



TIMBER TREES OF THE FUTURE

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KARAKA – CORYNOCARPUS LAEVIGATUS

by Ian Barton

INTRODUCTION

Karaka is the sole New Zealand representative of the Genus *Corynocarpus* which is the sole genus in the Family *Corynocarpaceae*. The Family is found only in Eastern Australia, New Caledonia, New Guinea, Vanuatu and New Zealand (including the Kermadec and Chatham Islands).

HISTORY

There is a tradition that the karaka was brought to New Zealand by the Maori but this seems unlikely because karaka does not occur in ancestral Hawaiki and time has blurred the memory of exactly where the actual source was. The most likely explanation is that the early migrants paused in their journey at Raoul Island in the Kermadec's, for it was certainly inhabited by Polynesians in the 14th century and possibly as early as the tenth. There is no doubt that karaka formed an important item of food for the Maori people, once they had learnt to detoxify them by baking, washing and steeping the kernels of the seed before use. It appears that the prepared seed was mainly eaten as a nut; however it has been ground into a flour although hinau was more commonly used for this purpose. One of the important attributes of prepared karaka seed is that they will keep for years. Karaka were planted by pre-European Maori in many places and were probably the second most important carbohydrate source after kumara; especially so on the Chatham Islands where kumara will not grow.

DISTRIBUTION

Karaka is found in coastal forest to Christchurch and the Chatham Islands but is commonest in the northern half of the North Island. However it is also found in many inland places where it was probably planted by the Maori. It is particularly common along the Whanganui River.

TREE SIZE AND GROWTH

Allan records the tree as growing to 15 metres and 60 cm diameter. However Burstall and Sale record the tallest at 19.7 metres in Gisborne. Growth data collected in the mid 1980's shows annual height increment to mostly range from 0.14 to 0.27 metres but with one tree at 0.86 metres. Diameter mean

annual increment mostly ranged from 0.28 cm to 0.68 cm, with one tree reaching 0.87 cm

TIMBER

There is no information available on timber qualities so it could be assumed that the wood is of no use. However it is more likely that the small size of the tree did not make it attractive to saw-millers. An example of a bowl turned from karaka has been seen, so presumably it has turning values. The wood is whitish/ grey in colour and is reputedly relatively light.

RECENT ASSESSMENT OF KERNEL VALUES

A Sustainable Farming Fund grant was made in 2006 to enable a study into the commercial potential of karaka fruit¹. It concluded that the treated kernels have a food value similar to that of oatmeal and that they were gluten free. They also have the highest dietary fibre content of any nut and the highest energy content. Some work has also been done with the flesh of the berry which has the advantage of being non toxic. It probably has the highest sugar content of any fruit (Brix 27.0) and has been successfully dried in a similar fashion to apricots. Trials to produce a karaka liqueur are underway. Details of the composition of karaka kernels and a comparison with (chestnuts) are as follows:-

Energy	kcal	319 (175)	S	mg	61 (?)
Protein	gm	16.6 (3.4)	Mn	mg	0.97 (1.18)
Total fat	gm	13.8 (0.6)	Fe	mg	3.24 (3.2)
Na	mg	8 (0.7)	Ca	mg	120 (13.4)
Mg	mg	57 (33)	Cu	mg	1.63 (0.51)
P	mg	204 (88)	Zn	mg	1.33 (2.2)
K	mg	178 (5)			

POTENTIAL

It may appear that the timber of karaka has no potential; however since apparently no research has been done into the timber qualities, it would be unwise to dismiss it out of hand. Trials to grow trees which have high seed production would appear to be warranted, especially in warm coastal regions.

RESEARCH REQUIREMENTS

Further research into the potential use of the fruit, kernels and timber of karaka are needed. Planting trials of heavy fruiting trees should be undertaken.

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¹ For full details refer to Kliniac et al



Karaka berries.

