Tāne's Tree Trust
Native Trees for the Future
Newsletter
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Timber trees of the future

BLACK MAIRE *(Nestegis cunninghamii)* — *Ian Barton*

History:

The Maori apparently had no medicinal use for black maire but its timber was highly regarded: mainly being used for weapon and tool construction. For example wedges for splitting wood, kō (digging sticks), canoe paddles and bailers, beaters, mallets and, while too heavy for some weapons was used for thin, double pointed spears. Early European uses were much the same; eg, as caulking mallets, mauls, wheel or shaft bearings, but also as framing for railway carriages, fencing and bridge building materials. It was also used for cabinet making and turnery. However one of its main uses is as firewood for it is probably the best indigenous timber for this purpose.

Distribution:

New Zealand's four species of Nestegis are our only members of the Olive family and in earlier years were included in the same genus as the olive, Olea. The species is found in lowland forest from near North Cape to the Marlborough Sounds but is most common in the Central North Island.

Tree size and growth:

It is recorded in The Flora of New Zealand, Vol. 1 as growing to 20 metres tall and 1.5 metres in diameter; the only tree recorded by Burstall and Sale being a little smaller than this. Growth rates of planted black maire comes from few sources but give an average annual height growth of 25 cm (max. 36 cm) and an average annual diameter growth of 6mm (max. 8.3 mm). A problem, as with many broadleaves, is that maire appear to be a favoured food sources for goats and deer; protection is essential.

Timber:

The most notable characteristic of black maire is its density; of New Zealand species only southern rata is heaver. The heartwood is reputedly quite durable, as evidenced from its use as a fencing material, but its durability has not been tested. In the 1880's it was obviously regarded as a very valuable timber. Fleet quotes average sawn timber prices in 1885 of 25 shillings ($397 in 2007) per 100 board feet for black maire, but only 12 shillings ($191) for totara and 6/6d ($103) for rimu. The black maire value converts to $1682 per m^3 sawn in 2007.

In recent years the small quantity of black maire coming on to the market is used for turnery -it being regarded as one of the finest turning timbers: golf putters –the springiness which makes it suitable for mauls having a similar affect on golf balls: and the wooden parts of flutes and bagpipes. According to wood-turner Dick Veitch it is only native timber on which a thread can be successfully turned.

Timber characteristics, with *P. radiata* figures shown in brackets for comparison, are:

Density (at 12% M.C.)	995kg/ m^3	(500 kg/m^3)
Moisture content green	43%	(130%)
Tangential shrinkage -green to 12% m.c.	5.4%	(4.7%)
Radial shrinkage	2.6%	(2.2%)
Modulus of rupture (air dry)	114 Mpa	(90 Mpa)
Modulus of elasticity (air dry)	11.6 Gpa	(9 Gpa)

Black Maire Leaves and Fruit

Potential:

Black maire is one of our least understood timbers but has potential for many high value uses, particularly in veneer and turnery but also cabinet making for which it seems to have been little used in recent years. Just why huge quantities were used as fire-wood when it had higher value for other uses is unknown. One can only hope that only low grade wood was burnt.

As it is closely related to the olive and has a similar prolific fruiting habit it may have potential for oil production, but, as far as is known only one small study on the chemistry of the fruit has been done.

Research requirements:

Initial small trials suggest that the growth rate of black maire may be reasonably fast, diameter measurements from an F.R.I survey in the mid 1980's being over 80 mm mean annual increment. Trials are urgently needed in areas where it can be protected from animals for the first few years. It is also likely that it will perform best on higher quality forest soils. Initial trials suggest that the growth habit is fairly upright. As its durability is uncertain and it is slow to dry, and cannot be kiln dried, further trials of these aspects are also needed.

