NZDFI: achievements, constraints and opportunities

Shaf van Ballekom

Proseed

New Zealand Drylands Forest Initiative (NZDFI)

www.nzdfi.org.nz

NZDFI established at Marlborough Research Centre on 1st July 2008

- Official launch on 28th January 2009

- First planting at Lawson's property, Waterfalls road on 7th October 2009

- January 2017

NZDFI Partners and Supporters

Founding Members

- Marlborough Research Centre Trust
- Proseed NZ Ltd
- New Zealand School of Forestry (University of Canterbury)
- Vineyard Timbers Ltd (Paul Millen – Programme Manager)

Supporters

- Juken NZ
- Nelson Pine Industries
- Sumitomo
- Ernslaw One
- Kaingaroa Timberlands
- NZ Farm Forestry Association
- Forest Growers Levy Trust
- Specialty Wood Partnership
- Regional Councils
- Marlborough Lines
- Marlborough Gold Honey
- Government (MPI, MBIE)
- 20+ landowners hosting trials

2008 NZDFI Vision

- Our vision is for New Zealand to be a world-leader in breeding ground-durable eucalypts,

- and to be home to a valuable sustainable hardwood industry based on 100,000 hectares of eucalypt forests, by 2050.

What is needed to achieve our vision?

To provide NZ forest growers the plants and knowledge to select and grow the species best suited to their site,

which will economically produce a high quality durable wood product that meets the requirements of domestic and international markets.

Integrated Research programme

Marlborough Research Centre

- Trial Management, trial assessments & outreach programme

Proseed

- Propagation, Seed Orchard Management, seed collection

School of Forestry/University of Canterbury

- Site-species matching / Growth and yield modelling
- Tree Health
- Breeding (growth, health, wood quality)
- Wood Processing

Lost Opportunity

Stringybarks (Shelbourne 2001) proposed for solid wood uses.Seed collections – 12 species and 69 provenances never got off the ground (considered too expensive).

Partly covered by

1. Management Trials – 8 sets of 14 species…49 tree square plots of mixed provenance.
2. SFF Eucalypt Evaluation trials 15 tree row plots of 10-15 spp on 40 sites throughout NZ.

Well done with scarce resources but not suitable for serious breeding.

Eucalypt Breeding Overview – Eldridge 1996

Looked at why there are not more eucalypt plantations in NZ
Suggested a number of reasons including:

1. **Insufficient** continuity of funds and staff for research.

2. **Dominance and success of radiata pine** particularly its plasticity has made eucalypts (and other spp) of minor importance to the NZ forest industry.

3. **Potential** – reluctance of management to recognise that eucalypts might be as or more profitable than radiata.

4. **Site/Species Matching** – more important than with radiata pine. Site Preparation – Eldridge wasn't impressed by what he saw.

5. **Pests and Diseases** – part of the problem is that species not well adapted to planting sites and integrated pest management is essential.

6. **Numerous species tested** but it's a large genus and there is a case for renewed species and provenance testing

the natural genetic resources of the eucalypts are still "A SACK OF UNCUT DIAMONDS" Eldridge (1996)

Durable hardwood markets

- Vineyard posts
- Cross arms for NZ's electricity networks
- Sleepers for NZ's rail network
- Wharf timbers for NZ's ports and marinas
- High strength LVL beams
- Decking and outdoor furniture