MAJOR ORGANIZATIONAL CHANGE

At the Trust meeting last Friday we interviewed several applicants for the part time position of Executive Officer of the Trust. The standard of applicants was very high and we have been fortunate in engaging Sarah Bodley-Davies who will be based at Landcare Trust in Hamilton and begin work in early April.

Sarah's appointment means that the office of the Trust will move from Pukekohe to Hamilton

and information about this, along with new contact details, will be published in the May newsletter. In the meantime the Pukekohe post box will continue to operate.

This newsletter is published a month later than usual because we want to post it out with the proceedings of the 2009 conference, and these have just been printed. (see below)

TRUST ACTIVITIES - SEPTEMBER 2010 TO JANUARY 2011

The Proceedings of the November 2009 Conference will be distributed to attendees and others who have requested them, with this newsletter. Anyone who is a member of the Trust network or the Indigenous Section of Farm Forestry is entitled to a free copy on request. If you want a copy and have not already requested one, do so now. Email ibtrees@wc.net.nz.

Likewise, and at last, the first stage of the Handbook, "Planting and Managing Native Trees" will be printed within the month. Those who ordered copies at the 2009 Conference will receive them in about one month's time at the pre publication price of \$30. For those who wish to order copies, the price for the handbook has been set at \$35 for members and \$55 for non members. The cost for individual sections (as they are published over the next few years) will be decided later this year. (See below for details of contents)

New Office: Arrangements have been made with Dr Nick Edgar, E.O. of Landcare Trust, to occupy one of their offices in the Landcare Research building in Hamilton. This will mean changes of address and telephone numbers for the Trust and these will be advised as soon as they are known.

New Executive Officer: The new Executive Officer will take over the E.O. role from Ian Barton at the beginning of April; Ian continuing as Chairman of the Trust.

Publication costs have not changed since the Trust began. With the event of higher GST charges, and to recover all of our costs, the charge to members of the network group for most Trust publications will be \$15.00; for non members it will be \$20.00. See Trust website for full list and postage charges etc

The website has been considerably upgraded and new additions continue to be made. Take a look at www.tanestrees.org.nz.

The new Subscription Rates, which will come into effect from 1 April 2011, are to be as follows:-

- \$45 Basic supporter
- \$95 Totara supporter for Family and non profit organisations
- \$250 Kauri supporter for Major supporters (corporates and Councils)

These are all inclusive of GST for the \$45 basic subscription. Amounts over \$45 are treated as donations to the work of the Trust. Subscription accounts will be sent out with the May newsletter.

This increase is the first since 2003; since then inflation has increased costs by 25% and GST has increased to 15%. Our costs (excluding those involved with projects) cannot now be covered by the old subscription rate and the increase is necessary to maintain Trust operations at the current level.

PROJECTS:

Sustainable Farming Fund. Fieldwork for the Beech Bulletin is complete except for a few sites on the West Coast — yet to be visited — and participation in a beech workshop at the School of Forestry during March. Work on producing the final draft is well advanced. We have applied to the Lotteries Board for extra funding to complete the publication process which is due for completion by the end of June.

Work on the Indigenous Plantation Survey is also well advanced with a small amount of field work still to be done in the Waikato and Auckland regions. This project is also due for completion by the 30 June.

New SFF Projects: The Trust is applying in February seeking funding for two projects. One is to undertake a scoping study into the preparation of a business case for indigenous forestry and the other to carry out thinning trials in kauri planted in the southern Hunua Ranges in the 1970's. Both are in the under \$25,000 project category.

Lake Taupo Protection Trust: A second year of trials, funded by the L.T.P.T, has been established and we now have two trial sites - Waihaha and Kawakawa Bay - on the west and northwest sides of the lake. Internal reports have been produced but the results to date are not comprehensive enough to warrant publication. The possibility of a workshop held in conjunction with this work is being considered.

