

7. SPECIAL-PURPOSE SPECIES

Pinus radiata dominates exotic forestry in New Zealand, increasingly so since the State has sold its forests to large corporations. Speed of growth and the surety of a good return on investment for shareholders are all-important, with production of a basic commodity that can be used in so many ways from furniture to paper.

Most farm foresters planting trees on a reasonable scale have their *P. radiata* woodlot as part of the farming business, but once interested they almost invariably want to plant other sorts of trees for different reasons. Not having shareholders to answer to, they can plant what they think will beautify their property, produce a valuable final crop maybe, and gain satisfaction from watching attractive trees grow into a possible asset for their children.

While a large number of species are grown on New Zealand farms, this section will largely refer to the trees decided on at a seminar conducted by the NZ Forest Service, with results published in September 1981. At this seminar, the Forest Service set out an objective of establishing sufficient area in the named species to produce 600 000 m³ roundwood per annum (the estimated demand), plus at least an equivalent volume as an insurance factor with export potential. The Forest Service thought much of this area would be planted privately, and would approve grants for the establishment of such species if soils and conditions were deemed suitable. The Service would itself plant sufficient areas to make up any shortfall as shown up in 5-yearly reviews.

Such a programme clearly has a long time frame, and so the winding up of the Grant Scheme in 1984 and of the Forest Service in 1987 had hardly allowed a start to be made.

On a positive note, the Forest Research Institute had instigated trials and measurements over many years, and worked in very well with farm foresters who had already planted. In recent years as research funds from Government have dried up it has been increasingly difficult to keep up this work, but some contestable funds are available and the Association contributes what it can afford. It has also set up



Mike Smith cutting useful high-quality timber from a windthrown *Cupressus macrocarpa*.

action groups for several of these species, groups which in turn attract research assistance.

The species covered at the 1981 seminar were:

Acacia melanoxylon

Cupressus macrocarpa, *C. lusitanica* (plus hybrid cypresses).

Eucalyptus botryoides, *E. delegatensis*, *E. fastigata*,

E. regnans, and *E. saligna*. This list of eucalypts has been

added to or amended because of pests and diseases, and with increased knowledge of sawmilling techniques and end-uses.

Juglans nigra.

In addition, the following will be considered here:

Paulownia species.

Pseudotsuga menziesii (not included at the seminar as it was already widely planted).

Populus species.

Minor species.

Indigenous species, mainly those managed for timber production.

Acacia melanoxylon

Recognised as one of the world's best furniture timbers, *Acacia melanoxylon* (or commonly Australian blackwood, Tasmanian blackwood, or just blackwood) grows naturally from Tasmania to Queensland but reaches its maximum size in north-western Tasmania and in the Otway Ranges of coastal Victoria in moist soils with a rainfall of up to 1500 mm.

Because of its rich brown colour and attractive grain it has been widely utilised and only a small annual cut is now available. Other countries including South Africa and New Zealand have attempted to grow it, and many farm foresters have been tempted to try a small plantation.

The earliest recorded tree growing in New Zealand was at Taita in 1896, but the Forest Service planted some 71 acres (29 ha) at Whakarewarewa Forest between 1903 and 1908.

Hew McKellar of Feilding wrote in *FF* 20/2 May 1978 of two small areas planted on his farm in 1962. He found it

to be unthrifty as an understorey tree, yet needing competition to draw the trees up for quality timber.

Neil Barr followed in *FF* 21/1 February 1979, suggesting a practice of cutting poor-form blackwood to the ground, and allowing vigorous straight suckers from roots or stumps to grow up rapidly—much easier to prune and manage. Neil referred to a FRI survey of blackwood which showed that form and growth were influenced by shelter, that seed source was important, and that competition was needed in early years. Neil also spoke about Frank Bartlett's old trees at Silverdale (planted by Frank's father). Although not ideal in form, these trees provided much fine furniture timber cut on Ken Bartlett's mill.

Maurice Williamson, NZ Forest Service Kaikohe, wrote in *TG* 7/4 November 1986 of Forest Service experience with blackwood in Northland, from an early trial in Waipoua Forest planted in 1937, to more extensive plantings in Waitangi and Glenbervie Forests. Generally, planting was close at 1.5 × 1.5 m, often with competing species such as *Pinus palustris* or *P. radiata*, or naturally growing kanuka. Considerable effort was taken in wet sites to drain and mound so that trees were planted well above the water table. Frequent pruning and thinning had been necessary, and growth was generally slow. Average dbh in the Waipoua stand was 34 cm at 48 years.

Dudley Franklin from FRI Rangiora, wrote of the frost-hardiness of blackwood in *TG* 8/3 August 1987. He showed that seed origin clearly played an important role in determining frost-hardiness in blackwood in the South Island trials.

The *Acacia Melanoxylon* Interest Group Organisation, AMIGO, was set up by the Lower North Association in 1989, and has had an increasingly important role in drawing together those who have planted the species and the researchers.

The first seminar of AMIGO was held in Warkworth in November 1989, attracting over 110 participants from Taupo to the Far North branches.

FRI personnel Ian Nicholas, Tony Shelbourne, and Ham Gifford told of the current state of knowledge of management of the tree, with a field day at Mike Malloy's 1977 planting and a discussion on end-use by John Mortimer who was endeavouring to supply the local demand with any mature trees he could find.

Establishment was generally through the use of bare-root seedlings, well wrenched and carefully handled, although an increasing number of nurseries were using "rootainers" producing small container-grown stock.

Seed source was known to be important, but it was too soon to give known provenances. Cultivation of the planting site and good weed control led to rapid early growth, and a measured dose of superphosphate (150 g/tree) had been shown to be the key element in fertiliser requirements. Ian Barton, with FRI had tried 11 fertiliser combinations on the blackwood stand at Hunua (Auckland Regional Authority forest), with phosphate clearly the important ingredient.

Pruning methods were discussed, with annual form pruning for stem straightness together with the removal of any branches over 30 mm in diameter recommended.

The best ways of obtaining a straight stem were by interplanting in light wells or lanes in existing scrub (the higher the better), by planting alternate rows in a different species to be later removed providing this species grew faster than blackwood, or by planting a pure stand and working very hard on frequent pruning and leader correction. All stands should be finally thinned to about 100 stems/ha.

The seminar concluded with a visit to Mike Malloy's forest to see his blackwoods planted at 3.8×2.3 m, with alternate rows being *Eucalyptus saligna*. Mike's tending programme had been:

- 1981 First pruning lift on blackwood: some eucalypts removed.
- 1983 Second pruning lift on blackwood: some eucalypts removed.
- 1987 Final pruning lift to 6 m: some eucalypts removed.
- 1988 Final eucalypts removed and blackwood stocking reduced by 20 stems/ha.

Ian Nicholas commented that this was an excellent plantation due to well-applied pruning and gradual removal of the nurse trees.

AMIGO news in February 1991 referred to the need to establish a seed orchard of superior blackwood from selected FRI genetic material, and the need to find a suitable site.

TG 12/3 August 1991 referred to field trips at the 1991 Whangarei National Conference where delegates visited Joll Hosking's attempt at growing blackwood as an agroforestry crop. Ian Nicholas and Ham Gifford showed comparative figures for the type of establishment and the subsequent growth of trees grown at Hosking's, Bill Crum's, and Mike Malloy's plantations. All had a degree of success by intensive work in different ways.

In 1993, the annual conference visited Malcolm Mackenzie's blackwood plantation north of Te Kuiti. Malcolm had planted 1100 stems/ha in 1985 and had now thinned to 120. He was concerned with the heavy branching and the work involved, saying he thought it would be necessary to get six times the price of *P. radiata* to make it economic.

Ian Brown began planting blackwood near Kaitaia in 1979, and more recently on a larger scale on Mt Pirongia in the Waikato. Ian has written extensively of methods that he has developed for managing blackwood, in *TG 14/3* August 1993, *TG 16/1* February 1995, and *TG 18/1* February 1997. Ian has brought a scientific approach to his observations of blackwood growth, particularly their natural lack of apical dominance and the resultant difficulty in growing a straight stem.

Briefly, Ian Brown has shown that where a tree leader is weak or aborted and being overtaken by lower ascending laterals, removal of the old leader at its junction with a chosen successor will cause the secondary branch to achieve a vertical alignment very quickly. This is done in summer, usually twice, in late November and February. An insecticide spray over the growing tip will help control psyllids and aphids, promoting growth—this is impractical after the first 2 years.



Joll Hosking's blackwood agroforestry.



Ian Brown with his 10-year-old open-grown blackwood.

Vigorous branches below the new leader are headed back about one-third of their length to slow growth or are removed.

With this operation, in good conditions, a straight tree of 6 m will be achieved in about 4 years, after which normal stem pruning can be carried out over several years when the diameter is about 10 cm.

Ian Brown suggests planting in groups of three or four trees at 8-m centres, gradually thinning to one by year 8.

The effects of psyllids and leaf miners on blackwood were considered by Clive Appleton and Patrick Walsh of FRI in *TG 18/1* February 1997.

Wade Cornell looked at a different approach to the growth of good blackwood timber, and in *TG 15/3* August 1994 outlined his thoughts on the need to produce a uniform coloured timber, with selection also for drying characteristics and density. Wade considered that clonal forestry was the way to achieve all the good characteristics of the timber while appreciating the ongoing need to concentrate on good silviculture.

From a selection of 20 000 trees over 12 years old, Wade Cornell took core samples from those exhibiting the best form and vigour so that colour could be assessed. Only those trees were judged as outstanding enough to warrant cloning. Root cuttings were established from these trees and it was hoped to bulk these up for sale within 2 years.

Wade Cornell followed this in *TG 18/3* August 1997 by announcing that small numbers of a clone named Te Awa Awa 6 would be available in 1997 and 1998, and that this was one of only two trees selected for cloning out of 50 000 evaluated.

Ian Nicholas responded to this second article by saying that earlier clonal trials at FRI had shown considerable variation and unimpressive form when planted out. He considered more time was needed to evaluate clonal selections over a range of sites, and warned prospective buyers of the advertised clone.

Both authors carried on the debate in *TG 18/4* November 1997, with a degree of heat! The results of a few years' growth of clonal material on different sites will be awaited with interest.