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Bergin D O &
Kimberley M O

Editorial

Native trees don't grow slowly

One of the oft-used arguments given for not planting native trees for timber or other purposes is that they "grow too slowly". The growth of kauri planted by Maurice Sutton near Tauranga and reported on later in this newsletter is one of many examples which show that native trees can in fact grow extremely well and that this perception is certainly not justified. In Maurice's stand, planted kauri are growing at around 2 cm diameter and 1 m in height each year, so you can just about see them grow! Somewhat slower but still good growth rates for totara, kahikatea, puriri, and beech of at least 1 cm in diameter and half a metre in height per year are also not uncommon, and these mostly occur in stands with little silvicultural management. These rates are still less than those provided by well-maintained radiata pine, Douglas fir, or *Cupressus* stands in New Zealand, but interestingly not by so much, and compare well with growth rates of temperate forests in many other parts of the world.

So where did the perception of slow growth come from? The problem, of course, is that the potential of our native species to perform in plantations is not consistently realised. The poor perception of native trees is often caused because of examples of poor establishment rates, with seedlings sulking for several years in the ground, or variation in growth rates between seedlings, with some doing well while others stagnate. This shows we still don't fully understand the environmental conditions that suit individual species, and particularly how to shorten the establishment phase to kick-start the growth of natives which we know can occur. Also, native seedlings that are available haven't gone through any selection process to choose the growth and form characteristics that we desire. Tane's Tree Trust is well placed to perform a number of important roles around this issue. First it can act as an advocate for native tree species, making New Zealanders aware of the tremendous potential inherent in these species and showcasing examples of plantations that are growing well. Second, it can develop and circulate the knowledge of how to realise this potential in better establishment techniques, tree selection, and management. I'm looking forward to the Trust influencing our future landscapes so that new forests of native trees are common and perceived as valuable and feasible options for land use.

Bruce Burns — *Landcare Research*

Trust activites

(September - December 2007)

Website:

We are currently trying to put the Archives Database project on to the website but have run into problems in making it fully searchable. Hopefully this will have been sorted out by February. Remember that all past newsletters are on the web site, as is our publications list. ***Send requests for publications to:-*** Ian Barton, PO Box 1169, PUKEKOHE Telephone: 09 239 2049, Email: ibtrees@wc.net.nz

Keep checking the site: www.tanestrees.org.nz

Renewal of Subscriptions:

Subscription notices for the 2007/08 year were sent with the May 2007 newsletter. A few have not yet paid and will receive a reminder subscription form with this newsletter. People who have not paid for the 2007 - 08 year by May 2008 will be removed from the membership list. Subscription accounts for the 2008 - 09 year will be sent out with the newsletter next May.

Strategic Plan:

The Trust has operated under a strategic plan since 2003 and the plan for the three years 2007 – 2010 has just been approved by the Board of Trustees. If network members would like a copy of the plan it can be posted or emailed to them by contacting Ian Barton at - ibtrees@wc.net.nz or 09 239 2049.

Erratum:

The Editor apologises because in the last Newsletter the name of the author was omitted from the article on kauri heartwood. This was of course written by Greg Steward who is doing this research.

Projects:

Sustainable Farming Fund
Ministry of Agriculture and Forestry
Te Manatu Ahuwhenua, Ngaherehere

Work on developing the new workshop format began in early December when we had a very successful seminar at Hikurangi in Northland. We are now working to set up the new programme which will be based upon a comprehensive work-book. FITEC have agreed to assist with funding for this and as a result the workbook can be made more comprehensive and to a higher standard. A draft workbook will be completed by the end of April and two workshops will be run to test the new format. These will probably be in the southern North Island and with an iwi group in the central North Island. Invitations will be sent to Trust network members close to the final venues

The Continuous Cover forestry manual is now due to go to the printer in Mid January. If there are no further holdups members should receive their copies with the May Newsletter.

Preliminary work has begun to produce a bulletin on the beech species and a meeting with interested people in the South Island is scheduled for March / April.

Early last year funding to convert a British Forestry Commission rapid inventory system to work in New Zealand was declined. However this system could also be useful in obtaining preliminary Carbon measurements and as the Government has made more funding available for carbon work, we have been asked to re-submit our application. We should know the results of this application within a couple of months.

In the current SFF funding round we are applying for funding to re-measure native plantings throughout New Zealand, last done in the 1980's, and for a project to do work on kauri and possibly other species in Northland.

