



## PROJECT UPDATES

**Compiled by Michael Bergin and Paul Quinlan**  
**June 2013**

Tāne's Tree Trust has two small projects funded by the Ministry for Primary Industries' Sustainable Farming Fund that are nearing completion. A summary of results to date for each of these projects is presented.

### Slashing the cost of establishing indigenous plants

This project involved the re-measurement of several planting trials established up to five years ago comparing the performance of two or more nursery stock types including open-ground transplants established at sites in three North Island regions – North Auckland, Waikato and Bay of Plenty.

Trials in up to 10 sites have been re-measured for height, diameter and plant vigour. Final reporting is underway including publication of two articles for the Tāne's Tree Trust Technical Handbook entitled:

- Choice of nursery method – container or open ground; and
- Comparison of the performance and costs for establishing native trees and shrubs.

Trials indicated that the performance of natives raised in open ground beds and planted as bare-root seedlings on a range of riparian and steep hill country sites is similar to that of seedlings raised in PB3 containers or equivalent size, whereas root trainer stock suffered greater mortality largely due to browsing damage and invasion of exotic grass. Cost of establishment for planting open-ground stock is likely to be half that of natives raised in large containers.

Amongst other outputs a field day is planned for end of June to profile one of the planting trial sites in the Mahurangi catchment. Further information on this workshop and other outputs from this project is available on the Tāne's Tree Trust website [www.tanestrees.org.nz](http://www.tanestrees.org.nz)



■One of the planting trials in North Auckland comparing different stock types – this riparian site six months after planting in February 2009 (above) and re-measured four years later in September 2012 (below).

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## PROJECT UPDATES (Cont.)

### Northland Totara Working Group: Developing and managing farm-grown totara forests for high-value timber

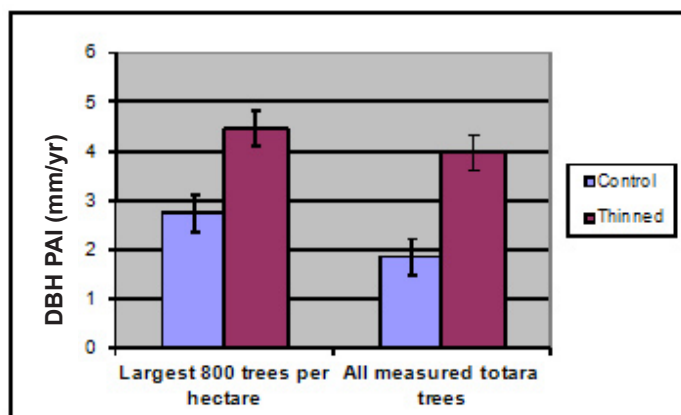
The Northland Totara Working Group has completed re-measurement of 38 permanent sample plots established in naturally regenerating totara stands, across 10 farms in Northland. Sample plots comprise thinned and pruned plots with a non-thinned and pruned control plot.

At all sites mean diameter growth-rates in the thinned plots are faster than in the un-thinned control plots. A cross-sectional disc taken from a felled stem in one thinned stand indicates the significant increase in diameter growth since silvicultural treatment five years earlier (Figure 1).



**Figure 1:** A sample disc from a totara tree within one of the plots thinned 5 years before. Note the dramatic increase in the size of the last four growth-rings compared to those before that.

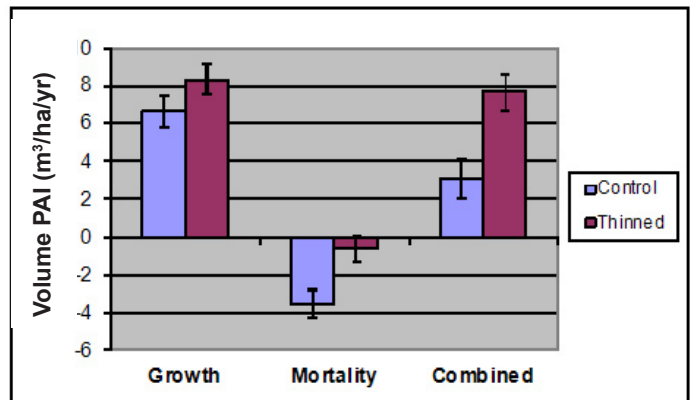
For the largest 800 trees per hectare, diameter (DBH) periodic annual increment in thinned plots averaged 4.5 mm per year compared with 2.8 mm per year in un-thinned plots indicating that diameter growth rates of individual trees in thinned stands are significantly boosted by the reduced competition post thinning (Figure 2).



**Figure 2:** DBH periodic annual increment averaged across all sites for thinned and un-thinned plots over the five-year period 2007-2012 since thinning. Means are shown for the largest 800 diameter trees per hectare and for all measured totara trees. Error bars show standard errors.