Current timber imports > $500M

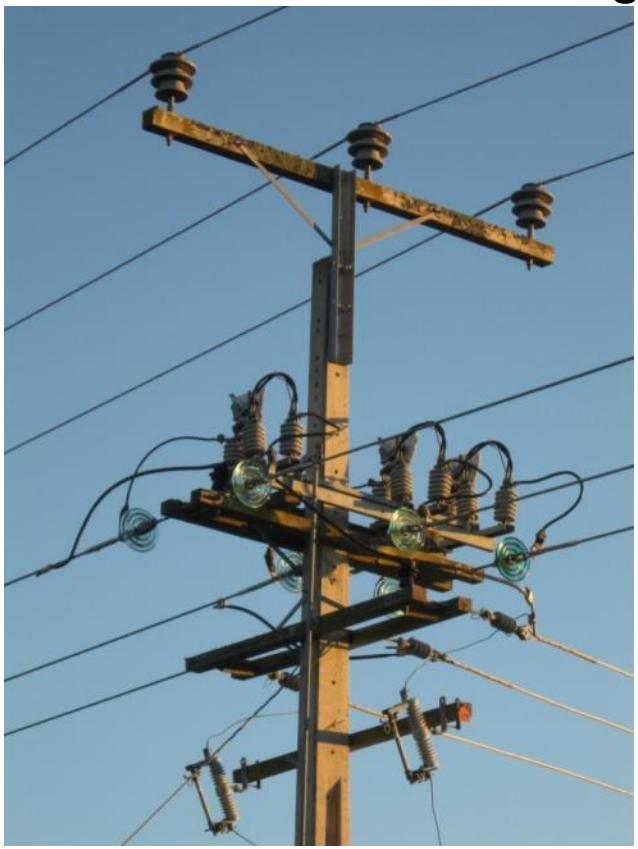
Significant export potential

Post breakage in Marlborough's vineyards

5% breakage per annum (due to mechanical pruning & harvesting) across 25,000 ha @ 600 posts per ha = 750,000

and cross arms.

- **‘Aussie hardwood’ cross arms in Marlborough**



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breeding tomorrow's trees today

Emerging Asian markets are huge

- 1500 million new middle-class Asians by 2050.
- Asian demand for timber forecast to increase 400%.
- China accounts for 6% of the world's consumer spending but 20% of global sales of luxury goods *(Economist 23-29 June 2012, p74).*
- Tropical rainforest supplies are decreasing: Asia produced 130M m3 of hardwood sawlogs in 1989, v 98M m3 in 2010 and is projected to fall to approx. 55M m3/annum by 2050.

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Feeding on dreams.

NZ teak (*E. bosistoana*)

Colour, durability, figure and tradition.

NZ rosewood (here, *E. camaldulensis*)

NZDFI Species Selection Criteria

Selection criteria for elite species & trees

- High natural durability
- Fast growth, straight stems
- Early heartwood formation & good colour
- Drought & frost tolerance
- Pest tolerance
- Coppice vigorously
- Nectar/pollen for native biodiversity & beekeeping

2003-7 trials to Field Test Candidate Species

Eucalyptus agglomerata
Eucalyptus blaxandii
Eucalyptus bosistoana
Eucalyptus camaldulensis
Eucalyptus cameronii
Eucalyptus cladocalyx
Eucalyptus eugenoides
Eucalyptus fastigata
Eucalyptus globoidea
Eucalyptus laevopinea
Eucalyptus longifolia
Eucalyptus macrorhyncha
Eucalyptus maidenii
Eucalyptus melliodora
Eucalyptus microcarpa
Eucalyptus microcorys
Eucalyptus moluccana
Eucalyptus muelleriana
Eucalyptus obliqua
Eucalyptus pilularis
Eucalyptus quadrangulata
Eucalyptus saligna
Eucalyptus tereticornis
Eucalyptus wandoo
Eucalyptus youmanii

25 → 5

- 5 Years of field trials
- Established 2003 - 2007
- 25 candidates reduced to 5

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NZDFI species

Breeding species

- *E. argophloia*
- *E. bosistoana*
- *E. globoidea*
- *E. quadrangulata*
- *E. tricarpa*

