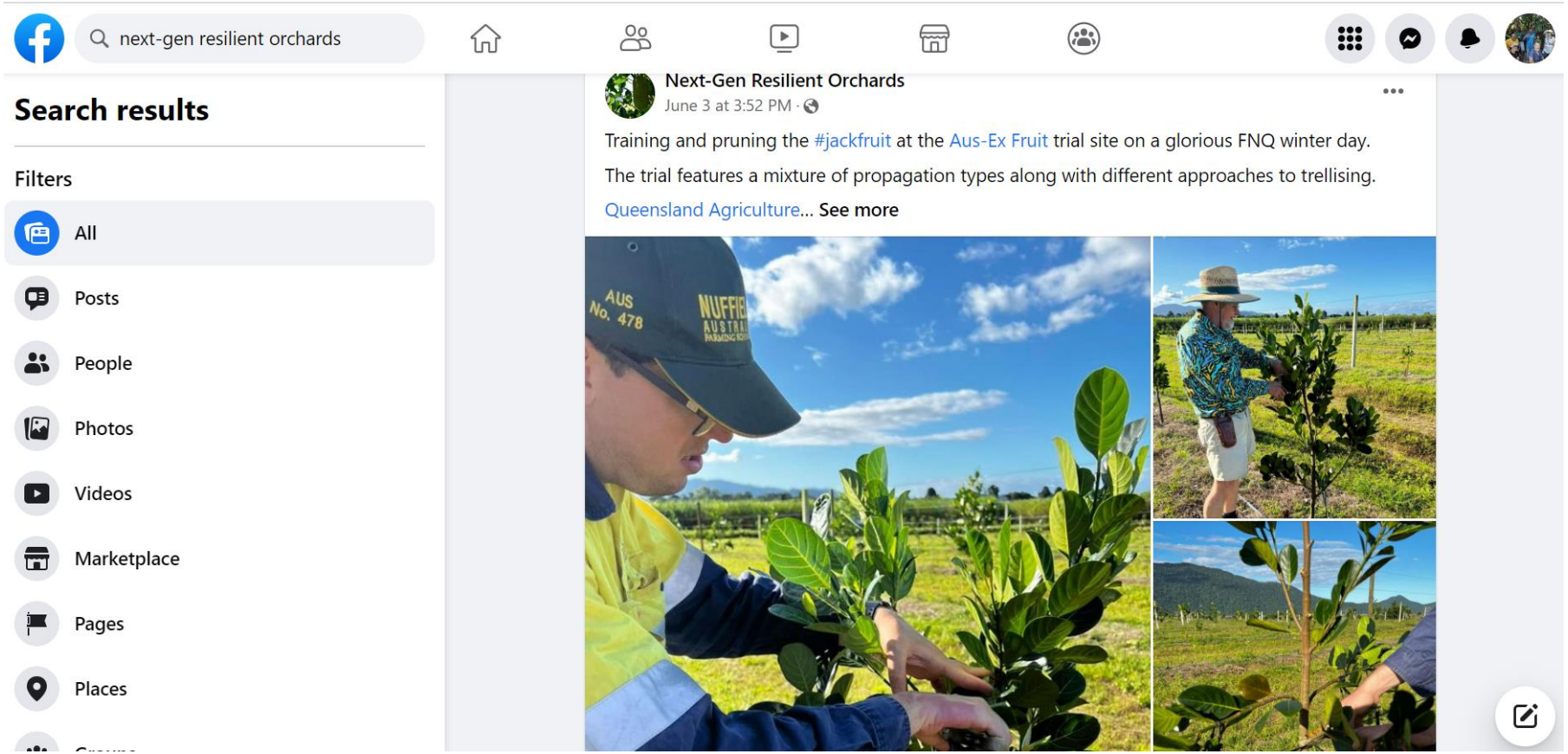


Iphone Voice Memo Recorder

Tapping implement and measure frequency change over time.



Facebook Page – Next-gen resilient orchards



Thank you!