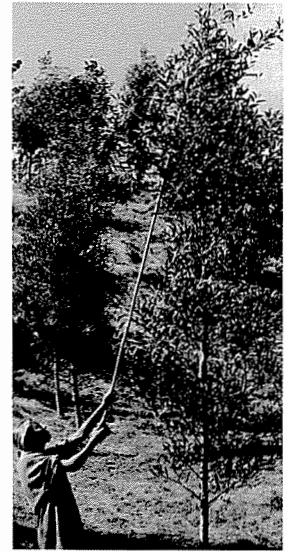
TG 17/2 May 1996 contained an article by Roger Gale and Richard Ward discussing crown control in older blackwood. Large acute-angled branches can break in storms, opening large wounds. Complete pruning of large branches can leave very large scars which are slow to occlude, allowing the entry of insects and fungi. Pruning these branches by shortening them stops heavy competing growth, but prevents the wounds. The trouble, of course, is getting high up in the tree to do the job!

Researchers Ian Power, Bruce Thorrold, Megan Balks, Mike Dodd, and Ian Nicholas wrote in *TG 19/4* November 1998 of the effects of blackwood on pasture under the trees. They showed that the nitrogen-fixing effect of the trees maintains pasture growth, leading to more grazing than for equivalent age *P. radiata*, and so blackwood can be considered to be a useful agroforestry tree.

AMIGO has continued by holding one main meeting each year—1995 in Rotorua looking at FRI trials with discussions on pruning and marketing. John Mortimer and Eric Williams, with extensive experience in milling blackwood, wanted large-diameter logs, the fatter the better, preferably 5–6 m long but 3 m was acceptable.

Other meetings have been held at Ian Brown's Mt Pirongia property to see Ian and his family demonstrate their pruning techniques. In 1997, the group visited the Auckland Regional Council forest at Hunua where Ian Barton described extensive planting of blackwoods in the 1960s. His conclusions were that early thinning to final crop stocking is necessary to keep crop trees growing vigorously, and that interplanting in high scrub gave excellent results.

In 1998, the AMIGO group visited Mt Maunganui where a furniture factory specialising in solid wood products exhibited some fine blackwood dining suites. A visit was also made to Shirley and the late Geoff Chavasse's forest at Te Puke.



Two-and-a-half-year-old blackwoods, planted in groups of three without a nurse crop. The system demonstrated here allows leader training to height 5 m.

The Cypresses

It is strange that two trees with a very limited geographic range in Monterey, California, should grow so well over so much of New Zealand, yet *Cupressus macrocarpa*, with *Pinus radiata*, has been very widely planted by New Zealand farmers. *Cupressus macrocarpa*, along with *C. lusitanica* from Mexico, and the intergeneric hybrid \times *Cupressocyparis leylandii* (*Chamaecyparis nootkatensis* \times *Cupressus macrocarpa*) are used extensively for shelter and timber throughout much of the country.

Records show that macrocarpa was planted at Mt Peel Station, South Canterbury, by J.B.A. Acland in 1864–65, in 1866 at Mt Eden in Auckland, and in 1867 at Wanganui. Seed was imported from San Francisco to Dunedin in 1869.

Larger-scale planting was carried out by the Selwyn Plantation Board in 1883, at Raincliff Forest in 1890, and in State forests in Rotorua since about 1905.

The resistance to wind, particularly salt-laden winds near the coast, has been an important reason for planting macrocarpa, but in more recent years lusitanica, away from the coast and in the North Island, has been favoured. Both have timber with very similar characteristics. The Leyland cypresses, several clones, have been used mostly as farm and orchard shelter, while some other species such as *C. arizonica* and *C. torulosa* have been tried in drier regions such as Canterbury.

Chamaecyparis lawsoniana has been extensively planted as a forest tree and as farm shelter since its introduction in the 1860s, growing well in higher rainfall areas but prone to cypress canker particularly in the Waikato. It is rarely planted today.

Forestry consultant, John Groome, wrote a controversial article in *FF* 2/2 May 1960 headed “A Species of No Value to Farm Foresters”. He wrote of the variation from seed, the losses when planting bare-root seedlings with the resultant need to “blank”, and of the need for close spacing to achieve a good bole, usually 1000 stems per acre (2400 stems/ha). This meant a heavy thinning to keep a green crown and good growth, with the thinnings not being easy to treat as posts.

John Groome said pruning was arduous and expensive, and most home-grown timber would be suitable only for gates or boxing. Shelter trees of macrocarpa were prone to windthrow causing damage to fences, while the shaded strip under the trees used a great deal of land and the removal and replacement of the belt could be very expensive.

In the following journal, *FF* 2/3 August 1960, Dick Beauchamp from Canterbury said that by using box-grown seedlings of a fine-branched type, excellent trimmed shelter could be attained, while posts lasted well in the ground without treatment. Fred Faulkner of Gisborne said that with treatment, macrocarpa was at the very top of the list as a timber for use on areas where it grows well. He said eucalypts were too heavy for hill country work, and did not last as well as treated (creosote) macrocarpa. He also recommended tray-grown seedlings to avoid losses on planting.

Gerald Hocking in *FF* 2/4 November 1960, said that John Groome must have written tongue in cheek, and should not be taken seriously. Gerald said that macrocarpa produced a timber of unusual value, with even texture, good working properties, high dimensional stability, and natural durability. He also said that, with adequate wrenching, large bare-root seedlings could be transplanted safely.

Dick Beauchamp, in *FF* 6/2 May 1964, drew attention to two distinct types of macrocarpa—an inferior form with long heavy branches and a dense bushy small-branched tree common around Christchurch and originally grown by Jack Humm of Nairns. He hoped the Forest Service would collect seed from this well-formed tree.

Gerald Hocking in the following issue of *FF* described similar narrow dense types of macrocarpa from Hawke's Bay, New Plymouth, and particularly Wanganui where they were grown for years at Benefield's Nursery at Aramoho.

The 1969 National Conference visited Fred Faulkner's property to inspect his macrocarpa among other trees. He described in *FF* 18/3 September 1976 how these trees had produced no waste—all thinnings had been treated by cold-soak creosote to give posts of satisfactory durability. The final crop was milled mostly for a neighbour's woolshed and

yards. Fred considered his costs and, compared to bought timber, reckoned on having timber for about half price.

Geoff Stanton, forester with the Wellington Water Board, wrote in *FF* 20/3 August 1978 of a small block of macrocarpa resulting from a neglected nursery some 37 years earlier at Hukinga plantation in Upper Hutt. Many posts, poles, and rails were taken out of this dense stand during this time but it finally had to be cleared, with 87 m³ logs coming from 0.133 ha, or 640 m³/ha. Because of the tight planting, knot size was small, and heartwood was out to within 25 mm of the bark. Some of the timber was to be used for interior lining, and some sold for furniture.

Geoff considered the value of macrocarpa was as a replacement for disappearing native species.

Many articles from 1968 onwards have discussed the Leyland cypress, *×Cupressocyparis leylandii*, and later *×Cupressocyparis ovensii*, a cross between *Cupressus lusitanica* and *Chamaecyparis nootkatensis*. Almost all of these articles were in reference to growing the trees for shelter, and are considered in the shelter section. Many farmers have planted a few in mixture with macrocarpa and *lusitanica* as the timber is similar. As with macrocarpa, cypress canker can be a problem in moist fertile soils, possibly aggravated by pruning, so it will be a few years before the speed of growth exhibited by these hybrids will show any advantage over the main species, particularly now that vegetative propagation of superior forms of macrocarpa and *lusitanica* is becoming more common.



Part of Will Hull's 52-year-old high-pruned macrocarpa plantation.

A particularly valuable review of what can be achieved with macrocarpa was written by Jim Park and April Smith of FRI in *TG* 8/4 November 1987. This started with a short history of Forest Service plantings of macrocarpa, with notes on the increasing recognition of its fine timber, comparing it to kauri for boat building.

The paper then considered the sale and milling of the late Will Hull's 52-year-old macrocarpa plantation. The result of Mr Hull's pruning of *P. radiata* is considered elsewhere, but the macrocarpa were grown at the same time, planted about 1933, and very carefully tended. Pruning was done with a

sharp hatchet, most to a height of at least 6 m but more than half to heights of between 10 and 12 m.

Pruning was completed by age 20 and, as milling studies revealed, was done with extreme care so that the knotty core was an almost uniform column of about 240 mm after occlusion.

The stand had been thinned to 450 stems/ha with almost no edge effect, due to the fact that it had been surrounded by pines and eucalypts for the first 35 years. The woodlot contained 140 trees averaging 56 cm dbh.

For the sawing study, 15 trees were taken to give a representative sample of size and also to give a fair sample of fluting and stem form. Conversion ranged from 68% for two large round logs down to 35% on a small misshapen top log.



The biggest macrocarpa log in the sawing study—83% of the timber from this log was in Clears Grades.

Because of the high pruning, most branches were still green, but some dead branches gave an average 13-mm bark-encased knot size which was responsible for one-third of all degrade.

Butt logs averaged 81% heartwood, and all logs combined 76%. FRI researchers had sampled heartwood in 14 other macrocarpa stands, but Hull's trees were clearly superior because of their age.

From this plantation, FRI concluded that to create a good stand of macrocarpa, a high initial stocking was required to allow for removal of heavily fluted trees, and trees affected by canker.

Late final thinning at about age 20 ensured branch size was controlled. Probably a heavier final thinning down to

300 stems/ha would allow for removal of more poor-form trees, keeping green crown and increasing growth of remaining trees.

FRI took the opportunity to test the market for the timber by showing colour photos and timber samples to end users for comment. All were impressed and bemoaned the fact that such grades were not readily available. None had seen such attractive full length clears.

Denis Hocking, in *TG 9/1* February 1988, commented on the value of the FRI study of Hull's trees. While agreeing with much of the detail, he thought thinning at age 20 much too late. "To suppress butt logs in order to upgrade top logs of dubious value is strictly for economic/silvicultural masochists. Dressing grade macrocarpa is worth less than half clearwood values. In addition, short squat trees should be more wind firm."

Both Denis and Hew McKellar refuted the FRI notion that cypress canker becomes less of a problem with age. FRI replied that canker varies in different parts of New Zealand, worse in wetter western areas and in shelterbelts, but little problem in plantations, and the risk did reduce with age.

Most farmers with macrocarpa growing consider it a cause of abortion in cattle, with most problems following storms when cows eat wilted material from broken branches. Veterinarians have been unable to isolate a particular substance responsible for this problem, but farmers are advised to fence off likely danger areas or to keep in-calf cows away from any cypresses in stormy weather.