Northland Field Days and the ANZIF Conference: Tāne's Tree Trust and the Northern Totara Working Group are joining with other groups on a stand at this year's Northland Field Days to be held 3 - 5 March 2011 at State Highway 14 approximately 1 km east Dargaville. We look forward to seeing many of you there.

The Trust is also joining with the Northern Totara Working Group to have a stand and present a joint paper at this year's Australia and New Zealand Institutes of Forestry (ANZIF) Conference to be held in Auckland, 2nd to 5th May 2011. Go to <http://www.anzifconference.co.nz/> for more information.

Future Workshops: A workshop is being planned for the West Coast. It will probably be held over a weekend about mid May and time and place will be advised to local Trust network members as soon as details are complete. Anyone else wishing to attend should contact Ian Barton at ibtrees@wc.net.nz. The programme will include visits to a sawmill and local forests, as well as presentations by the Trust.

NETWORK GROUP

The number of members is 271 with Corporate members numbering 24. It is intended that the Trust will review the membership conditions and benefits later this year in order to make them more explicit and meaningful.

STRATEGIC PLAN

The Strategic Plan sets 22 targets to be achieved over the three year period, 2010 - 2013. At Feb 2011 18% of the targets had been achieved, 50% were underway, 9% are stalled and 23% had not started—some not being required until the end of the plan period—the 31 March 2013.

INFORMATION TRANSFER

Newsletter: Newsletters continue to be put out every four months. When the new Executive Office begins it is intended that she will produce the bulk of the newsletter material with a Trustee acting as supervising editor.

Bulletins and Handbooks: The Conference Proceedings and part one of the Planting and Managing Native Trees handbook are due to come out in the next two months and the Beech Bulletin will probably be available by the end of the year.

FUNDRAISING

With the appointment of the new Executive Officer it is expected that a major fund raising effort will begin. Details will come out in the newsletters as projects are determined.



PREPARATIONS FOR THE INTERNATIONAL YEAR OF FORESTS 2011

New Zealand values the role of forests and supports the UN Year of the Forests in 2011. With so many aspects to celebrate and raise awareness of, planning is still under development. Tāne's Tree Trust has been in touch with the NZ organizers and we hope to be involved in any way which will increase people's awareness of our indigenous forests.

For further information as it comes to hand please see <http://www.un.org/en/events/iyof2011/index.shtml>

CONTENTS OF STAGE ONE OF HANDBOOK

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Foreword

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1.1 Why do we need a Handbook?

1.2 How to use this Handbook

1.3 Introducing Tāne's Tree Trust

2. Objectives for establishing natives

2.1 Objectives and strategies for planting

2.2 Options for establishing native trees

3. Cultural and historical perspective on planting native trees

3.1 Nga Taonga o te Wao Nui a Tāne – a cultural perspective

3.2 Native forests – an historical perspective

4. Requirements for establishing native trees

4.1 Physiological factors – trees and environment

4.2 Lessons from nature – using ecology to help grow native trees

5. Seed and propagation of natives

5.1 Seeding of natives (Available later 2011)

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6.1 Key factors in site selection

6.2 Sites for planting native trees

7. Site preparation

7.1 Planting – getting started

7.2 Livestock and pest management

7.3 Preparing grass sites for planting – herbicides

7.4 Preparing gorse, broom, blackberry sites for planting natives

8. Planting and maintenance of natives

8.1 Planting techniques for natives

8.2 Planting patterns and density

8.3 Maintenance (Available later 2011)

9. Planting and managing natives in riparian areas

9.1 Riparian margins – an introduction

9.2 Riparian planting for sediment, nutrient and pathogen management

9.3 Riparian planting for aquatic and terrestrial biodiversity

9.4 Riparian planting for native timber and multiple purposes

9.5 What is it with willows? What is the way to tame them?

Also due out toward the end of 2011 will be two or three sections on continuous cover forestry and four sections relating to the current SFF project on the indigenous forest survey results.