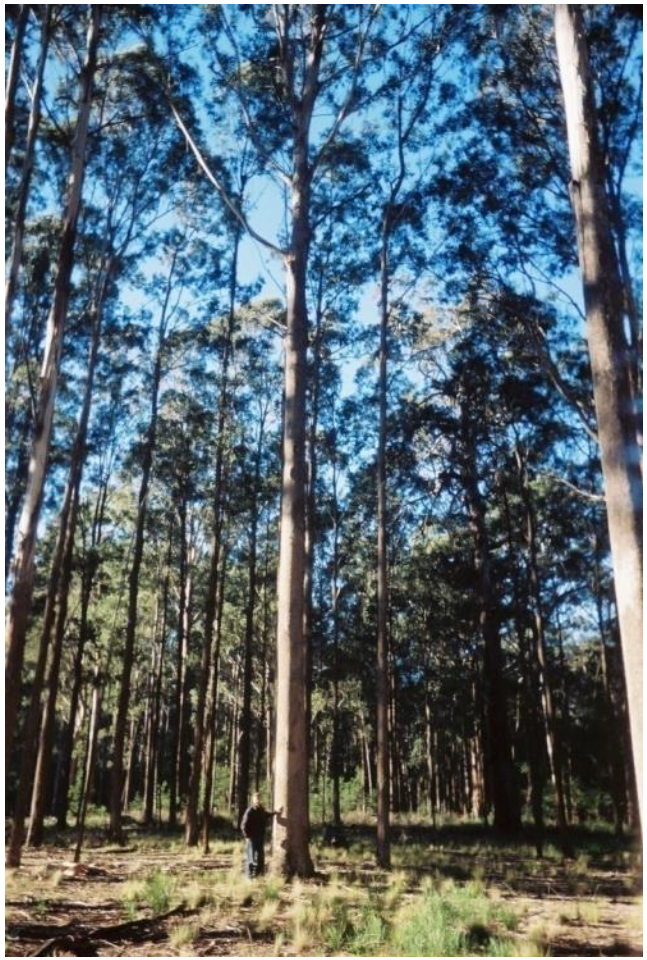
P. radiata included at several sites as a control

Species of interest

- *E. camaldulensis*
- *E. cladocalyx*
- *E. eugenioides*
- *E. longifolia*
- *E. macrorhyncha*
- *E. notabilis*

Seed Collection

NZDFI's first task (since 2003) was to identify our desired species and collect seed from individual trees throughout their whole natural range.