The annual increase in volume per hectare of the live trees from the five-year re-measurement was significantly higher in the thinned plots compared with the un-thinned plots (Figure 3). Thinned plots showed significantly lower mortality. Therefore the combined effects of greater growth

and lower mortality meant that the average net volume annual increment in thinned plots at 7.7 m<sup>3</sup>/ha/yr was more than double that of un-thinned plots at only 3.1 m<sup>3</sup>/ha/yr.



**Figure 3:** Periodic gross annual volume increment per hectare, mortality, and net volume increment, for control and thinned plots across all sites over the 5-year period 2007-12. Error bars show standard errors.

These are encouraging results that demonstrate a clear growth-response to management (thinning) of natural stands (Figure 4). Reducing competition through the removal of suppressed and malformed trees, can improve the growth-rates of the remaining trees, and also reduce the mortality. Also of particular note is that no significant loss to wind-throw was observed in the thinned stands. Furthermore, analysis of the data indicates that the thinning done within many of the trial plots was generally too conservative. It is therefore likely that a more aggressive thinning would further boost the growth of residual trees in thinned stands.

A preliminary thinning schedule has been developed for totara pole-stands based on average stem diameters of target stands to provide landowners with a guide on suggested levels of thinning required to optimise growth of treated stands. Detailed results will be published in articles in the *Indigena* and *Tree Grower* magazines and as an article for the Tāne's Tree Trust Handbook, all of which will be available from our website [www.tanestrees.org.nz](http://www.tanestrees.org.nz).



**Figure 4:** One of the naturally regenerating totara pole stands which was thinned five years ago showing a significant increase in diameter growth compared to an adjacent control (non-thinned) plot.



## Establishment of a thinning trial in a planted kauri stand and initiation of the continuous cover process

*Based on work by Ian Barton and Greg Steward*

This project began in November 2011 when plots were established in a block of kauri, planted in the 1970s, where the original stocking of 6950 stems/ha had reduced, by natural mortality, to 4400/ha in 2011. In November 2011 stocking in two 400 m<sup>2</sup> thinned plots was further reduced to 1060 s/ha. These were surrounded by thinned buffers, 3 metres wide, to ensure isolation of treatment effects. As controls, two un-thinned plots of 64 m<sup>2</sup> were established. The smaller size gave about 40 trees, which was the same number of trees left in the larger plots after thinning. It is expected that thinning will enable the remaining trees to considerably increase their rates of growth relative to those in un-thinned plots and this will be assessed at the next measurement to be done in November 2013. Another objective is to test the potential of kauri for continuous cover management by measuring any regeneration of timber species that may follow thinning. This, too, will be the subject of a report next year.

One thinned and one control plot are located on the flat, moister site where the trees are larger; with the other pair on the adjacent slope where soil conditions are drier and the trees smaller. Selection of trees to be retained in the thinned plots was done using Continuous Cover principles – leaving a range of tree sizes; larger trees to become dominants and smaller trees to occupy the sub-dominant strata. This is expected to create a stand which will, under the canopy of the older trees, encourage regeneration of kauri from seed shed by the dominants.

Timber samples from larger felled trees were taken to Scion to be analysed separately via a Future Forests Research programme, for density and strength properties. Five mm diameter pith-to-bark cores were removed from 19 thinned stems. These showed no heartwood development at age 38 years for kauri up to 18 cm DBH. The average wood density of the kauri thinnings was 440 kg/m<sup>3</sup>, ranging as high as 478 kg/m<sup>3</sup>. Wood density was not influenced by diameter and whole core density was similar to outer-wood density (439 kg/m<sup>3</sup>).

Log sections, averaging 1.496m in length, were recovered from the lower point of 21 felled stems and tested for stiffness. They had an acoustic speed of between 3400 and 4100 m/s and their stiffness ranged between 13.0 and 19.0 GPa\*, averaging 15.6 GPa (10 GPa is accepted as being satisfactory; that for *P. radiata* being 9). Stiffness was not influenced by diameter. Timber from 68 year old trees in New Plymouth stands averaged 13.6 GPa, but was as high as 15.0 GPa.

The wood density of 440 - 478 kg/m<sup>3</sup> is low in comparison to many exotic and most naturally grown native forest tree species but was similar to other planted kauri assessed from Northland, Bay of Plenty and Taranaki.

The results of timber tests supports the previously small amount of information about the timber of planted kauri, showing that it is very similar to old crop heart kauri except for a slightly lower density. This is good news and gives encouragement to those who wish to plant kauri. Based upon results from thinning natural kauri pole stands, it is expected that this thinning will also result in accelerated growth rates; the answer to which we will have later this year.

