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JUDGES' REPORT

BUSINESS INNOVATION

NZ DRYLAND FORESTS INITIATIVE

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INTRODUCTION

The New Zealand Dryland Forests Initiative (NZDFI) is a commercial research project to select the best eucalypt species to establish a durable hardwood industry in New Zealand.

While eucalypts grow in many countries, none has been specifically bred as a strong ground-durable timber that can be used for decades without chemical treatment. This is a pressing issue in Marlborough where millions of copper-chrome-arsenic (CCA) treated pine posts are used in vineyards.

NZDFI has created a scientifically rigorous field trial programme using genetics to propagate durable eucalypts suited to different growing conditions. Their research will be developed into nursery stock for hardwood growers around the country and the world.



This project provides many environmental benefits:

- An alternative to chemically treated posts for winegrowers and other industries.
- A reduction in broken chemically treated posts going to landfill or burnt.
- A fast-growing commercial crop and productive use of drought-prone land.
- Reduced risk of erosion on steep land - trees are coppiced, not clear felled.
- Lower transport costs and carbon emissions with the ability to grow and process hardwood near site of use.
- Reduces hardwood imports and the destruction of tropical rainforests.

From genetics to harvested hardwood, this project focuses on developing the science to make the right decisions - an advance for Marlborough from the days of planting contorta pine in the high country and “seeing what happens”.

The level of funding and range of backers for NZDFI is testament to this scientific approach. The judges were impressed on many levels and can see significant environmental and economic benefits for Marlborough and New Zealand from this project.

GENERAL INFORMATION

NZDFI was established in 2008 with a 15-year research and development programme. It aims to provide growers with the knowledge and resources to establish sustainable hardwood forests and develop markets in New Zealand and overseas.

The idea to plant eucalypts for durable hardwood came five years earlier after meeting Marlborough organic winegrower Konrad Hengstler, who was importing hardwood posts from Australia. Paul Millen and his brother Ash had won the 2003 Marlborough Environment Award for their mixed forestry block and Konrad said he'd much rather get hardwood posts grown in New Zealand. Thus the seed for NZDFI was sown.

NZDFI has a 20-year strategic plan that starts with research into seed selection and ends with marketing their Xylogene branded durable hardwoods to the world. Six years on, 120,000 eucalypts have been planted in 38 trials in eastern dryland regions from Gisborne to Canterbury.

More than \$2.5m has been invested in NZDFI so far. Backers include Marlborough Research Centre, Ministry for Primary Industries, Proseed NZ (Ngai Tahu), University of Canterbury School of Forestry, Vineyard Timbers Ltd, NZ Farm Forestry Association, Marlborough District Council and other regional councils, Marlborough Lines and private landowners.

This reflects the diverse interest in durable eucalypts – as well as being an alternative to CCA treated pine posts, durable hardwood is used for power pole cross arms, railway sleepers, decking and outdoor furniture. Eucalypts are also an alternative to willows for flood control and provide a cash crop at the same time.

Another trial, Trees for Bees, is studying eucalyptus species best suited to providing pollen and nectar for bees throughout the year.

The NZDFI project stages are:

1. Seed Selection

Proseed's expert seed collectors went to native eucalypt forests throughout Australia and found the best examples of the five main species under study:

- E. Argophloia – western white gum
- E. Boisistoana – coast grey box
- E. Globoidea – white stringybark
- E. Quadrangulata – white-topped box gum
- E. Tricarpa – red iron bark

From each mother tree, Morgans Road Nursery in Marlborough propagated 500 seedlings.

2. Genetic Trials

The best 300 seedlings from each mother tree were selected to create a collection of 120,000 trees planted in seven regions. These include Permanent Sample Plots that are closely monitored, measured and data recorded by the NZDFI team.

From the trial trees, the top performers are selected based on growth rate, colour, stiffness/strength, frost tolerance and durability. The genetic material from these go forward for the Project's breeding stock.

3. Grafting and Breeding

The project now has enough data to start grafting and selective breeding the best performers. Growth rates have been impressive, with Quadrangulata reaching 8-10 metres in five years. Research is focusing on the physiology of the heartwood, the key to durability. NZDFI is also developing a new, non-invasive method to assess the durability of heartwood at an early stage of growth.



4. Commercial Plantations

Huge gains in the growth, form and wood quality of NZDFI selected durable eucalypts is expected by 2020. Proven performers will be bred in large numbers to supply to growers for dryland plantations throughout New Zealand. NZDFI has already established close working relationships with landowners hosting the trials and run workshops for growers and those interested in commercial durable hardwood forestry. NZDFI will also be developing forestry management systems for growers.