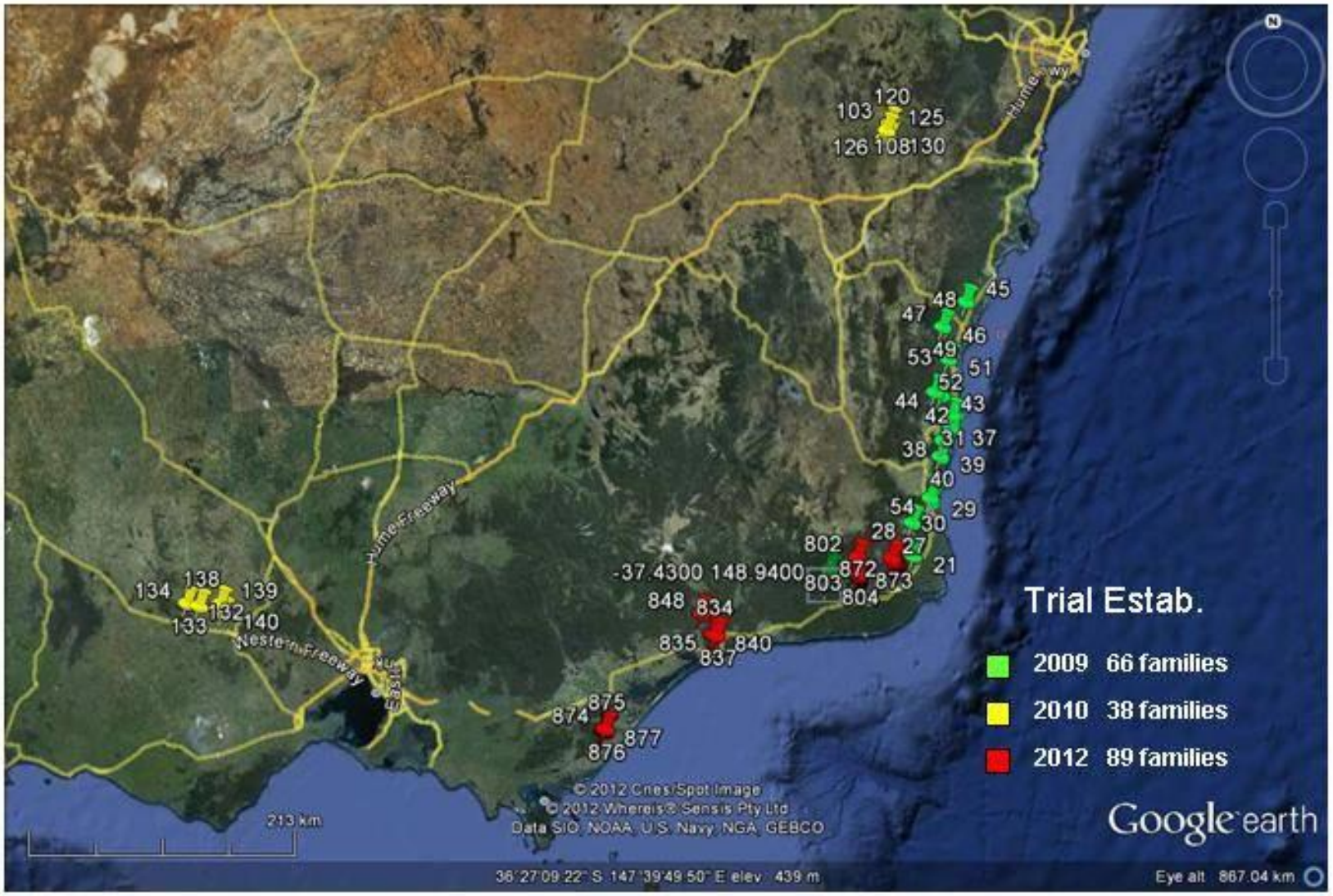


Issues

- Some candidate species survive today in fragmented remnant stands. Most are "unrecognized" in Oz.
- Poor flowering following droughts, good seed years are infrequent.