Following a remit to the AGM at the 1987 National Conference in Masterton, an action group was set up in Canterbury to study research and promotion of the cypresses. The group consisted of Peter Smail, Pat Cotter, Dudley Franklin, and Dugald Rutherford. They initially decided on three main thrusts—silvicultural options, improved genetics, and utilisation.

There was talk of establishing an action group in Hawke's Bay in 1989. As interest in the cypresses tended to be regional, it was difficult to form a national group.

Dudley Franklin, in *TG 9/3* August 1988, discussed pruning young macrocarpa at a field day in North Canterbury. He advocated frequent pruning, at least annually, removing branches over 2.5 cm in diameter but not too many at once—no more than 10 per tree. Any other large branches should be shortened to stop them growing.

He recommended clear pruning when stem was 10 cm in diameter, but not above the 10 cm level, or higher branches would rapidly increase in size, and the tree would be more susceptible to canker; thinning to 600 stems/ha when 3 m high, and 300 stems/ha when 6 to 8 m high, leaving crop trees no closer than 4 m.

Dudley Franklin wrote further in *TG 11/4* November 1990 of establishing trials of macrocarpa and lusitanica families from original Californian material, and from outstanding trees from within New Zealand. In 1985, 4000 trees were established at Strathallan and Gwavas Forests, and a 12-ha block at Mahinapua Forest. These were assessed in 1990, with cuttings being taken of the best form trees, even though at age 6 it was expected that propagation would be difficult. If cuttings did root, it was expected to be easier to take cuttings from these with greater success.

Peter Bolton from Proseed was to graft some of these superior forms on to seedlings in the hope of establishing a seed orchard.

A novel method of preventing sheep from damaging young macrocarpa stems was employed by Peter Smail. Branches in the bottom metre of the stem were cut back close to the stem and allowed to coppice. The result was a "poodle cut", a cluster of coppice shoots that kept sheep clear of the stem. Delegates to the 1990 Canterbury conference visited this plantation.

Neil Barr wrote of his thoughts on vegetative propagation of macrocarpa, lusitanica, and in-between hybrids in *TG 12/3* August 1991. He commended FRI for the work being done on the pure species, but also advocated rooting cuttings from good-form hybrids.

Denis Hocking in the same issue, noted that Don Tantrum of Taihape in his farm forestry nursery was rooting cuttings



Ten-year-old macrocarpa grown from cuttings taken from a 44-year-old plus-tree selected in Ashley Forest.



The "poodle cut" on these trees protects the lower trunk from browsing.

from locally superior form cypresses, unfortunately fairly expensive at \$3–\$4 each due to low rooting percentage.

Neil announced in *TG 12/4* November 1991 that the Farm Forestry Foundation was making a grant of \$2000 towards a grade and volume study of 27-year-old macrocarpa at Lismore Forest, and \$3000 to Mike Menzies of FRI, Rotorua, for further work on vegetative propagation.

Ian Stringer in *TG 14/3* August 1993 gave his experience in tending lusitanica, agreeing with earlier recommendations of Dudley Franklin—Do not prune too heavily or too early, keeping a minimum 10-cm bole before pruning.

TG 15/4 November 1994 contained the first of the Cypress Pages, in this issue a summary of all the well-known species from around the world with a word on their New Zealand performance. Contributed by FRI Rangiora, this was just one of many articles from FRI of help to farm foresters.

In the same issue of *TG*, Jacqui Aimers-Halliday, John Miller, and Tony Shelbourne from FRI, Rotorua, discussed both macrocarpa and lusitanica with their hybrids, explaining the current breeding programme, vegetative propagation, and the plans for a seed orchard.

Dudley Franklin continued with the Cypress Page in most issues of *TG*, giving general information on many aspects of their growth, or specific information such as the Leylands in *TG 16/2* May 1995 where this hybrid was discussed from a timber production point of view.

Ian Barton, in *TG 16/4* November 1995, gave the results of a trial he had conducted near Glen Murray in South Auckland, where experience had shown windthrow problems with lusitanica and Leyland cypress in about their third year. By “sail pruning”, that is by reducing the branches by pruning and tipping in various ways, he was able to increase the number of stems that had a lean of less than 10%.

Also in *TG 16/4*, Dudley Franklin gave a detailed account of the cypress canker problem, the causative organisms, and the species most likely to be affected. He said that canker is often worse in young trees subject to drought

stress, or in heavily pruned trees, but was also prevalent in good soils with high nitrogen content. He recommended planting *lusitanica* rather than *macrocarpa* if canker was common in the area.

The Cypress Page in *TG 17/1* February 1996 gave useful information on the establishment of seedlings, with emphasis on handling bare-root stock and the need for weed-free planting sites with the recommended chemicals.

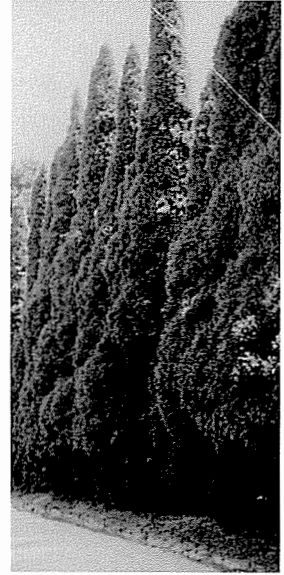
The need to concentrate on pruning large acute-angled branches was the main point in the Cypress Page *TG 17/2* May 1996.

Peter Smail described the Himalayan cypress, *C. torulosa*, in an article in *TG 18/1* February 1997. He explained how wind- and drought-resistant they were, and the excellent forms available in Australia and now in New Zealand for single-row shelter. Timber quality was reputed to be excellent, though growth slower than other cypresses.

At the Palmerston North Conference in 1997, Don Tantrum highlighted the need for cypress breeding and selection to be co-ordinated and expanded. Delegates visited Don's property at Taihape, and later Denis Hocking's property at Bulls, with discussion on forming an action committee. A committee was formed with South Island members Patrick Milne, Dugald Rutherford, Dudley Franklin, and Eoin Garden (who was currently Chairman of the Association Research Committee).

For the North Island, members were Don Tantrum, Denis Hocking, Geoff Brann, Peter Davies-Colley, and Mike Halliday. A problem with such a group was that the South Island, with research based at FRI Rangiora, concentrated mainly on *macrocarpa*, while the North Island group working more with *lusitanica* had their research based at Rotorua FRI, but interest throughout the country was clearly rising.

Eoin Garden wrote in *TG 18/4* November 1997 of initiatives Executive had taken in co-operation with FRI which resulted in two papers appearing in this same issue. Alan Somerville, FRI Rotorua, gave a history of research



Cupressus torulosa trees forming shelter of high quality. They had never been side-trimmed.

and how it was funded, together with growth modelling and market potential.

Dudley Franklin wrote a review of research on cypresses in New Zealand coming right up to date with information on using cutting-grown trees that were now on sale, and describing Patrick Milne's efforts to produce control-pollinated seed.

Dudley concluded with a suggested regime for growing macrocarpa—

- Establish 1000–1200 stems/ha (unless improved stock available).
- Low prune and thin to 800 stems/ha using a 12-cm gauge for the stem.
- Prune 400–500 stems/ha at least every 2 years using a 12-cm gauge, but also removing the six largest branches above the gauge.
- At time of last pruning, thin to 400–500 stems/ha, or 600 stems/ha if a production thinning is possible.
- If production thinning is carried out, thin to 350–400 stems/ha at age 25, aiming to clearfell at age 35. Without production thinning, leave to age 40 to maximise clearwood recovery.

The Cypress Action Group was taken a step further in 1999 at the Taranaki Conference, following a meeting at Rotorua involving Geoff Brann, Tim Rose, and Don Tantrum. National Executive approved the formation of this group to be run along similar lines to *Acacia melanoxylon*'s AMIGO.

With little interest from large commercial forests, it is satisfactory to note the joint efforts of farm foresters and FRI within the funding available. Considerable benefits should follow as the genetic improvements already noted by researchers become more widely available when commercial nurseries begin larger scale propagation.

The Genus *Eucalyptus*

With its numerous species covering a tremendous range of climatic and soil variations, together with a most interesting end-product in timber for widely different uses, the genus

Eucalyptus has excited landowners in New Zealand from early settlement.

Just before his death on 1 January 1996, Neil Barr, who had always been an enthusiast, completed his book "Growing Eucalypt Trees for Milling on New Zealand Farms". Mike Smith, with the help of experts in the field, arranged the editing and printing of this book, written very much for the farm forester.

Because of this recent publication, it would be inappropriate to repeat much of the material here, so an effort will be made to cover the development of the science (or is it art?) of growing eucalypts from journal records and elsewhere, but for an up-to-date treatise on how to do things today, the reader is referred to Neil's book.

Seed of many different species was brought to New Zealand by early missionaries or traders, with plantings recorded from the 1830s. Perhaps 120 species have been tried in New Zealand, many doing poorly as it took a long time for growers to realise that rainfall, frost tolerance, and soil types needed to be similar to the tree's natural conditions in Australia, to be sure of success.

Then it has been only in comparatively recent years that sawmilling techniques linked to log diameter and hence tree spacing or age in the woodlot, have given consistent quality to the sawn timber.

Eucalypt seedlings are more difficult to grow and transplant safely than are most conifers, and so many nursery practices have been tried.

H.A.Goudie, a former Conservator of Forests in Rotorua, supplied many seedlings to farmers in the 1920s. These were grown in trays, shallow wooden boxes where seedlings were pricked out in rows allowing a sharp knife to cut between the plants.

After World War II Fred McWhannell started a nursery in the Waikato, growing a large number of species. His trees were grown in open beds, wrenched by spade, and, about a month later, lifted, root trimmed, and tied in bundles of usually 10 which were then replanted to allow fresh roots to

form. The bundles were given a lift by hand every week or two to prevent long roots forming. For sales, the bundles were lifted, dipped in water, and packed in moist straw and hessian.

With this method, quite large 1-year trees were grown, up to 45 cm high and with a sturdy stem. If they were kept damp and planted quickly, good results were achieved with most species. Some species such as *E. pilularis* and *E. muelleriana* did not like their roots disturbed.

Fred McWhannell wrote a book “Eucalypts for NZ Farms” published by Pauls Book Arcade in Hamilton in 1960. The book described the genus in general, with information on identification, and details of how and where to grow some 150 species, with wood quality and colour also mentioned.

