

NZ Dryland Forests Initiative Research Programme

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Introduction

Our research programme aims to provide potential growers of dryland Eucalypts with the best trees and information required for decisions that promote successful plantations of durable Eucalypts.

Species selection for the New Zealand Dryland Forests Initiative (NZDFI) builds upon decades of research conducted by the Special Purpose Species group of the New Zealand Forest Research Institute, the Eucalypt Action Group of the New Zealand Farm Forestry Association, and collaboration between Vineyard Timbers, the Marlborough District Council, Proseed NZ and several private landowners in Marlborough. Our five species were chosen from a shortlist of the 25 most promising species, which included 9 stringybarks.

Requirements can be divided into product and market information, access to well-characterised superior genotypes, help with matching species to the right sites, predictions of forest growth and yield that include information about volumes of different products that might be grown on those sites, and reduced risk of failure due to clear guidelines for protection of crops from insects and diseases. These are distinct research streams, but they are also linked. (Figure 1.)

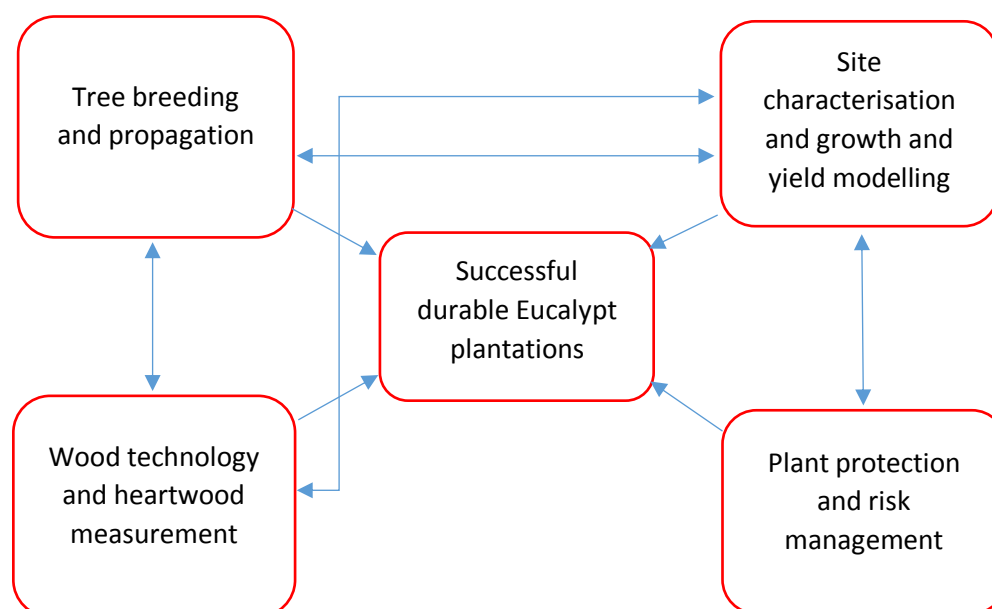


Figure 1. Linkages between research streams designed to support growers of dryland Eucalypt Species

Several of the species that will suit growers have not been previously domesticated, and our breeding programme will identify and propagate genotypes that exhibit rapid volume growth, good form, and plenty of highly durable, low-growth-strain heartwood. This key first step has been underway for several years now and it is described in **Section 1. “NZFI Breeding Research Plan”**. We have almost completed a full generation of improvement for *Eucalyptus bosistoana*, but still have to progress with the characterisation of wood properties for our other species.

The core of the NZDFI project involves developing Eucalypts of superior quality wood; that is durable and low growth-strain wood. The attached “**NZDFI Wood Properties Research Plan**”, **Section 2**, gives a clear description of the development and application of early and rapid assessment of long-term wood durability and growth-strains for different species and genotypes. This research is closely aligned to the implementation of the breeding plan.

Working on a range of promising species increases the likelihood of programme success, and makes the work applicable to a wider range of environments and economic circumstances. Matching the right genetic material that will thrive on difficult sites is an essential part of the programme.

The “**NZDFI Site – Species Matching Research Plan**”, **Section 3** describes a research programme that aims to provide easy access to software that delivers high quality descriptions of site attributes anywhere in New Zealand, along with ranked suggestions for NZDFI species that might be grown on those sites for particular purposes. In addition, growth and yield models will provide summaries of measurements from our trial sites that enable the best possible predictions of yields on those sites. Ultimately, as our datasets become more complete, these predictions will include survival estimates, stem dimensions, stem shapes, and also yields of durable heartwood. There will be a facility to identify log types as well. These estimates can be placed into discounted cash flow spreadsheets that will allow growers to compare silvicultural regimes and determine optimal rotation lengths.

Growing high value crops with clear objectives is less risky if we understand threats from insects and diseases and know what impacts they are likely to have on tree crops in particular conditions.

Eucalypts may experience problems with pests and diseases. These problems occur all over the world, including where the most successful plantation species belong to the subgenus *Symphyomyrtus*: *Eucalyptus globulus* (in temperate regions) and the hybrid *E. urophylla* x *E. grandis* (in tropical regions). Pests can be specific to eucalypts or generalists and this is an evolving problem. We do not know if the NZDFI species are particularly susceptible to defoliators. The “**NZDFI Forest Health Research Plan**”, **Section 4** has been screening the presence of pests in breeding trials. This will be complemented with broader evaluations in the species trials. Insect load and defoliation vary with stand age and location and this work is expected to continue for several years. This research will help growers cope with threats and reduce risk.