STUDY TOUR 2011 – EUROPEAN SUSTAINABLE FORESTRY

The study tour in August – September, to look into the latest ideas in sustainable forestry, is now in the final stages of planning and, providing reasonable quotations are received, details will be finalized very soon. At this stage the proposal is for three weeks and visits will be made to forests in California, Germany, Italy and the UK.

There are still a few places available if you are interested (no commitment required at this stage). Please contact Mark Dean at mark@naturallynative.co.nz or telephone him at 07 543 1494 or 021 942 339

CONTINUOUS COVER FORESTRY – THE START OF THE PROCESS *by Ian Barton*

INTRODUCTION:

Compartment 3 of Amakiwi Forest, located in north Waikato, has been undergoing the process of conversion from exotic plantation to Continuous Cover since 2003. An area of 0.545 hectares (3/1a - Fig 1) in the compartment was set aside in 2008 as a trial area to test the concept of building the forest around dominant trees selected as "Frame Trees". This initial report covers progress over the first few years.

Block 3/1a was originally planted with exotic species, has patches of native bush on the west and south sides and exotic forest on the other two. The bush (6.5 ha.) is classed as mixed broadleaf / conifer forest and had been heavily grazed by sheep, cattle, goats and possums prior to the establishment of Amakiwi in 1989. Since then, following the removal of animals, the bush has recovered and in 2008 contained seedling regeneration of eight indigenous tree species, especially kahikatea and kohekohe. The removal of animals also allowed bird numbers to increase. Although no counts are available, tui and kereru are very common in the area and will be the main agents of seed distribution.

PLANTING AND SILVICULTURE OF THE ORIGINAL EXOTICS:

Originally planted in 1989, block 3/1a, consisted of a 50/50 mixture of *Acacia melanoxylon* (blackwood) and *Eucalyptus saligna*. These species grew well but tended to be very branchy. In 1993, to try and reduce wind exposure, a double row of *Cupressus ovensii* was planted in available gaps up the east edge. The blackwood and *E saligna*, were thinned in 1995; the stumps coppicing vigorously. In 1997 any gaps were interplanted with a mixture of *Cupressus lusitanica* and *C ovensii*. Thereafter these trees, and any good coppice material, were pruned as required, and further thinned. The 48

TĀNE'S TREE TRUST CALENDAR FOR 2012

The Trustees have resolved to provide the initial funding for this by guaranteeing to buy 15 copies each. The calendar is expected to be A3 size, contain a great deal of useful information and be printed on high quality paper. A sample page will be printed in the May newsletter and orders will be sought then from Trust network members and others so that print numbers can be determined by the time the calendar goes to print next June.

frame trees were selected in 2008 and their positions plotted on the plan (Fig 1). Measurements of frame trees have been done from 2008 and counts of regeneration from 2010.

The stocking of exotics in 1989 was 1100 stems per hectare, increased by later planting of Cypress species to 1400 per hectare. This has decreased by subsequent mortality and thinning to 661 stems per hectare. (Table 1).

TABLE 1 BLOCK 3/1A TALLY OF TREES SAPLING SIZE AND ABOVE

SPECIES	Frame trees	Other Dominants	Sub-dominants	Saplings & suppressed	TOTALS (stems/ ha.)
Acacia melanoxylon	13	29	147	160	349
Eucalyptus saligna	16	5	7	4	33
x Cupressus ovensii	35	44	48	6	132
Cupressus lusitanica	24	29	79	15	123
TOTALS	88	107	281	185	661

Most of the native tree species in the native bush have seed which is bird distributed and, following the near exclusion of competing animals, it was noticed that regeneration of indigenous seedlings was beginning in the adjacent exotic area. In October-December 2010 regenerating native seedlings were counted in a 6 metre diameter circle around each of the 48 frame trees. Table 2 shows that the two Cypresses are surrounded by equal numbers of regenerating seedlings, about 3,150 per hectare, while the E saligna has 5,300 and the blackwood 7,530. These numbers suggest that the Cypresses, being similar in shape and branch habit, provide similar perching opportunities. The two broadleaves having more open branching systems, probably provide better perches.