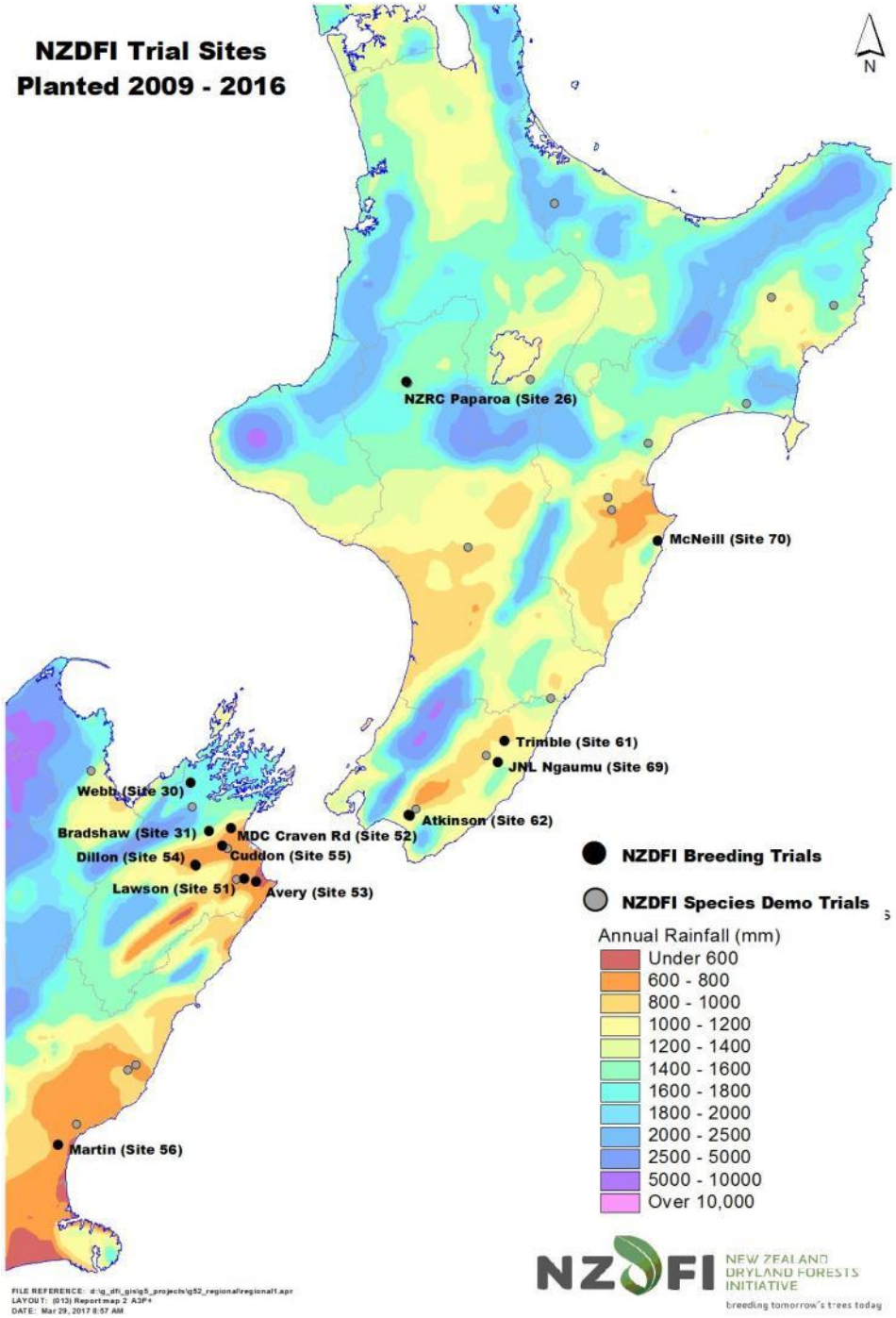
Seed collection

E.bosistoana Australian Seed Collection



30 NZDFI trial sites
150,000 seedlings planted on 70 ha from 2009-2016

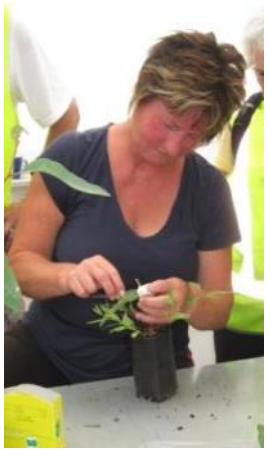
Mean Annual Rainfall



E. bosistoana Seed Orchard (Amberley)

Propagation research

- Recent investment new propagation facility.
- Eucalypt propagation includes grafting, clonal production research; experimenting with hydroponics



Key Milestones (to date)

•150,000+ individual trees from 5 species in 23 breeding trials at 10 properties in 4 regions.

•40,000 trees with up to 11 species in demonstration trials on 25 sites in 7 regions.

•First seed from E. globoidea Waikakaho Seed stand available 2014.

•First selections of E. bosistoana for growth and form grafted for clonal seed orchard(2014). SSO's of other species

•Propagation facility at Amberley (2014)