When FRI developed mechanical undercutting equipment, Jaap van Dorsser showed that many eucalypts could be treated like pines, providing wrenching was done frequently, and handling between nursery and planting was careful and quick.

In recent years, most nurseries have used small containers, usually tapered, with vertical ribs to prevent spiralling of roots, and with an opening at the base or side slits to allow roots to grow out into the air and wither. Only small trees are produced this way, but planting can be extended to autumn and spring if ground moisture is suitable. Murray Faulkner from Centrepont Nurseries in Albany described such techniques in *TG* 2/3 August 1981.

With good weed control, fertiliser, and control of rabbits and hares, these small trees establish and grow very rapidly.

Members soon began writing letters and articles to *Farm Forestry* and *Tree Grower* about their experiences in milling and utilising eucalypt timber.

In *FF* 1/4 August 1959, E.R.Fannin wrote of his 25-year experience operating a farm sawmill, and described how individual trees grown well away from their neighbours, gave the least trouble in milling. He described how the larger the diameter, the bigger the volume of timber free from stress

contained in the centre of the log. He also said that if good milling timber is required from plantations, trees should be thinned to obtain maximum diameter growth.

These observations, looking back 40 years from 1999, are remarkable as they are still exactly what is recommended today.

Harry Bunn completed his forestry degree in Canberra and developed an enthusiasm for eucalypts while working with Australia's Dr Max Jacobs. Harry became Director of Production Forestry Division, FRI Rotorua, and had a big influence on research in many fields, but always retained an interest in farm forestry. He wrote in *FF* 3/4 November 1961 "Eucalypts for Farm Woodlots and Shelterbelts", a paper presented to the 1961 Auckland Conference. Members were given his typical "what, where, how, and why" practical approach to growing trees, and were encouraged to think about what they wanted from the final crop, and how to think about this from the time of planting.

An important reason for eucalypts not being more widely planted in New Zealand has been the number of insect pests from Australia that have thrived in New Zealand without natural predators. The tortoise beetle, *Paropsis dilatata* (later named *P. charybdis*) was very widespread for a time, chewing leaves of such species as *E. viminalis*, *E. macarthurii*, and *E. nitens*, but is now under biological control. H.J.Kelliher's Puketutu Island forest in the Manukau Harbour was aerially sprayed with DDT in 1960, but this was clearly not a long-term option. One can imagine the shock, horror of Aucklanders today at such an action!

Other insect pests, including the leaf-mining sawfly found near Auckland Airport in 1985, and the small black wasp *Ophelimus eucalypti* which causes severe galls in the foliage of *E. botryoides* and *E. saligna* and was found in Wellington in 1988, have discouraged recent planting of these species with attractive reddish brown wood.

The general feeling among biologists is that insects such as these are going to continue to come to New Zealand either as wind-borne invaders or through our ports of entry. Biological control which keeps them in check in natural

Australian stands may slowly become available in New Zealand, but requires research and finance.

E. Y. Cutten from FRI Rotorua wrote a detailed article on "Eucalypts for Canterbury" in *FF* 6/1 February 1964. Many species were described with preferred soil types, degree of frost-hardiness, and end-use. Nursery practice, establishment, and spacing to produce good sawlogs were covered.

Ewen Bellis wrote of eucalypts growing well in the Wairarapa, mainly those planted by the late H. G. Groves and identified by Neil Barr. This appeared in *FF* 10/3 August 1968.

In the same issue, Gavin McKenzie, then Forest Extension Officer at Kaikohe, wrote of the good timber to be milled from large trees of *E. pilularis* and *E. resinifera* from Kerikeri. Material was used for durable posts as well as yards, weatherboards, and furniture.

Clive Anstey, Forest Service, Dunedin, wrote in *FF* 12/4 November 1970 about the fine stand of *E. regnans* at Waitati. J. H. Simmonds in his fine book on eucalypts published in 1927, described how the original trees at Waitati were planted about 1870, but spread following a fire in 1906 which allowed widespread natural seeding to occur. Clive Anstey listed the details of produce removed in 1969 and 1970. An interesting fact to emerge from this southern stand of *E. regnans* was that trees raised from Waitati seed were found to have poor frost-resistance inland.

Harry Bunn gave an updated version of his 1961 paper to the 1971 Whangarei Conference, which was published in *FF* 13/2 June 1971. The performance of different species in different areas of New Zealand was discussed, with an important recommendation that we should plant a lot of one or two species for clearwood and pulp, plus a little of a few other interesting species, but never plant a little of a lot of species.

Neil Barr gave a paper to the 1971 Conference which appeared in *FF* 13/3 November 1971. Neil also emphasised that only a limited number of species should be grown, and the importance of identification.

In *FF 18/1* March 1976, John Edmonds who was then an Extension Officer with the Forest Service, Dunedin, wrote of eucalypts suitable for Otago. An account was given of trials and plantings on a number of sites in Otago, with recommendations on species that had proved themselves in different degrees of exposure and cold.

In *What's New in Forest Research No.37* in 1976, the main eucalypt species with proven growth records and timber quality were outlined. It concluded, as had previous authors, by saying that what was lacking were enough trees of the right species of the required dimensions growing in the one locality to establish a processing industry.

Neil Barr wrote in *TG 1/3* of species suitable for Hawke's Bay and other East Coast areas, with reference to the farmers growing them successfully, and especially the importance of seed sources.

FRI contributed a useful article to *TG 4/1* February 1983 with up-to-date practices for the nursery, establishment, and silviculture of recommended species. They suggested a regime of planting 1200–1500 stems/ha, reducing to 1000 stems/ha at top height 5 m, to 400–500 stems/ha at 10–12 m, and to 100 stems/ha at 25 m or age 11–14. Clearfell at age 30–40. Pruning of persistent or acutely angled branches was recommended, with a painting of acrylic or fungicidal paint on the wounds to prevent fungal entry.

A Hawke's Bay newsletter in 1986 talked about the act of faith many farm foresters had discussed, in growing something different to mainstream forests. The newsletter repeated the logical statement from an earlier FRI seminar, "the industry follows the resource".

We were spending a great deal of effort on encouraging the planting of good eucalypts by attracting attention to the qualities of the few trees at that time available for milling. This created a demand which could not be met for 40 years! The article ended by saying "We have the tree stock. We have the expertise. It's not too late to start this year. Don't just think about it. DO IT!"

An article in *TG 8/1* February 1987 by Ian Wallace, Forest Service, Dunedin, drew attention to the potential of

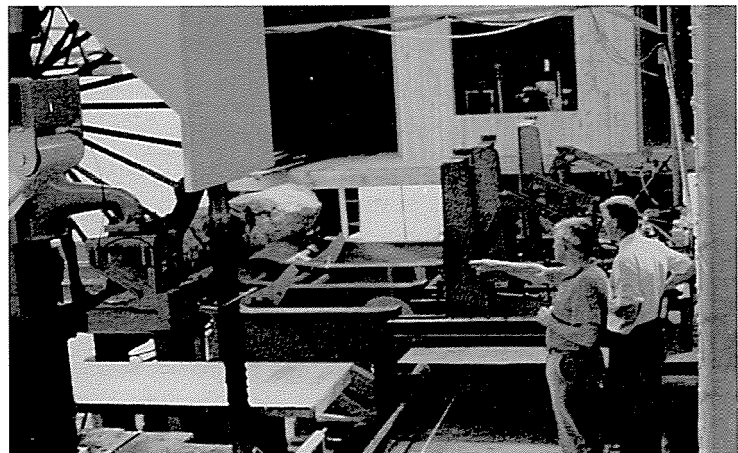
growing firewood crops of, in this case, *E. nitens*. Ian came up with an internal rate of return of 13%. Many other writers have looked at the potential of growing eucalypts or acacias for firewood, but most who have tried have difficulty relating the amount of work and costs to perceived sales and profits!

Graham Milligan from Dipton wrote of his efforts in establishing root-trainer-grown stock of *E. nitens*, *E. regnans*, and *E. fraxinoides*. He planted in October with care in soaking the root systems first and with weed control. Frost of -12°C killed 75% of the *E. fraxinoides* and caused some burning on a few *E. regnans*. The long-term aim of this block was to produce 100 stems/ha of peeler quality logs of 2 m³ volume in under 20 years without significant grazing loss. In a later article in *TG 10/2* May 1989, Graham Milligan gave a detailed account of the frost tolerance of eucalypts in Southland.

In *TG 8/4* and *TG 9/1* November 1987 and February 1988, Tony Haslett of FRI Rotorua described the methods needed to saw eucalypt logs to minimise stress-related losses. The correct milling and drying of eucalypts is a complex issue, but must be thoroughly understood to get full value from all those years of carefully growing the most suitable species.

David Davies-Colley has established a large sawmilling operation purely for eucalypts at the Eucqual Sawmills in Northland, complete with dressing planers and drying kilns. By concentrating on *E. pilularis* and the stringybark group,

Richard Davies-Colley explains the operation of the new Eucqual Sawmill to John Falloon, Minister of Forestry, at the opening of the new complex.



and paying a premium for large logs, Eucqual has produced excellent results, with most produce being used for flooring. The red-timbered species, *E. botryoides* and *E. saligna*, are also cut for panelling and furniture.

This operation based on a portable mill designed by David Davies-Colley was described in *TG 12/2* May 1991 following the visit from over 400 delegates to the 1991 Whangarei Conference. It was also described by Peter Davies-Colley in *TG 13/4* November 1992, with the new large mill opened by the Minister John Falloon in March 1995, described by Peter in *TG 16/2* May 1995.

Neil Barr described his own experience in using Ross Hood's and Colin McLeod's Colthart mills nearby, to mill a range of species he had planted some 40 years earlier. This article was in *TG 9/4* November 1988.

The Lower North branch organised a sawmilling course at FRI in 1989, where some 13 members attended a 2-day course conducted by Tony Haslett. The course covered log selection, milling, and drying for eucalypts, and the notes were published in *FRI Bulletin No. 142* "A Guide to Handling and Grade Sawing Plantation Eucalypts".

As FRI moved into the "user pays" era, the means of funding research, and priorities in research became more important. A Management of Eucalypts Co-operative was set up, with John Mortimer being the first farm forestry representative. Through membership of the Co-operative, the Association was able to raise matters it thought should be on the research list, and distribute information from the Co-operative to its members. Ian Nicholas of FRI managed the Co-operative and has been a strong supporter of farm forestry in all special-purpose species research and field days.