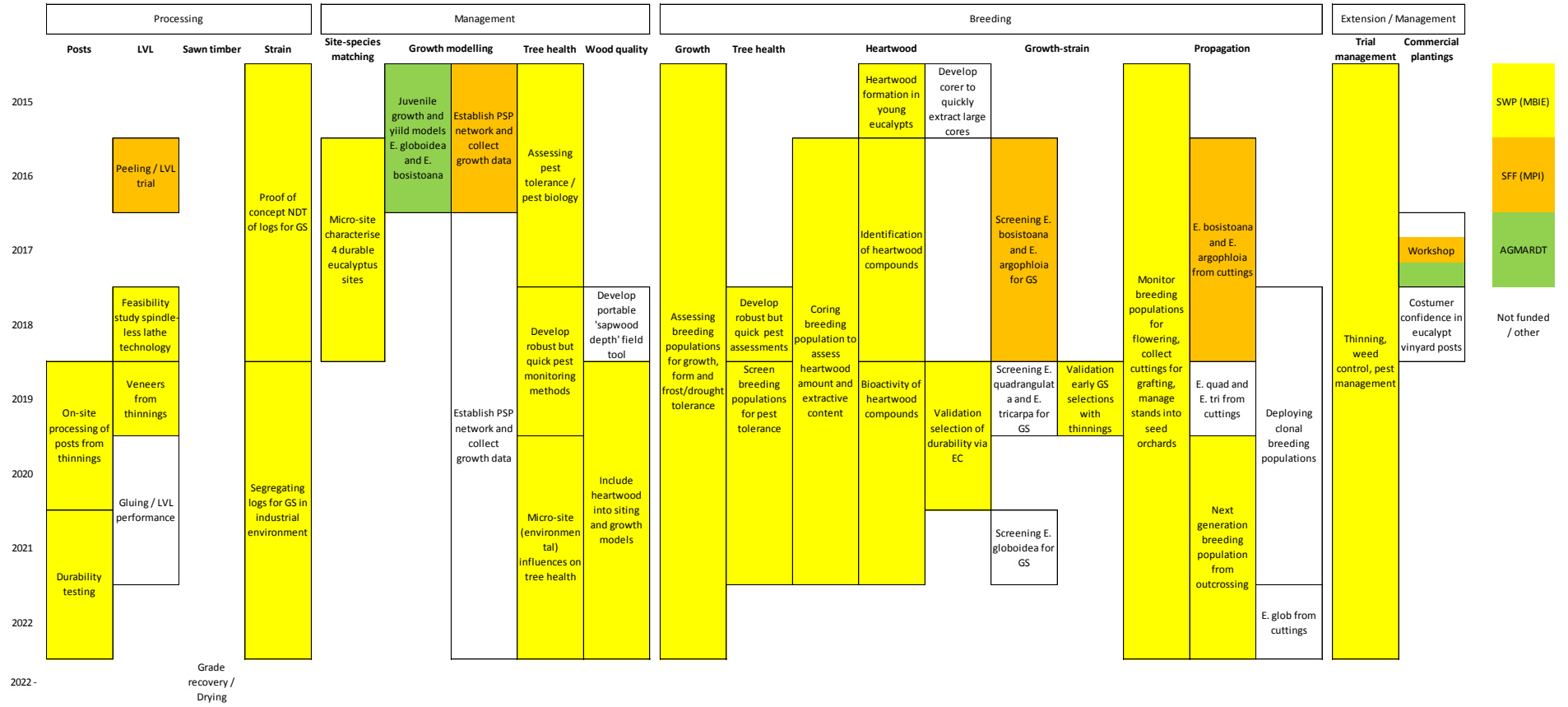
The elements of the NZDFI Research Programme are inevitably linked. For instance, species and genotypes will differ in heartwood content and durability. Durability and heartwood content need to be represented in growth and yield forecasts, and these forecasts should take into account different genotypes, not just different species. Site selection and pest risk are related, and pests can impact on growth and yield.

The inter-relationships of the research streams, timeline and funding streams for the elements of the research are shown in Figure 2.

The NZDFI Science Team is a collaboration group of University of Canterbury teaching staff and post graduate students with Marlborough Research Centre consultants who plan and manage the research programme. This group meets regularly to coordinate effort and resources to ensure operational efficiency. **A list of the key personnel is given in Table 1.**

NZDFI acknowledges the essential contribution of the 30 landowners who host our trials and that of our industry partners who funded the establishment of the NZDFI research programme. Without their input and support it would be impossible to sustain the NZDFI research programme.

Figure 2. Timeline and funding of research activities.



Not funded / other

Table 1. List of key personnel

Gerald Hope	Marlborough Research Centre Trust	CEO	Blenheim
Paul Millen	Millen Associates Ltd	Project Manager	Blenheim
Kevan Buck	Buck Forestry Services Ltd	Secretary and data/financial management	Blenheim
Ruth McConnochie	Consultant scientist	Tree breeder	Nelson
Roger May	Tomorrow's Forests	GIS and geo data base consultant	Nelson
Harriet Palmer	Farm forestry journalist	Communications and web site management	Wellington
Shaf van Ballekom	Proseed NZ Ltd	CEO	Christchurch
Paul Schroeder	Proseed NZ Ltd	Propagation	Christchurch
Bruce Manley	University of Canterbury	Head of School of Forestry	Christchurch
Dr Clemens Altaner	University of Canterbury	Senior lecturer, Wood Quality	Christchurch
Dr Luis Apiolaza	University of Canterbury	Associate Professor, Tree Breeding	Christchurch
Dr Tara Murray	University of Canterbury	Lecturer, Entomology, Biodiversity	Christchurch
Euan Mason	University of Canterbury	Professor, Silviculture, Modelling	Christchurch
Dr Justin Morgenroth	University of Canterbury	Senior Lecturer, GIS	Christchurch