Health Risks

***Paropsisterna varicollis*, the** Eucalyptus Variegated Beetle

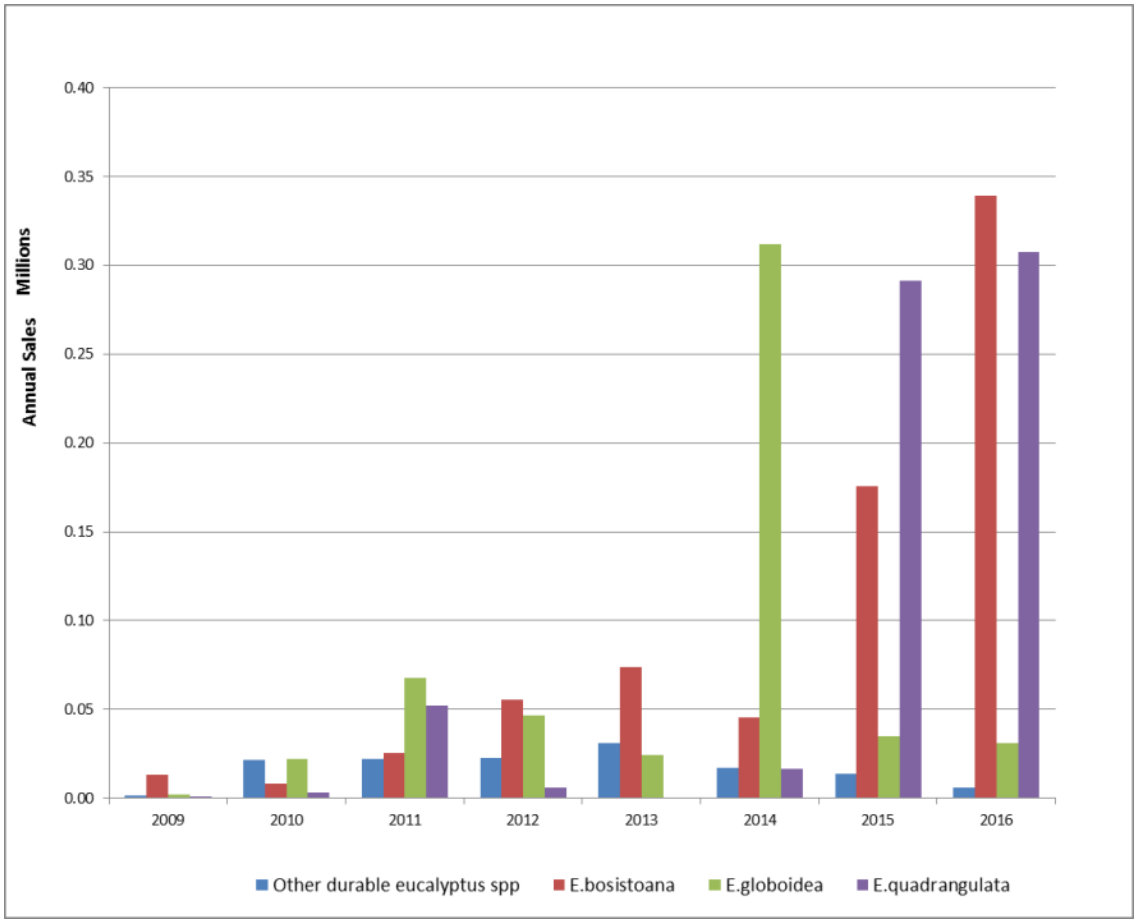
Uredo rangelii, Myrtle Rust

Changing Emphasis

- **2007 Workshop – Growing Ground Durable Hardwood for Vineyard Posts**
- **2017 -Durable Eucalypts on Drylands: Protecting and Enhancing Value**

Group	2007	2017
U/C Researchers	1	13
Private Foresters	8	11
Overseas		6
NZDFI Members	4	6
Guest Speakers		4
Wine Industry	10	2
Other	1	2
Corporate Farm		2
Central Govt (MPI)		2
Regional Govt	3	2
Corporate Forestry		2
Nurseries	3	2
Infrastructure		1
Bee Industry		1
Private Farm	2	
Total	32	56

Interest in planting durable eucalypts is increasing



Branding Quality for traceability in future Markets

The XyloGene® Nature's Green Diamond Brand

- ❑ Seed
- ❑ Seedlings
- ❑ Forests
- ❑ Sawmills
- ❑ Posts/poles
- ❑ Timber

Key to A Successful (Breeding) Programme–Henson 2011

•Focus on the clients needs – as opposed to your 15 minutes of fame √

•It is a game of numbers!√

•Take opportunities√

•Look outside the designed trials for gain √

•Always think of how you are going to deploy the material at the start of any tree improvement program√

•Manage the risk √

•Always have a back up plan – or be quick and clever enough to respond to failure√

This is a transformational opportunity

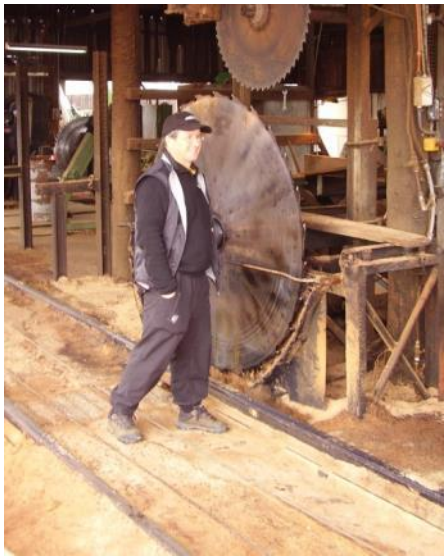
The creation of a highly coloured, naturally-durable eucalypt resource suited to drylands that mimic in their qualities those of the most valuable tropical hardwoods—to compete on innovation and excellence rather than price, undergirded by scarcity and environmental constraints.

New Zealand should enjoy a comparative advantage in that low-value, marginal, pastoral dryland can be used to supply high-value timber

With our elite breeding populations we will have first mover advantage.
New Zealand will be the partner of choice for international dryland ventures.

We already have some low-cost, rapid tools and technologies to capture vastly improved wood quality attributes for very young eucalypts.

Acknowledgements



Ian Nicholas (1954-2013)

- Research Scientist and passionate eucalypt advocate
- Well known for his ability to deliver science to industry in a simple, but clear manner

Emeritus Professor John Walker

- Leading expert in wood processing, particularly mechanical properties, drying and preservation research in New Zealand.
- Visionary approach to wood research