The Co-operative had two major projects in 1990, the measuring of 373 plots of different species throughout the country, and the establishment of *E. nitens* trials in various places.

Peter Davies-Colley took over from John Mortimer as farm forestry representative on the Eucalypt Co-operative in 1992. In *TG 13/2* May 1992 he spoke of the increased interest

in eucalypts as a world shortage of hardwoods was looming, and he spoke enthusiastically on the benefits of farm forestry combining with other growers to get the best from research.

Interest in *E. nitens* continued to grow, as explained by Ian Nicholas in *TG* 13/2 May 1992.

Peter Davies-Colley referred to the cost of research in *TG* 15/2 May 1994. The Association at that time was contributing \$3500 per year to the Co-operative, but in so doing, got the benefit of the Public Good Science Fund contribution, as well as that from other members. Peter spoke of the current research programme, looking at the growth and yield of a range of species, the site effects on the growth of eucalypts, and the effects of pruning.

One criticism of the Co-operative is that there appears to be a focus by large company members on growing eucalypts for chips on short rotation, whereas farm foresters are interested in solid wood with long rotations.

The 1999 Research Committee Report from Eoin Garden referred to this division in the Co-operative, saying that some of the forestry corporates had withdrawn from membership, and that the Co-operative was struggling to survive.

Members of the Association have advanced the practice of growing, milling, and promoting eucalypts in a very practical way. With the help of FRI, practices now recommended will ensure success providing the country is ever vigilant against imported pests and diseases.

Many individuals within the Association membership have planted large numbers of eucalypts and taken great care to manage them well. Their names and the species they have grown, or their milling experiences are contained in Neil Barr's book which is again recommended to the reader.

***Juglans nigra*—The Black Walnut**

About the only time the average New Zealander will see black walnut timber is on the stock of a shotgun or on the dashboard of a Jaguar.

Growing naturally in the north central forests of the United States, black walnut produces a beautiful dark timber

easily cut into solid wood or veneer from the trunk, or highly figured pieces for ornamental use from branches and roots.

Farm foresters had often discussed growing black walnut, and in 1971 Pat Bates of Rukuhia Soil Research Station collected seed from several good trees she knew, and gave them to the Association.

Joll Hosking, then National Secretary, stratified the seed by mixing in peat and storing in the fridge over the winter, then advertised in *FF 13/3* September 1971 for any member wanting seed. The seed was priced from 10 c to 2 c each, depending on number. Joll well remembers wrapping up and posting scores of little parcels to members all over the country. For some reason the exercise was never repeated!

The second reference to the tree in Association records is in the copy of an article from *Time* appearing in *FF 15/3* September 1973. This story covered the rustling of walnut trees from parks, forests, and farms in a number of north-west States by thieves armed with muffled chainsaws and trucks with winches. One tree was even felled on to the owner's house in his absence, but the log was still taken. A good tree was reported to fetch up to US\$15 000.

In *FF 18/4* December 1976, Hamish Deans, then President of the Association, wrote an article on walnuts, mentioning the timber properties of *J. nigra*, but mainly writing of the nut production of the English or Persian walnut, *J. regia*. *Juglans nigra* nuts do not have the volume of flesh that *J. regia* do, but the species is sometimes used as grafting stock for named varieties of *J. regia* such as "Wilson's Wonder".

In this same journal, Mark Dearborn from Upper Moutere contributed an article from the *Pork Industry Gazette*, on the value of black walnuts as a timber tree, and as a possible source of shade and fodder for pigs! He gave the composition of the food value of the nuts saying that only adult pigs could crack the hard-shelled nut, and so a few trees would be ideal in an area for a dry sow run.

Mark Dearborn said the natural range of black walnuts was latitude 32°–47°N, which compared well with New Zealand's 34°–47°S. He mentioned a few old trees known in

the Waikato, Hawke's Bay, and Bay of Plenty, and expected fast growth with good management, perhaps 25–30 years to produce a veneer log. Deep, well-drained, alluvial soils were required such as along stream banks.

First-class weed control was needed for perhaps 3 years. Mark Dearborn suggested a spacing of 3.4×3.4 m to 5.5×5.5 m. Pruning should be carried out when the stem is about 10 cm diameter, and carried up to 5 m. After that, at a spacing where limbs touch, self pruning will occur to give clear logs of 10–15 m.

The pinnate structure of the leaf allows sun to penetrate and maintain pasture growth, while leaf fall acts as a fine mulch, encouraging pasture growth, making the tree ideal for two-tier agriculture in pig farming.

Leith Knowles summarised the New Zealand experience with black walnut in *FF 21/2* 1979 with an extract from a paper appearing in the *New Zealand Journal of Forestry*.

He spoke of the enthusiasm of small holders, particularly, for an agroforestry-type tree in preference to *P. radiata*, but cautioned against extensive planting because of the lack of knowledge at that stage.

Seed provenance was variable, and hard to determine from the few open-grown mature trees in New Zealand. Susceptibility to hormone spray drift (2,4-D) was evident, and the reported high prices received in United States needed to be considered against the amount of timber with defects that could be recovered from a tree. More realistic prices from the United States were quoted.

Leith Knowles described the nursery operation, and the habit of the tree in producing an enormous taproot, perhaps 0.9 m in 1 year, that needed to be cut to spade depth of about 0.25 m. Direct sowing of seed was an alternative worthy of consideration.

Provided seed came from a reliable source, and planting was on good soils such as well-drained river terraces, the tree did look to have a future in New Zealand. Shelter and nitrogenous fertiliser, possibly provided by interplanting with lupins or tree lucerne, were required.

Pruning should not be too vigorous, no more than 40% of crown removal, and a final stocking of 75–100 stems/ha was recommended to get a tree of about 50 cm dbh in 30–40 years.

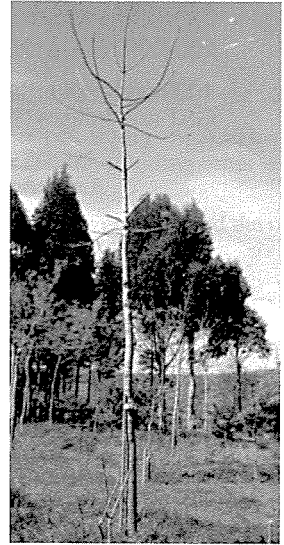
L. Wybourne and Ian Nicholas gave a good account of the establishment of black walnut in *TG* 6/2 May 1985. They pointed out that the planting of nursery-raised trees with severely cut tap roots often led to a long struggle for the tree to get going again, in spite of good soils and preparation.

They suggested that direct sowing was cheaper and, in the absence of squirrels which dug nuts up in the United States, could give good results. Seed needed to be floated to find empty shells, then stratified—that is, cold stored at about 4°C for 3–4 months. By sowing two seeds per prepared spot the 65% germination gave a fairly even establishment. Height growth was a little behind nursery-grown stock for the first 3 years, but then no different. Five trials in the North Island gave similar results. Again, good soils and shelter were emphasised as being essential for success.

Dick Endt, of Oratia in Auckland, brought back seed of the Andean walnut, *Juglans neotropica* or Tocte, from a trip to Ecuador in 1977. He wrote of its growth habits and timber qualities in *TG* 9/4 November 1988, saying that growth of 1.5 m per year was being achieved in Auckland. Dick Endt has continued to advertise seed of this species up to the present.

John Mortimer wrote in *TG* 11/2 May 1990 of his experience in pruning black walnut. John found that leaving a branch unpruned because he felt enough of the crown had been removed, resulted in large, perhaps 50-mm, branches to prune the following year. By cutting back these branches to 25–30 cm from the stem, plenty of foliage was produced from coppice on these cuts to help the tree grow, but the branch diameter remained small.

John didn't worry too much if a tree branched heavily and could not be pruned further to increase the stem length. He thought the resulting interesting grain pattern in these crotches would produce fine wood for craftsmen.



A black walnut of 8.6 m, pruned by John Mortimer to 4 m, with branches cut back to 6 m.



An older tree from which John hoped to get some interesting crotch figured wood.

Nick Nelson Parker of Opotiki wrote in *TG* 12/2 May 1991 of the value of timber plus nuts in plantations of *J. regia*. He gave a detailed analysis of the way differently pruned and spaced walnuts produce different volumes of nuts, and said that the value of *J. regia* timber at that time was \$380/m³ standing, with nuts valued at \$2-20 to \$5-30/kg. He made a good case for a combined nut/timber operation on a 47-year rotation. The same good soil, moisture, and shelter conditions apply to growing good crops of *J. regia* as to growing *J. nigra*.

***Paulownia* spp.**

Alan Meyer from South Canterbury, who served on the National Executive for a period in the 1960s, read an advertisement in the "*American Forests Journal*" concerning the American Paulownia Corporation in Wisconsin. Alan wrote for information which he received and published in *TG* 1/4 November 1980.

The information covered the origin of paulownia in America, the trade in paulownia timber with its uses and wood properties. At that time, Japan was importing some 73 000 m³ mostly from China, the United States, and Brazil. The price received by Americans was up with black walnut. This, combined with the speed of growth on good sites, created a great deal of interest.

In 1986, The Asian Network for Biological Sciences published a book, "Paulownia in China, Cultivation and Utilization" by Chinese Academy of Forestry staff. The nine species of paulownia were described showing their natural distribution and soil-, moisture-, wind-, and frost-tolerance. Growing practices from nursery to harvesting and the wood properties and end-uses were fully described.

Ian Barton, a forestry consultant at Hunua in South Auckland, began experimental plantings of *P. tomentosa* and *P. fortunei* in the early 1980s, and reported his findings in *TG* 6/4 November 1985. He found growth rates excellent, with one tree 4 years from planting being 5.5 m tall and with 9.1 cm dbh.

To maintain a leader, Ian had found that each winter the terminal bud died back with two new growth buds creating

a fork. To maintain a straight stem, one of these buds and the earlier dead leader needed to be pruned in early spring.

Ian Barton had sent a sample of wood from the branch of a local tree to Japan for evaluation, and found it well received with a demand present for New Zealand timber. Ian asked any member of the Association with a log to spare to make it available to him to send to Japan for further testing.

In a further item from Ian Barton, in *TG 11/1* February 1990, the ability of the tree to shoot up when cut at ground level was mentioned, so that if initially a weak or kinky stem developed, it could be replaced by a very straight fast-growing pole, with other coppice shoots removed.