Regenerated seedling quantities, calculated on a per hectare basis at the time of thinning, show that a considerable amount is already present, the most common species being tanekaha

(*Phyllocladus trichomanoides*) – with 3594/ha (64%) on flat site and 1719/ ha (52%) on slope. However kauri is already well represented – with 1250/ha (22%) on the flat site and 469/ ha (14%) on the slope – kauri being 2.7 times more frequent on the flat. Small numbers of rewarewa, totara and kahikatea were the only other species present.

Following the November 2013 measurement the plots will be re-measured biennially for ten years or until growth increment slows; measurements will then be done every five years. The plots will be entered onto the Scion Permanent Sample Plot register, which is programmed for regular re-measurement, and into Tāne's Tree Trust indigenous species data base. At some time in the future, which will be dictated by the falling increments of dominant trees, further thinning of both current residual stems and regenerating trees will be needed to maintain reasonable growth rates.



**Kauri thinning trial, Mangatangi 2011.**

**Top: Lower plot before thinning. Middle: After thinning. Bottom: Billets for testing.**



## LETTER TO THE EDITOR

GREETINGS Mel, from Jolendale Park, Bridge Hill, Alexandra 9320.

Our 6-hectare 53-year-old research parkland has been recently gifted to the community amenity Jolendale Park Charitable Trust, having earlier (2004) been permanently protected by the QEII National Trust for Open Space Covenant as the sole registered 'semi-arid woodland reserve' in New Zealand.

This has been a rather unique family venture in the driest ecological district in New Zealand. It is essentially too dry to seriously consider without very regular watering 'native' trees yet we are anxious to support the fundamental purpose of Tāne's Tree Trust having joined up as members at a special gathering held in Gore a decade ago. We much admire the quality of the special topic publications produced by the Trust and see good reason to treat more of our predominantly native ecosystems in a multi-purpose manner - production and craftsmanship, conservation and resilience, recreation and other forms of social amenity.

We have in the past supported The Men of the Trees, The Royal NZ Institute of Horticulture, The NZ Society for Forest and Birds, The NZ Farm Forestry Association, The NZ Tree Crops Association, the Intl. Dendrology Association, the NZ Arboricultural Association, etc. I have been a member of the NZ Institute of Forestry (including the office of national vice-presidency under Dr Wink Sutton and the late Peter Olsen and a member of the former NZ Forestry Council and NZ National Parks Centennial Commission. And so it was natural that my wife and I should become members of your special Trust.

In more recent years we have enjoyed rather special personal links with the late John Johns (NZFS specialist in forestry photography) and Dr Brian Molloy (leading taxonomist and South Island high country adviser to the QEII National Trust. Now in our 80th year we still take an active curatorial interest in Jolendale Park, the Waitaki Lakes Committee and care for a lakeside amenity beach front at Champagne Gully, Lake Dunstan. Jolendale Park has featured on the pages with well illustrated articles in *NZ Leisure* and *Mid Latitude* magazines and can be viewed on our website [www.jolendale.com](http://www.jolendale.com)

Most interested to listen to NZ National Radio items on kauri studies in the past two/three weeks and have them on podcast. Amazing what the latest technology can unlock in terms of tree physiology.

Somewhat akin to my wife's lifetime professional medical research in high blood pressure (hypertension) in which Otago has featured internationally with pioneering studies that have led to modern day treatment.

If you and/or other members of your team (largely concentrated in the north — so far...) are visiting Central Otago we would love to have the opportunity to meet you and view the trees in our park etc.

Cheers,

Jolyon Manning JP

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## Tāne's Tree Trust on display at the NZFFA's Annual Conference

Michael Bergin

Tāne's Tree Trust (TTT) provided a poster display at the NZ Farm Forestry Association's annual national conference held in early April in Orewa, North Auckland. Cimino Cole, Michael Bergin and Peter Berg were in attendance to help man the display over the three days of the conference.



The large display included several posters profiling the work of TTT, the new Mahurangi Farm-Forestry Trail, Scion and the Northland Totara Working Group (NTWG). A range of TTT publications and samples of totara discs from the thinned plots and a milled slab of totara as part of ongoing NTWG projects were also on display. The stand proved extremely popular with conference attendees with many impressed at the range of collaborative projects underway promoting the establishment and management of native trees.

The interest in a closer relationship between TTT and the NZFFA Indigenous Forestry Special Interest Group was raised again at the meeting of the latter held during the conference. It was noted that Michael Bergin of TTT produced *Indigena*, the magazine of the Special Interest Group and it was suggested this could lead to greater coordination and cost savings on publications if the two organisations worked more closely. To help more consideration of the relationship TTT Chair Peter Berg was added to the Special Interest Group Committee.

### DONATIONS and BEQUESTS

All donations and bequests are gratefully accepted, and enable Tāne's Tree Trust to do more research and information sharing.

**Reminder:** Any Donations you make to Tāne's Tree Trust are tax deductible and can be claimed as a tax deduction as we are a registered charity. Please let us know if you want a receipt for your donation.