TABLE 2 REGENERATION OCCURRING WITHIN THREE METRES OF FRAME TREES

		INDIGENOUS REGENERATION UNDER EXOTIC DOMINANTS (stems per ha.)			
Frame Tree Species		Acacia melanoxylon	Cupressus lusitanica	Eucalyptus saligna	x Cupressus ovensii
Indigenous Regeneration					
Kohekohe	Dysoxylum spectabile	103	219	78	74
Tawa	Beilschmiedia tawa	251	53	276	92
Rewarewa	Knightia excelsa	1568	354	0	205
Taraire	Beilschmiedia taraire	0	273	0	0
Mangeao	Litsea calicaris	2227	28	2910	988
Pukatea	Laurelia novea-zelandiae	202	0	0	0
Puriri	Vitex lucens	50	0	0	18
Swamp maire	Eugenia maire	0	0	39	0
Kahikatea	Dacrycarpus dacryioides		28	106	35
TOTAL TIMBER SPECIES		4400	956	3409	1412
Pigeonwood	Hedycarya arborea	1416	818	1614	949
Mahoe	Melicoryza ramiflorus	605	464	117	428
Putaputaweta	Carpodetus serratus	0	53	39	39
Wineberry	Aristotelia serrata	50	135	0	131
Patete	Schefflera digitata	0	0	0	18
Mapou	Myrsine australis	103	0	39	18
Karamu	Coprosma lucida	404	81	78	39
Hangehange	Geniostoma ligustrifolium	50	81	0	39
Nikau	Rhopalostylis sapida	152	598	0	57
Kawakawa	Macropiper excelsum	50	0	0	0
TOTAL NON-TIMBER SPECIES		2828	2230	1887	1717
TOTAL ALL SPECIES		7229	3186	5296	3129
NUMBER OF PLOTS FOR EACH FRAME TREE		7	13	9	19

Note: Because the regenerating seedling count is taken around dominant trees it may be biased and too high, especially for mangeao, but this should not affect the basic findings of this report.

The correlation of distance from the bush edge to individual frame trees with the number of all indigenous seedlings around each tree, is shown in table 3. This demonstrates that seedling number decreases as distance to bush increases but may be influenced by the varying mean distance for each frame tree species from the bush. However other factors

could also be involved; eg the larger, taller crowns of the E saligna may be more attractive to birds.

TABLE 3 CORRELATION OF DISTANCE FROM FRAME TREES TO THE BUSH EDGE WITH THE NUMBER OF ALL INDIGENOUS SEEDLINGS

Species	Correlation	Seedling No. per plot	Mean distance to bush (m)
Acacia melanoxylon	-0.7267	20.43	14.9
Eucalyptus saligna	-0.5432	15.0	42.9
Cupressus lusitanica	-0.3673	9.0	21.3
x Cupressus ovensii	-0.2507	8.84	31.5

CONCLUSIONS:

Several conclusions can be drawn from this small study.

- The mixture of exotic species in the continuous cover trial provides a suitable habitat for regenerating indigenous seedlings
- No seedlings of the exotic species have appeared. However blackwood is regenerating by coppice and C ovensii is sterile. C lusitanica, E saligna and possibly blackwood are capable of regenerating from seed but may not be because light levels are still too low.
- Blackwood and Eucalyptus appear to provide better sites for dispersal of indigenous seed than the Cypresses -probably because they make better perches.
- Keeping animals under control is essential for obtaining regeneration.
- It may be possible to eventually return this stand to indigenous forest.

FURTHER WORK:

At present the seedlings are all very small and many may not survive. However there are sufficient present to form the basis of the next cohort of trees. A more detailed study, proposed for two years time, will more accurately determine the stocking of indigenous seedlings which have become established.



A. Kahikatea seedling



B. View into stand looking S.E.