Trees were grown easily from seed, but sold as a root with the stem cut back, in 1989 averaging \$2-65 each, or less for large numbers.

Chris Lucas, proprietor of Farm Fodder Trees Australia Pty Ltd, wrote in the same issue of the value of leaves for fodder. These leaves can be enormous in young trees. An 8- to 10-year-old tree can produce 100 kg green fodder or 28 kg dry fodder, rich in sugar, fat, and proteins.

In August 1990, *TG 11/3* carried an advertisement that was to become widespread for a time, from the Paulownia Timber Company Ltd of New Plymouth. This offered 20-cm trees of 'Kiri'TM at \$25-00 each, but large numbers of *P. elongata* grown by tissue culture; 50 trees were \$5-0 each, 200-999 were \$4-50 each, and over 1000 \$3-00 each, all plus GST.

"Trees are very small", the advertisement said, "but do not fret—they will grow two, three or four metres in six months." Seedlings were also offered at \$300-00 per 100 plus GST.

Interest had grown to the stage where in 1990, the Paulownia Action Group was set up which had 140 members by August 1991. The Group, under the auspices of the Association, had Ian Barton as Chairman and Peter Haywood as Secretary, but had representatives from FRI, MAF, Tree Crops Association, and Waikato University. The main objectives of the Action Group were to counter the rather



This 18-month-old *Paulownia tomentosa* has been cut down once at age 12 months to stimulate straight growth.

extravagant claims of the entrepreneurial approach, and to show what species to grow, where, and how.

Ian Barton and Ian Nicholas visited China in 1991 and reported on their findings in an Action Group newsletter. FRI was monitoring tree growth and setting some eight trials in suitable sites throughout the country, looking for site limitations, silvicultural requirements, and what the Japanese market wanted.

Most of these trials have not been a success, due to either poor site selection or management problems. Species trialled were *P. tomentosa*, *P. fortunei*, *P. elongata*, and *P. catalpifolia*.

In 1999, interest has waned to the stage where the Action Group will probably be wound up. Ian Barton has almost completed writing a handbook on paulownia. This will be a useful record of the New Zealand experience with paulownia, and will be used in future if present plantings produce a valuable resource.

The promotions and advertisements have died, with nursery production only on request. The problem with promoting a new species in New Zealand is that it needs planting and enthusiasm to get research into action, and it is only after a few years of trials that conclusions can be reached on the viability of such planting.

People with good soil, rainfall, and suitable temperatures, together with a degree of shelter, can now add paulownia to their range of exotic timber trees, with research information available to help them.

Poplars

The genus *Populus*, represented by many species and hybrids, is largely thought of as a tree to control erosion or as a shelter tree, but it has always been a valuable timber resource in the Northern Hemisphere, and now that we have a number of large trees on New Zealand farms, more attention is being given to the timber value.

Chris van Kraayenoord, affectionately known as Mr Poplar by New Zealand farm foresters, described the timber

values of poplar and its extensive use in other countries in an address to the 1961 Auckland Conference and published in *FF 3/3* August 1961.

He told delegates that some 400 000 poplars were being planted annually with Soil Conservation subsidy. They were being used for gully control, hillside stabilisation, and riverbank protection, with increased planting likely.

Chris said that the Soil Conservation Service of the Department of Agriculture had established a central nursery at Palmerston North where the introduction of new varieties and propagation of correctly named species and hybrids could be assured, before distribution to Catchment Boards and nurseries.

Chris van Kraayenoord gave a summary of all the uses for which poplar wood was suitable, and the prices paid for peeler and sawlogs.

Neil Barr wrote a letter to *FF 4/2* May 1962 outlining his method of planting poplars from poles, and his experience in getting a *P. deltoides* log peeled which yielded excellent veneer with a fine grain.

Jim Pottinger in an address to the 1969 Sheepfarmer's Conference at Massey University, said that soil conservation ranked first in his list of reasons for planting trees. He spoke of the assistance from Catchment authorities, and of the value of poplars for erosion control, shade, and beautification.

Jim was Chairman of the Wairarapa Catchment Board for some years, and promoted the use of trees for conservation work. He was also known to use poplar branches and foliage as fodder during severe drought situations, maintaining cattle weight during such seasons.

K.Wyley of Wanganui wrote in *FF 17/4* December 1975 of his visit to the Po River valley in Italy where he observed intensive farming of rice, grass, maize, and vegetables together with poplars on a short rotation, with cattle to provide the humus! He said the aim was to produce peeler logs in 10–12 years with a diameter of 30–46 cm. He also thought there was no reason why we could not do the same in New Zealand.

In 1968, The Soil Conservation and Rivers Control Council approved the establishment of a National Plant Materials Centre at Aokautere in Palmerston North which was to become the focus for the hybridising and distribution of poplars, as well as many other trees used in soil conservation and for shelter. The poplar rusts (*Melampsora* species) arrived in New Zealand in 1973 with a considerable effect on most species and cultivars then in use, including the famous upright ‘Lombardy’. The rust had less effect on drier South Island properties.

A breeding programme soon found that it was possible to produce rust-resistant hybrids which began to replace the earlier forms. Many Italian hybrids (that is, *P. deltoides* from America crossed with *P. nigra* ‘Italica’, the Italian Lombardy poplar) were named *P. euramerica* with numbers prefixed by I, e.g., I 214, I 455, etc. Most of these succumbed to rust but I 214 was fairly resistant.

Peter Davies-Colley wrote of the family’s experience with growing poplars in *TG 9/1* February 1988. His parents Richard and Wilma had planted 4000 poles between 1966 and 1977 to stop gully erosion. Only I 214 was used after the rust became obvious, but by 1988 the erosion control had been splendid with good pasture growing right up to the trees, and a considerable timber resource was being produced. The whole farm had become beautiful as well.



Jim Pottinger (*left*) discussing poplars with Richard Davies-Colley. This tree is an I 214, 28 years old, with a dbh of just over 1 m.

Peter milled some I 214 logs for cupboard doors and panelling in the kitchen of the new house he and Nikki had built and found it a joy to work with, producing a beautiful finish.

In the same article, Peter spoke of the fodder value of poplar leaves which he fed to Friesian bulls. The trees were pruned to produce longer clearwood logs, and the bulls thrived.

Photographs by Bruce Treeby of poplar trees and sawn timber ready for sale at the Davies-Colley property appeared in *TG 14/1* February 1993, in which Alan Wilkinson, then managing the Aokautere operation, now Landcare Research, spoke of the need to reactivate the New Zealand Poplar Commission. This was done, with Alan as Chairman.

Under Government restructuring, Catchment Boards or Commissions had been changed first to United Councils and in 1986 to Regional Councils which looked at broad policy issues rather than actively planting trees. Alan Wilkinson had recently returned from the 19th FAO International Poplar Commission meeting in Spain where he could see the world interest in poplar timber.

Delegates to the 1988 Conference in Dunedin visited Bill Wise's property. Chris van Kraayenoord (who had just retired) cautioned against severe pruning of poplars as this induced many epicormic shoots. He suggested pruning no more than two whorls at a time.

TG 9/4 November 1988 contained a short note from Reid Mallinson, Resource Manager of NZ Veneers Ltd in Christchurch, looking to buy poplar logs for veneer if the resource proved sufficient. He wanted Italian hybrid logs, pruned, straight, either 2.7 or 5.4 m, and with a minimum small-end diameter of 40 cm.

Colin Stace of Landcare Research reported in *TG 15/1* February 1994 on a Wairarapa Branch field day held in conjunction with the Wellington Regional Council in November 1993.

A plantation established for match-wood production for Bryant and May in 1972 with I 488 had been abandoned due



This 7-year-old stand of the Italian hybrid poplar I 78, planted at 5.5 × 5.5 m, averages 32 cm dbh and 18.5 m in height.

to the arrival of rust and company restructuring. Because of their close spacing, these trees had stopped making much growth at 40 cm dbh, but local sawmiller Hugh Kjestrup had milled several trees for local farm use, and some material had been treated with 'Tanalith' preservative.

It was reported from Hawke's Bay that a 22-year-old plantation of I 78 had yielded 430 m³/ha, netting the owner \$17 000/ha. The logs had gone to Korea. Hugh Kjestrup's property was visited to inspect the recent clones 'Kawa' and 'Yeogi'.

A larger Lower North Branch field day took place in 1994 at which Murray Hunter, a nurseryman producing poplar cuttings, wands, and poles in Northland, gave details of good planting methods. John Mayhew from Rotorua brought samples of his furniture made from poplar which impressed the group. He said poplar wood does not darken in the sun like pine, takes stain well, and finishes well with sharp equipment. This field day was at Cam and Liz Mitchell's property, Warkworth, where some 60 clones had been planted after Cyclone Bola had made the land unstable. Pruning of the stand was discussed as it was overdue.

TG 15/3 August 1994 carried a report of the above field day, and also news of the transfer of part of Landcare Research to HortResearch, a Crown Research Institute. Poplar breeding was continuing with new possum- and disease-resistant clones being released.

Tony Haslett, Ken Gilchrist, and Bob Britton of FRI Rotorua gave a wide-ranging summary of the timber and sawing qualities of poplar wood in *TG 16/3* August 1995. The current information about the timber was summarised in *FRI Bulletin No.112* and *FRI Bulletin No.142*. The article referred to black heart of hybrid poplars, a zone of bacterial infection which has a big effect on collapse and drying time.

The wood density of poplar is comparatively low at less than 400 kg/m³, with consequent effect on strength and pulping yields. The new cultivars such as 'Kawa' show more uniform density and less susceptibility to black heart. Information was given on log cutting, sawing patterns, and end uses such as furniture, gates, truck decking, etc. Boric

treatment was found to be satisfactory, but CCA was not reliable enough for ground contact.

The Poplar Commission published newsletters which were given edited coverage in various issues of *Tree Grower*; they showed the new breeding programme and where trials were being sited.

Alan Wilkinson gave a summary of the state of poplar research into breeding and utilisation in *TG 17/1* February 1996, which was followed by Colin Stace writing in *TG 17/3* August 1996 on establishment methods and costs of growing poplars.

This journal also carried a request from the Poplar Commission for information on stands aged 10 years or more, so that a yield model could be developed with a set of log grade specifications and an inventory that may be useful in marketing.

Poplars will continue to have a multiple value to New Zealand farmers for erosion control, shelter and shade, timber production, and, not least, a source of beauty to the landscape.

