

Nursery Workstream Overview

Presenter: Claire Stewart

Meeting Date: 7/10/2022



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Topics for discussion

- Nursery workstream overview
 - Drivers for change
 - Activity planning
 - Milestone progress
- Presentations from project leaders

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Workstream overview

- Aim: To deliver **prototype** units focusing on **key bottlenecks** in tree nursery production system. The prototype development will span production activities in both **containerised** and **non containerised** nurseries, from seed sowing through to deployment to the forest.
- Total budget: \$6.35M



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Drivers for change

- Less reliance on manual labour.
- Greater support for nursery production scale up.
- Improve tree stock quality > growth > survival > value.
- Reduce nursery pesticide use, future proof for restrictions.
- Improve data for management in nursery through to forest.
- Better tree stock consistency and predictability.



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Activity areas

Review and benchmarking

Bareroot establishment

Autonomous tree stock monitoring

Mechanised lifting in bareroot nursery

Automated de-plugging, grading and packing system

Stool bed optimisation and mini plugs

Tree stock and box tracking

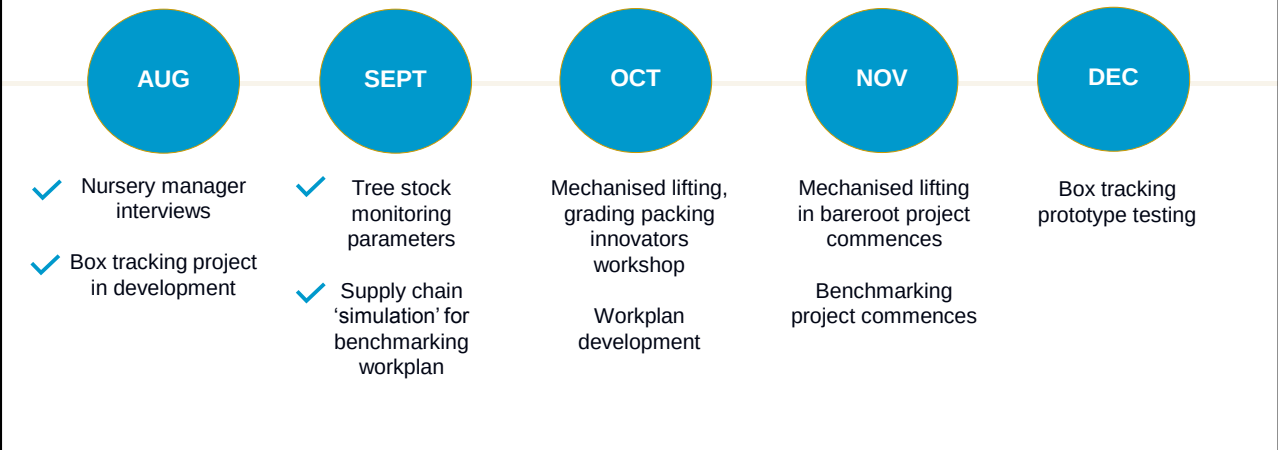
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Activity planning

Activity	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
1.1 Review and Benchmark	Workplan to be presented today						
1.2 Automated Growing Operations : Bare Root Establishment	Not started						
1.3 Automated Growing Operations : Autonomous Tree Stock Monitoring Platform	Progress to be reported today						
1.4 Automated Growing Operations: Mechanised Lifting in Bare Root Nursery	Workplan underway						
1.5 Automated De Plugging, Grading and Packing System	Workplan underway						
1.6 Stool Bed Optimisation and Mini Plugs	Not started						
1.7 Tree Stock and Box Tracking	Progress to be reported today						

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Milestone level progress and planning



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Precision Silviculture Partnership

1.3. Autonomous Tree Stock Monitoring

Presenter: Claire Stewart

Project progress update



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Background

- Tree stock monitoring is largely conducted as a manual task.
- This impacts on the frequency of monitoring undertaken.
- Reliance on human observation is variable and not systematic.
- Problems can end up being diagnosed too late.
- Value add from accurate and consistent data collected and stored over time for analysis a missed opportunity.



Approach

- Scion in partnership with PlantTech have undertaken:
 - Visits to 6 nurseries (bareroot and containerised) to review current operations, problems to solve, define needs of future tree stock monitoring 'platform'.
 - A report highlighting findings and parameters delivered.
- Currently underway:
 - Technology scan on available solutions to adopt, adapt or custom pathways to achieve needs surfaced against must have, should have, could have parameters.



High- level parameters to be monitored

Tree Population

- Count (population density, individual)
- Growth rate (accuracy/ frequency)
- Growth timeline (seed arrival, planting, lifting, dispatch).
- Size (height, root collar diameter diameter).
- Repeatability in a future system critical to accuracy.
- Historical growth analytics.

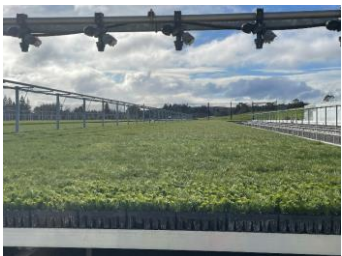
Tree Health

- Colour as a marker for:
 - Maturity
 - Nutrient
 - Deficiency
 - disease presence.
- Form as a marker for:
 - disease presence
 - double leaders.
- Root Sampling
 - Root collar diameter
 - mycorrhizal fungi.

Tree Environment

- Weed- presence, type. Spatial variation in environment.
- Stress- water.
- Pest identification.
- Data storage for insights across time.

Highlights from nursery interviews



1.1 Nursery Supply Chain Simulation

Presenter: Karen Bayne

Workplan overview



Background

- What is are problems to solve?
 - Ability to assess impacts on production logistics from introducing new technologies into the nursery supply chain.
 - Potential disruption/ unintended consequences
 - What are ‘typical’ production stages and timeframes (benchmarking of industry)
 - Tolerances from each task – how precise/accurate
- Areas in focus:

Nursery Mechanisation	Tree Stock and Packaging Tracking System
	Mechanised Lining Out and Lifting
	Automated Grading and Packing
	Autonomous Sensing and Precision Weed Control
	Containerised Planting Systems

Planned work

- 2 phases –
- Year 1 Establishment and discovery
 - What is “the nursery system” – an overview of the supply chain and establishing key parameters required in the simulation model
 - Generic for bareroot and containerised operations.
- Year 2 & 3 Benchmarking through simulation modelling
 - Establish full simulation model – unpopulated logistics
 - Benchmarking using real data (3-4 nurseries)
 - Main emphasis: lifting, grading, sorting, dispatch.

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Key milestones and timing

- Overview of main process logistics
 - November '22 – February '23
- Establish simulation model for lifting and despatch
 - November '23- October '25
 - Establish model (unpopulated)
 - Simulate with real data to identify existing bottlenecks and constraints
 - Identify scenarios (new technologies etc.) to identify new bottlenecks and impacts

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Involvement from industry partners

- Phase 1 –
 - Any past reports or videos outlining production phases willing to share
 - Phone interviews or site visits with 4-6 participants to understand lifting and packing procedures
 - Agreement (via TST) on the key parameters to include in simulation model
- Phase 2 –
 - Established data series on key parameters (costs, times, resource inputs, process consumption, tolerance, QC etc.)
 - If no established data, collection of empirical data on these parameters
 - Identification of early technology deployments

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