Other Projects:

Work on totara in Northland is going well and we have supported this by obtaining a grant from the ASB Trust to allow a trial aerial inventory to be made of the area around Kaeo. This work is complete and a report should be available by February. Any members who would like a copy of this report can contact Ian Barton at - ibtrees@wc.net.nz or 09 239 2049

Visit of Dean Meason:

The article on *Acacia koa* in this newsletter was written by Dean and is based upon work he is doing in Hawaii. Dean, who is a New Zealander, is doing his Doctoral studies on this species and will be home in Feb - March this year. He has generously agreed to give a series of seminars on his work which, as you will agree once you have read his article, has important parallels with our work on native species.

Arrangements are not yet complete but seminars are scheduled as follows and all Trust network members are invited to attend one near them. For further information contact Ian Barton at:- ibtrees@wc.net.nz or 09 239 2049

Auckland:	12 midday 11th February, Landcare Research , 231 Morrin St, St Johns
Hamilton:	12 midday 14th February, Landcare Research, Gate 10, Silverdale Road
Rotorua:	10.30am 15th February, Scion, Sala St,
Napier:	7.30pm 19th February, Tamatea Motor Inn, York Ave.
Christchurch:	Between 24 & 26 February, School of Forestry, Forestry Rd (off Creyke Rd), Ilam. Contact Euan Mason for details - euan.mason@canterbury.ac.nz; Telephone: 03 364 2584
Invercargill:	28 Feb, Invercargill. Contact john Purey-Cust - oq43@ispnz.co.nz

The current development of viable management regimes, and associated problems, for the endemic tree *Acacia koa* in Hawaii, USA

Acacia koa (Gray) is a nitrogen fixing, tree species endemic to the Hawaiian Islands where its natural range includes most of the archipelago, from near sea level to over 2,000 m, and where it tolerates rainfall conditions ranging from wet to dry. It is a hardwood which acts as a primary successor, but remains a keystone species right up to and including forest climax. The wood from *Acacia koa* (koa) was extensively used by the native Hawaiians, from spear handles, bowls, and carvings, to paddles and canoes. The arrival of Europeans led to the extensive clearance of large tracts of koa forest for agriculture and timber, while grazing by introduced mammals limited koa regeneration (Wilkinson and Elevitch 2003). Today, it is estimated that only 10% of the original koa forest remains. In the last 25 years, the public's appreciation of koa has increased with resurgence of native Hawaiian culture, concern about the health of the remaining koa forest, general appreciation of a unique tree and increasing demand for its high quality wood. Koa wood today is mainly used in high-end value wood products like fine furniture, carvings, crafts, picture frames, and musical instruments. The demand from this sector, koa's scarcity on private land and its importance to Native Hawaiians has dramatically increased its stumpage value from a low of US$0.30 per board foot in the early 1980's to over US$3.5 per board foot (NZ$1925) today. The value per m^3 sawn ranges from US$6 per board foot for low quality wood to US$120 (NZ$66,000 per m^3 sawn) for top quality fiddleback.

The sudden decline in the late 1980's of traditional agricultural crops in Hawaii (i.e. sugar cane) has created a large surplus of unused agricultural land throughout the State (Simmons 1999). Forestry currently plays a small but important part of Hawaii's diversified agriculture; it was conservatively estimated that forestry contributed $31 million to the State in 2001 (Yanagida et al. 2004). With the availability of mature trees for logging decreasing, there is a push from several quarters to use a substantial portion of this unused agricultural land to create a commercial koa forest industry. There is also interest by various organizations in the re-establishment of koa forests on these lands for non-commercial reasons; for example ecological restoration, enrichment of biodiversity, development of bird corridors, carbon sequestration, or for cultural purposes. The value of the wood, interest from various groups and the availability of land are all positive indicators that the koa forestry can be vastly expanded throughout the State of Hawaii.