***Pseudotsuga menziesii*—Douglas-fir**

Thanks are due to Nick Ledgard, FRI Christchurch, for help with this section.

Douglas-fir is New Zealand's second most important plantation species after *P. radiata*. It has been used in plantations for almost 100 years, although such use declined in the mid 1960s after the fungal disease, Swiss needle blight (*Phaeocryptopus gaeumannii*), became established in the North Island where the largest plantings were being made. Interest in and enthusiasm for the species are now keenest in the eastern South Island where Swiss needle blight has not had a significant impact on stand health and productivity, and growing conditions can be highly favourable.

The current resource (1988), is approximately 88 000 ha, 5% of the national estate. Since 1997, new plantings in Canterbury/Otago/Southland have exceeded those of all other commercial species combined. Douglas-fir is now

33% of the plantation estate of Otago/Southland, mainly because of the large commercial growers Ernslaw One and Blakely Pacific.

Farm foresters have not been major growers of Douglas-fir because most farmers in New Zealand do not have the best sites for the species. The tree likes moist sites, on moderately fertile free-draining soils with cool conditions and low humidity. It needs 1000 mm rainfall or better, is tolerant of shade, and can stand severe wind, snow, and low winter temperatures, providing seedlings are not exposed to out-of-season frost. (The writer well remembers seeing 40 million Douglas-fir seedlings of about 100 mm being cut back to the snow level (about 25 mm) by frost in a nursery near Vancouver in 1973).

The tree must not be planted in frost hollows, and succeeds on slopes up to 900 m altitude.

Rotations are longer than for *P. radiata*, about 40–50 years but, with a high stocking starting off at 1400–1600 stems/ha, very high volume growth can be achieved.

TG 4/3 August 1983 carried a piece from a North Canterbury newsletter, where members had visited Hanmer Forest. A 50-year-old stand of Douglas-fir which had had one commercial thinning was growing at 20 m³/year. The newsletter noted that this was not considered profitable by the economists in Wellington with their discounted costs formulae.

Mark Belton reported in *TG 14/3* August 1993 that a plantation at the head of Lake Ohau in Canterbury, planted at 1600 stems/ha in 1940 and left untouched, showed a volume growth of 36 m³/year to age 42, then 40 m³/year from ages 42 to 53. This compares to *P. radiata* at about 23 m³/year. Mark Belton gave a stumpage value of this stand at \$200 000/ha, or \$4000/ha/year.

Eoin Garden of Miller's Flat, Otago, made his first contribution regarding Douglas-fir in *TG 13/4* November 1992. In an address to Young Farmers, he spoke of the value of trees compared to livestock, and mentioned Douglas-fir as a high-value species most suited to growing in cold climates.



Douglas fir growing in Oregon, USA. The average height of these 14-year-old pruned and thinned trees is 11.6 m, and dbh is 17.8 cm.

Its timber was more valuable than *P. radiata* and was a sound investment option for the South Island environment.

The nursery production of Douglas-fir has changed in recent years. Earlier plantings were established from mostly 2/0 seedlings, that is seedlings left 2 years in the nursery before lifting.

Adrian Ford developed a large-scale container operation using a Swedish container system, and growing the plugs in glasshouses. The rather small size of the tree produced led to unacceptable losses from pests or seasonal influences, and so these plugs are now lined out in beds for a year before wrenching and lifting. The resultant trees are sturdy with a good root system.

Nick Ledgard gave a modern regime for the successful growing of Douglas-fir. With present knowledge and more research necessary, he suggested seed from Beaumont Forest in Southland as providing a better-form tree with lighter branches than seed from Ashley Forest. After an initial stocking of 1400–1600 stems/ha, Nick suggested a production thinning at age 25 if conditions allowed (mainly, not too much wind), with clearfelling at age 40–50. Alternatively, a thinning to waste at age 12–15, and clearfelling at age 35 or more.

Pruning is not normally done, except just from the ground to give easy access. High pruning might be considered on prime sites to produce export clears, if no major costs are involved (use of own labour).

Eoin Garden wrote in *TG 15/3* August 1994, after a trip to Oregon in the United States to look at the forests there. He noted the range of seed sources used for different latitudes and altitudes, comparing New Zealand's reliance on Ashley Forest seed which produced coarse branches, sinuosity, nodal swelling, and multiple leaders. After outlining the advantages of growing Douglas-fir in the South Island, Eoin said one of the reasons holding people back from planting was the dearth of information, knowledge, and understanding.

A Douglas-Fir Research Co-operative was set up in New Zealand by FRI about 1992. Eoin Garden wrote of work



High-pruned Douglas-fir in Central Otago.

this Co-operative was doing and the advantages of farm forestry being a member even though it would cost \$5000/year plus \$1-20/ha of planted forest. Membership had been 12, but the four biggest companies announced that they were withdrawing in 1998. By joining quickly, farm forestry could obtain all the intellectual property held by the Co-operative.

Eoin suggested that because not many Association members could grow Douglas-fir, the Association would be unlikely to pay the subscription, and so he made the suggestion that individual members interested should contribute on their own between \$40 and \$100 per year each depending on numbers.

Unfortunately, this did not come about, although Eoin has joined the Research Co-operative as an individual because of the area he has planted in the species and his interest.

The Research Co-operative has a breeding programme in which imported seed, plus second-generation New Zealand seed, are being selected to establish seed orchards for the future.

Eoin thinks there may be 40–50 South Island farmers with substantial Douglas-fir plantations.

An environmental argument is sometimes heated regarding the spread of wildings of Douglas-fir and some pine species in the tussock high country of Otago and Southland. Many purists want to see the brown tussock mountain slopes as they have been for many years, but with the invasion of rabbits and the weed *Hieracium* spp., sheep farming is becoming increasingly less profitable and some people see afforestation, either natural or self seeding, as a benefit. Douglas-fir is certainly the most attractive of the species concerned, and thrives in the conditions. Time will tell whether the spread is allowed, with ultimate controlled extraction to take tourism into consideration, or indeed whether the spread can be controlled on such a vast landscape.

Lesser-grown Species with Potential

Many exotic trees with timber-producing potential have been tried in New Zealand since early settlement, by farmers

and by foresters. Wood has been used for furniture, panelling, wood turning, and in some cases for posts, rails, and building sheds and barns. Just a few of these will be mentioned here.

J.A.Buchanan, North Island Extension Officer with the Forest Service, wrote four articles in the 1960s, in *FF* 6/4, 7/1, 7/3, and 8/1, describing a whole range of minor species with their origins, timber qualities, and the New Zealand experience gained by small scattered plantings in different State forests.

Fred Faulkner of Gisborne, in *FF* 7/4 November 1965, encouraged farmers with exotic trees growing on their properties to use them, not just burn them. He described in particular how to cut *Eucalyptus macarthurii* (regarded as pretty useless) into posts by chainsaw and how such posts, dried and dipped in cold-soak creosote, could be expected to last for 24 years.

J.S.Reid, Assistant Director of the Forest Service, gave a definition of specialty uses in an article on minor timbers in *FF* 8/2 May 1966. He described them as “those uses in which the ultimate value of the product is very high in comparison to the ultimate value ... for general - utility purposes”. He gave examples of hickory for skis, teak for designed furniture, totara for window sashes, or black maire and rewarewa for ornamental turnery.

“Observer” wrote a short piece “The Vignette of Veneer” in *FF* 9/4 November 1967, beginning “the bird’s eyes in the magnificent cabinet looked up from the lustrous walnut veneer and said to the prospective purchaser ‘the pristine beauty of nature transcends the modern era of plastics and synthetic imitation’”. The piece ends by hoping that some day in the sequestered valleys of New Zealand, we shall be able to find growths of hardwood destined to serve the veneer industry for the adornment of our buildings and our homes.

Niall Alexander when President of the Association in 1968 noted, after speaking of *P. radiata* and the need for special-purpose species, that it was being taken for granted that farmers could and would supply this special-purpose timber. So it was now over to us.

Lindsay Poole, when Director General of Forests in 1968, told the Christchurch Conference that a direct subsidy may be more desirable than the Forestry Encouragement Loan Scheme, because “growers could use the money for planting species requiring a longer rotation than *P. radiata*. The present loans scheme has come to be based almost entirely on this tree, and such a lopsided development is undesirable”.

Geoff Chavasse in *FF 12/3* August 1970 wrote of growing hardwoods in New Zealand. He said that the management of hardwoods on farms in New Zealand could be not only financially attractive, but also add immeasurably to the beauty of the countryside. If it turned out to be a labour of love, would so much be lost? The satisfaction of gaining the gratitude and affection of the populace at large would be a major gain. Geoff carried this theme into the next journal, *FF 12/4* November 1970, with a list of species to try from temperate climates around the world.

George Stockley, that well-known Forest Service nurseryman from Southland, gave his methods of raising special-purpose trees in the nursery, and how to plant them, in *FF 13/1* March 1971.

Past-President Russell Smith planted 12 trees of *Nothofagus obliqua*, the Chilean beech raised by FRI nursery, at his Masterton farm in 1961. When he wrote to *FF 14/1* March 1972, these trees were 11 m high with a dbh of 20 cm. He found them almost evergreen in Masterton, and the timber was reputed to be heavy, hard, and durable.

James W. Harris of Waikanae was a frequent contributor to the journal in early days, with a whimsical turn of phrase. In *FF 15/2* June 1973 he was the first to write of *Robinia pseudoacacia* which many had tried in New Zealand because of its durable timber, flowers attractive to bees, and the nitrifying qualities that made it a good nurse tree for others. Its problem was the very crooked stem which ruled out timber production.

C.R. Gordon wrote more on robinia in *FF 19/1* 1977. At his Queenstown property, robinia had been used 31 years earlier for posts and battens which were still perfectly sound.

The crooked growth caused a lot of waste and inconvenience but he observed some self-sown trees that had come up under an old plantation, and what a different story. Up they went, straight as a power pole, towards the light above.

His suggestion was, therefore, to plant robinia seedlings in plantation light wells after thinning, say, *P. radiata*, and thus produce our own durable timber.

TG 7/4 November 1986 carried an article on the tissue culture of Hungarian clones of robinia, written by M. Barghchi from Plant Physiology Division, DSIR, Palmerston North. The superior form of some Hungarian clones was discussed with the difficulty in bulking them up from root or shoot cuttings, and so tissue culture was being used to supply plants for widespread trials.