5. Harvesting

The research will establish growth rates, at what age different species bulk out, and the best time to harvest/coppice (current estimate is 15-18 years from planting to harvesting). Paul estimates mature durable hardwoods will have three times the profitability of pinus radiata. The wood will be harvested by coppicing, leaving roots and hillsides intact and the trees ready to grow another crop.

6. Marketing

NZDFI is developing the XyloGene brand. This is the NZDFI mark of quality assurance and will be applied to all parts of the process, from seeds to milled timber (and even honey). NZDFI will enable access to national and international timber markets for growers and the XyloGene brand will be a big part of that. International links are also being built through the University of Canterbury Phd students who received scholarships to work on NZDFI research. They are from China, India and Bangladesh.

PROBLEMS AND HOW THEY HAVE BEEN TACKLED

The original seed for the mother trees had to be collected from native forests in different parts of Australia. This was made easier with the use of Proseed's specialized collectors. It would be hard to repeat now with the tighter access restrictions in Australia and import restrictions into New Zealand.

Securing suitable sites for the genetic trials relied on co-operative landowners prepared to partition off part of their property for about 15 years. The NZ Farm Forestry Association network helped NZDFI find landowners to host the trials and participants include farmers, forestry companies, iwi and regional councils.

Sourcing funding – \$2.5m spent so far – has not been easy and for every successful grant application four or five miss out. Support from organisations such as the Marlborough Research Centre and University of Canterbury Forestry School encouraged others to back the project.

The prospect of wilding eucalyptus has been raised as a concern and while some species can spread in certain conditions they are generally considered a low spread risk. Managing wilding eucalyptus comes down to responsible land management and planting the best species for the site. Durable hardwood plantations would not be on the scale of pine forestry and because the wood is valuable the landowner would have an incentive to cut to sell.

As the project progresses, Intellectual Property protection becomes a pressing issue. Canterbury University scientists are more interested in their research than commercialization but there is big potential for NZDFI to earn money from exporting its IP as well as wood.

Solving this issue is part of the growing pains being experienced by NZDFI. The expectations for the project and growth is challenging their ability to keep up with it.

The current stage is focused on genetics and breeding but potential growers and customers want to see the finished wood.

"We know there is a powerful market potential but we have to be patient and get the science right. We are learning the economics on the way," says Paul.



SUMMARY

NZDFI's 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.

Six years on and the project is well on track to achieve that vision. Forestry consultant Paul Millen has been the driving force and achieved a great deal already by building a strong scientific team, attracting financial backers and nurturing relationships with landowners, regional councils and farm foresters.

This research is pioneering – it has not been done in Australia or anywhere else in the world. The results will give growers the plants and knowledge to farm the species best suited to their conditions. Earnings will come from hardwood exports and the Intellectual Property behind the research.

The judges were impressed by the patient, step-by-step approach and the understanding of the need to get the science right to create a sustainable industry. But just as impressive are the solutions from this project for a wide range of environmental issues, both locally and overseas:

- Alternative to CCA treated grape posts and reduce stock piles of hard-to-dispose treated posts
- Productive use of drought-prone land and erosion control on slopes
- Land stability retained after harvest (coppiced, not clear-felled)
- Savings on fuel and carbon emissions with trees planted and milled near where they will be used
- Alternative source for durable hardwoods rather than clear-felling tropical rainforests
- Food source for bees during lean times of the year

The NZDFI team has shown what can be achieved with a professional approach, outstanding networking and a commitment to add value to Marlborough and New Zealand forestry.

SUGGESTIONS

- Seek advice and take steps to protect the Intellectual Property around the seed research and new fast-track method to assess durability of hardwood. If the Canterbury University commercialization unit (Research and Innovation) is not an option consider approaching Callaghan Innovation www.callaghaninnovation.govt.nz. You may need to add a specialist to your team to pursue protection and commercialisation of your IP.
- As well as providing a further income stream, your IP could also be used to leverage more funds.
- People want to see the NZDFI durable hardwoods. Create a showcase/presentation that can travel the country for field days, funder presentations, Council meetings, A&P Shows etc. Include a timeline of the NZDFI research and when XyloGene-branded durable hardwoods could be available for growers and end use.
- As part of the showcasing, seek an opportunity to incorporate Marlborough durable hardwood in the new Blenheim theatre and library.
- NZDFI would make a good case study on the University of Canterbury School of Forestry website.