In order for a species to be successfully grown as a renewable resource or for ecological purposes; its ecology, limitations, and lifecycle need to be understood. Unfortunately, koa was never studied as species until very recently and was never assessed as a commercial tree species; consequently only several scattered permanent monitoring plots exist. In addition, many of the agricultural areas that could be established in koa haven't had trees on them for over 100 years; making it impossible to assess the potential of an area for growing koa from existing populations. Traditional forestry method of assessing silvicultural treatments for each major soil type, and different temperature and rainfall regimes would be too expensive and time consuming for Hawaii's diverse ecological regions. Indeed, Hawaii has 10 of the 12 US Soil Orders and the soil age ranges from recent lava flows to over 4 million years old. For a more rapid assessment of potential silvicultural options and viable management regimes, we are attempting to understand factors which limit the growth rate and distribution of koa and the mechanisms behind responses to silvicultural treatments. By incorporating traditional forestry assessment techniques with the scientific areas of tree ecophysiology, soil science, GIS, remote sensing and computer modelling we hope to develop a method that can be applied to develop viable management options that are suitable for each ecological region in Hawaii and which meet the goals of the decision makers.

With increasing interest in New Zealand for growing native trees for commercial, cultural or restoration reasons and the limited information available, New Zealand growers are facing similar problems as those in Hawaii. While in New Zealand I would like to discuss how the Tropical Forestry unit at the University of Hawaii at Manoa are developing and assessing management regimes for koa, the scientific approaches used, the pros and cons of our approach, what problems we have accounted, where we are now and what we hope to achieve. I can also discuss similarities and differences between New Zealand and Hawaii in the terms of the history, legal framework, competing interests, and the various cultural, social and economic forces behind the desire to develop a viable koa forest industry.

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Dean Meason — *Tropical Forestry Laboratory, College of Tropical Agricultural and Human Resources (CTAHR), University of Hawaii at Manoa Honolulu, Hawaii*

Sutton's Kauri – Four years on

In 2003 a six year old planted stand of kauri was located at Te Puna, to the north of Tauranga. The kauri had been planted on a converted kiwifruit orchard and was exhibiting exceptional growth. With support of the owners (Maurice and Pat Sutton) Tane's Tree Trust and Scion established two growth plots in the stand and monitoring of the growth performance began. In 2003 height and diameter were 5.7m and 10.2cm respectively. The annual growth rate (0.95m/year and 1.7cm/year) was phenomenal for the species. Since the initial measurement in 2003 the stand has been measured again in 2004, 2006 and 2007. The question was obvious; would or could the original growth rates be maintained? In short, the answer has been a resounding yes. While following the development of the stand, we have also learnt other lessons from the stand that will be relevant to managing the species in plantations.

Growth:

Mortality has been extremely low from 2003 to 2007. Of the original 80 trees in the two growth plots only one has died (1.25% mortality). At age 10 the average height in the stand is 9.1m; with a maximum measured height of 10.7m. Annual height increment has slowed somewhat from 0.95m/year to 0.91m/year. Diameter growth on the other hand has increased slightly. Diameter now averages 19.7cm; with a maximum of 24.5cm. Annual diameter increment is now 1.97cm/year. When compared with a database of planted kauri of all ages, height and diameter increment for the Te Puna stand of 0.91m/year and 1.97cm/year respectively are significantly in excess of the average for the species of 0.38m/year and 0.69cm/year.

Branching:

The kauri was planted at 4m x 4m spacing (625 stems per hectare). Despite the exceptional growth rates these kauri are exhibiting, they are maintaining the ricker form common for young kauri. Consequently they are yet to acquire canopy

closure and shade out the grass growth beneath the stand. As light can penetrate to the ground level this also has some implications for the development and persistence of branches on the lower stem. One of the many useful features of kauri is its ability to naturally shed branches, in a process called abscission, as shading limits the usefulness of the lower branches. In this stand, in the presence of good light levels, the lower branches were persisting and some were developing into substantial size, with the likelihood many would become permanent. The stand was in danger of becoming coarsely branched with few clear lower stems developing. In response, the owner undertook a pruning of the stand during 2007 leaving a branch stub 4-6cm in length. Very large branches were pruned close to the stem.

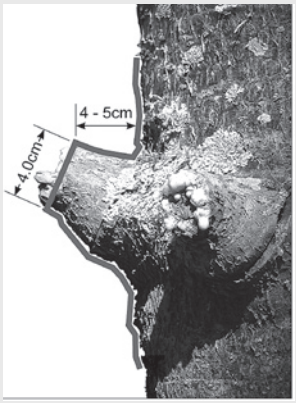


Photo 1: Example of the correct pruning of kauri before branches reach 4cm in diameter.