North Canterbury branch produced a newsletter in the same *Tree Grower* reporting on work by Otto Krijgsmann in travelling to Hungary to see robinia, and study the Hungarian work on genetic improvement of the tree. Otto worked with FRI, Rangiora, in propagating trees from seven improved timber-producing varieties of robinia.

Bruce Treeby corresponded with the British Forestry Commission on robinia; their records of planting back to 1712 showed a lack of enthusiasm, and currently only a few ornamental specimen trees were known.

Otto Krijgsmann wrote further in *TG 10/1* February 1989 of the work being done at Rangiora, and the trials established with Hungarian clones of robinia. He was hopeful of trees being grown in New Zealand so long as deep well-drained soil with a pH of 6–7.5 on a sheltered site was used.

Otto followed this up with more information in *TG 11/2* May 1990 and *TG 14/2* May 1993, by which time he had left FRI to establish his own robinia nursery in Rangiora. He gave a suggested regime with initial stocking of 2000 stems/ha and recommendations for thinning, with uses for thinnings.

Bruce Bulloch from Landcare Research had also researched the growth and form of the Hungarian robinias at Aokautere nursery and in trials. Some were affected by a



A well-pruned robinia.



Heartwood formation in 12-year-old robinia grown at Rangiora.

fungal disease of the foliage, others damaged by wind, while still more died in dry summers. This summary of Landcare research appeared in *TG 15/3* August 1994.

Otto Krijgsmann wrote further articles in *TG 19/2* and *TG 19/3* May and August 1998, in which he remained positive about the future of robinia in New Zealand, and discussed heartwood formation on 11-year-old trees.

R.H.Locker of Hamilton wrote a plea for more species to be grown in New Zealand, and less emphasis on just *P. radiata*. He spoke of power boards importing timber for cross arms when we could grow it here, and of the lack of imagination of present-day foresters who always came up with arguments against any tree but pine.

Bob Berry from Tiniroto Gisborne was an acknowledged expert on oaks. His articles in *FF 20/1* February 1978 and *TG 9/4* November 1988 were written more from a botanist's point of view than that of a forester, and so their value lay in helping with identification rather than timber quality.

Bruce Treeby wrote of the oak and other plantings of Peter Murphy of Tolaga Bay in *TG 7/1* February 1986. The Catchment Board wanted Peter to plant an unstable 20-ha block in *P. radiata*, but in the block he called "The Park" he planted 14 000 oaks and other species such as chestnuts, ash, elm, and walnut. A hardwood resource for the next century was under way.

G.P.Bowles of FRI Rotorua wrote of the establishment of redwood (*Sequoia sempervirens*) in *TG 1/4* November 1980. He stressed the need for good grass or weed control for up to 3 years, and recommended large bare-root seedlings that had been well wrenched. He said that less than 1% of the 4500 ha planted by the State and forest companies in Depression years had survived. One magnificent remnant is the stand on the Long Mile at FRI Rotorua, part of larger Whakarewarewa Forest plantings. Mr Bowles thought the tree had potential for Auckland, Bay of Plenty, and Poverty Bay, and might be useful in stabilising the mudstone soils of the East Coast.

Many farm foresters who have visited the coastal stands of Northern California have thought efforts should be made

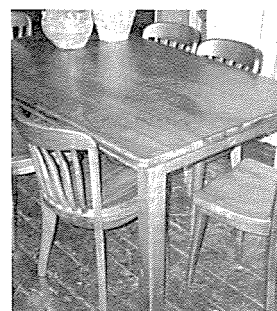
in humid coastal areas of New Zealand to grow this magnificent tree.

Geoff Chavasse wrote an article for the *Logging Journal* in November 1981 in which he questioned, after returning from a trip to Japan, the wisdom of New Zealand growing so much low-value softwood. He found 72% of land in Japan under forest, much in the form of small woodlots among intensively farmed land. He said that many other countries were planting softwoods while hardwood forests were being mercilessly exploited. Geoff said that 20% of our hill country should be in trees, and 3% of valuable land should be in shelter trees, so there was plenty of land to grow valuable hardwoods.

Interest in chestnuts, particularly *Castanea sativa*, was being promoted by the Tree Crops Association, and Bruce Treeby mentioned the timber potential of the tree in *TG 3/3* August 1982. The tree in the open would have only a short bole, but if grown in a forest situation could easily develop a clear stem of 6 m or more. The timber was like oak, but could have spiral grain or radial cracks if grown to maturity, so might be best grown on a short rotation. It was easy to work and glue, and took nails well.

Ernie New, Secretary of the Central Otago branch in 1985 and a keen advocate of tree crops, wrote in *TG 6/1* February 1985 of his recent visit to the chestnut-growing areas of Southern Europe. He explained the perpetual forests he saw where clearfelling was never allowed to spoil the views from tourist areas. Suckers grew to replace a felled tree and quickly maintained the forest. The wood was strong in the round and naturally durable. Italians coppice their chestnuts on a 9-year rotation for post material. In world terms there were 1.3 million ha of chestnut forest, of which 300 000 ha was managed for nuts.

A 72-year-old stand of *C. sativa* at Whakarewarewa Forest was studied by Bruce Treeby in 1986. The stand had never been managed, but there were some good trees with logs being sawn and supplied to furniture makers who were coming back for more. Sales were currently realising \$650/m³ sawn and dried. The cover of *TG 7/2* May 1986 featured sawn boards drying in a filleted stack at Whaka Forest.



Dining table and chairs made out of solid chestnut.



Ernie New addressing the NZFFA Conference on the subject of Tree People he had met.

The formation of a NZ Chestnut Growers' Association was announced in *TG* 7/3 August 1986. This group wanted to look into research and publications, propagation and nursery production, nut production, and timber potential. Ray Knowles was elected Chairman of the Association, and gave further information in *TG* 8/1 February 1987, mainly on the nut-producing side. He emphasised the susceptibility of *Castanea* spp. to *Phytophthora cinnamomi*, a root-decay fungus, and stressed that only well-drained soils were suitable.

Ernie New wrote to the Minister of Forests at the time, Peter Tapsell, suggesting that following Cyclone Bola, the East Coast area should consider extensive plantings of chestnuts. Mr Tapsell obtained advice from the Ministry of Forestry which agreed there was potential for afforestation with chestnuts on the East Coast, but was not enthusiastic about large-scale plantings because of lack of knowledge, and because the land was not good enough for commercial nut or wood production.

[Which of course leaves *P. radiata*!—Author]

Doug Revell of FRI, best known for his work with eucalypts, wrote in *TG* 4/4 November 1983 of a range of minor species that had a timber value, including sycamore (*Acer pseudoplatanus*), camphorwood (*Cinnamomum camphora*), European beech (*Fagus sylvatica*), ash (*Fraxinus* spp.), silky oak (*Grevillea robusta*), sweetgum (*Liquidambar styraciflua*), tulip tree (*Liriodendron tulipifera*), cherry (mainly *Prunus avium*), lime (*Tilia* spp.), elm (*Ulmus* spp.), and others. A brief note on the type of timber with its uses was included with each species.

A note appeared in *TG* 6/2 May 1985 about an auction held to sell logs of mainly old kauri and rimu salvaged from Tairua Forest and Coromandel Forest Park where trespassers had allegedly entered the park to fell trees.

Selling high-value logs by auction was common about the same time in South Africa, where small supplies of stinkwood, yellow wood, and blackwood graded into even-sized logs fetched a good price. This may be a possibility for small quantities of specialist logs grown by farm foresters in the future.

Mike Malloy wrote of “Market Conditions 30 Years Hence—A Wood Famine” in *TG* 6/4 November 1985. Mike gave a studied account of the world’s present forests and their rates of depletion. He expected our indigenous cut to disappear and imports of tropical hardwoods to become scarcer and more expensive. Mike wanted a national forest policy to considerably expand our exotic forests, with an increased area in special-purpose species and an expansion of research into the growing of such species, together with a shift in emphasis towards high-quality solid-wood usage.

Mike Malloy recommended using joint ventures between landowners and city businessmen (using the Forestry Rights Registration Act 1983 which he had been largely instrumental in drafting), with the aim of producing top-quality clearwood, and remaining free of processor control and influence.

Mike wrote as a thinker in world and national forestry issues, but also as a very practical forester who had spent every weekend for a number of years planting and tending a wide range of special-purpose species with considerable success.

TG 12/3 August 1991 reported that Otanerito Station overlooking the eastern bays of Banks Peninsula was to concentrate on high-value hardwood plantations of some 400 ha, and would be the biggest hardwood scheme in the South Island. Director Stuart Wright-Stow said the furniture industry was being targeted and the business was likely to create six to 12 jobs. 2200 stock units would be run on the 920-ha property. Conservation and leisure were also being catered for in this favoured area where some of the highest rainfall in Canterbury made it an excellent tree-growing region.

Derrick Rooney wrote an article for the *Press* in Christchurch in 1992 on the efforts of David Brailsford who, as a furniture maker, wanted to grow and mill his own timber. He purchased a 45-ha property in French Farm Valley Rd on Banks Peninsula which already had old elms, chestnuts, walnuts, macrocarpa, and indigenous trees which he had covenanted to the QE II National Trust. By excluding stock, and transplanting seedlings and suckers of the elm and

chestnuts, and planting other hardwoods, the property was rapidly being changed into an environmentally friendly place to work.

Ian Power of the Whatawhata Research Centre described in *TG 17/2* May 1996 the loss of a *P. radiata* plantation on a steep siding of the Raglan farm, due partly to the ravages of Cyclone Bola. After some major efforts in weed control a decision was made to plant a variety of special-purpose species, both exotic and indigenous. Lotus had been sown before tree planting and, although some releasing was necessary, both around and up the young trees, the thick dense mat of lotus prevented weeds establishing. The area was to be managed as a demonstration unit to show the potential for some alternative tree species in a hill country environment. Pruning and thinning would be managed to produce high-quality timber, and an attractive use would be provided for a problem area of ground.

Bruce Treeby in *TG 18/1* February 1997 gave details of the Martin New Memorial Trust Fund. Martin was the son of Ernest and Lois New, and had been developing a special interest in broadleaved hardwoods and wood turning. The Trust would have about \$4000 available on an annual basis for, as the Trust Deed states, “research into the use of broadleaf hardwood species in general, and *Castanea* in particular, for timber, coppice and nut production”.