In August 2007 a sample of 60 stems in the stand were assessed to see what had happened to these pruned branch stubs, and whether any abscission had or would occur. Of the 488 pruned branch stubs assessed, almost 70% were abscising 4 months after pruning. Effectively the pruning has fooled the kauri into a position where it "thinks" its lower branches are now no longer required and they are dropping the branch stubs off. This will result in the development of characteristically clear timber. The situation is different for the large diameter branches that were pruned close to the stem and through the branch collar. The larger branches pruned in this manner have shown no sign of abscission of the cut branch stub. This will likely result in a scar or degrade in the timber, once they have been occluded or grown over. The result of this assessment indicates that pruning of kauri should be undertaken before branches exceed 4 cm in diameter (see photo 1).

Photo 2: Sutton's kauri in 2003 Age 6.

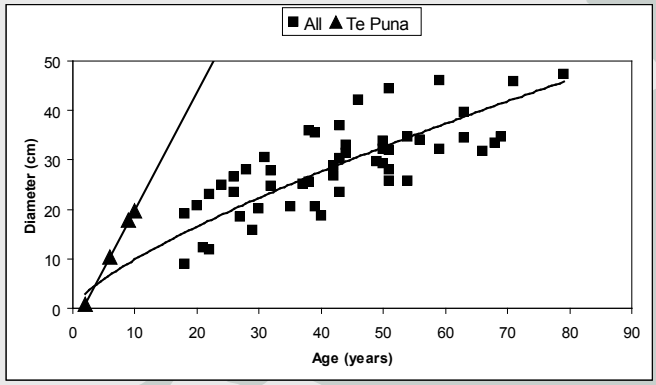
General:

The fast growth of these kauri has resulted in some soft growing tips breaking out, especially during strong wind events. These stems have frequently produced multiple new leaders. Mr Sutton has attempted to maintain the form of these stems by selecting the best of these new shoots and pruning off the competitors. At age 10 the kauri crowns have thickened considerably (see photo's 2 & 3) and are producing small, but viable seed crops.

As ever, we are grateful to Maurice and Pat Sutton for allowing access to their kauri.

Greg Steward

Photo 3: Sutton's kauri in 2007 - Age 10.



Comparison of diameter of the Te Puna Kauri, with all planted Kauri

The endemic tree *Acacia koa* in Hawaii, USA

Planted Indigenous Forests Regulations

Planted indigenous forest can now be formally recognized following the approval of the Forests (Planted Indigenous Forest Certificate) Regulations 2007 on the 26th February last year. The regulations took effect on 28 March 2007.

The regulations enable the Ministry of Agriculture and Forestry Indigenous Unit to issue certificates confirming that indigenous timber trees or tree ferns have been planted on specified land that was not covered by indigenous forest immediately before planting, or immediately prior to the land being prepared for planting. The certificate can be presented as evidence that timber is from a planted indigenous forest at the time of harvesting and milling and therefore exempt from the Forests Act's requirements for a sustainable forest management plan or permit.

The regulations were developed in response to landowner's concerns on the uncertainty for future harvesting of planted indigenous forests. This followed the introduction in 1993 of the indigenous forestry provisions of the Forests Act. Landowners were concerned that by the time a plantation of indigenous timber species was ready for harvesting, it was likely that an under-story of shrub indigenous species world be well established, giving the appearance of a natural forest.

Because natural forest may only be harvested and milled under a registered sustainable forest management plan or permit, landowners felt that without some form of officially recognized certification, harvesting options for planted indigenous forest may be restricted. The issue was raised in the 2002 report –A Sustainable Future for our Indigenous Forests presented to the House of Representatives. A register of planted indigenous forest certificates will be maintained by MAF. Information on what is required when applying for a planted forest certificate is currently being prepared and will be available on MAF's website in the near future.

Ian Platt — *Indigenous Forestry Unit, MAF*