WORKSHOP ON SPECIAL PURPOSE SPECIES

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ABSTRACT

In March 1979 the New Zealand Forest Service convened in Auckland a 3-day workshop on special-purpose timber species.† The objective was to define exotic timber species whose properties might be described as special, and additional to the diverse (but generally middle-of-the-road) values offered by radiata pine.

After long, and at times tortuous debate, a short list of species with a wide range of site tolerances was agreed on: the “ash” eucalypts, Eucalyptus saligna, Cupressus macrocarpa and C. lusitanica, and, on special sites in favoured localities, Juglans regia and Acacia melanoxylon.

BACKGROUND

For many years now it has been the practice of the Forest Research Institute to organise symposia on forestry matters of wide general interest. For a variety of reasons, perhaps mostly centred on finance and a need to restrict attendance to more manageable proportions, the interval between symposia has grown longer, and the gap filled with smaller workshops on more specialised or local subjects. The first of these, on Forestry in Canterbury, was held in 1978. This was the second.

ATTENDANCE

Attendance varied in numbers as people came and went with the subjects under discussion, but at times reached about 150.

Representatives of forest management, research, and timber use were there, including economists grappling with the thorny problem of defining the prospects for species as yet hardly grown commercially or used in New Zealand.

There were sawmillers with experience in the species under discussion, and Neil Barr defended the cause of farm forestry.

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†The full proceedings are available from the New Zealand Forest Service, Private Bag, Wellington.
THE MEETING

Something like 40 papers were presented, from long and erudite expositions to simple statements of experience. They fell naturally into three groups:

- the need for special purpose species;
- the qualities required of them;
- the use required for their wood.

The broad subject was introduced by R. Cutler. He pointed out that both the previous Forestry Development Conferences, in 1969 and 1974-5, had recommended the growth of high quality, special purpose species, but that little had resulted. There had been some research and some planting of eucalypts, but not much more. Now the bulk supply of indigenous species was finished and that fact reinforced the need to look more widely or go without in the future. The workshop should examine the options open to replace the native and imported species now in short supply, seeking to find species that would grow in a range of sites and produce wood with qualities additional to those of the general purpose exotic softwoods. It should not dwell at length on the indigenous species with accepted management potential, nor should it spend much time on exotic species which are unduly fussy about site or climate. In both cases the volumes at stake would be very small for many years to come in terms of the total demand, and they would be used alongside any general resource of special purpose species that was grown.

Hopefully, the meeting would arrive at some sort of consensus, and produce recommendations which the Forest Service might use as the corner-stone of a policy on special use species.

THE NEED FOR SPECIAL USE SPECIES

The first session then moved into the need for specialist species. This was probably the most difficult and tortuous part of the workshop, though the theme seems simple enough.

Every meeting takes a little time to settle down while people get on to the same wavelength and use the same language; this one was no exception. At the same time it was befogged by guilt over the fact that radiata pine is the money-maker. Were we therefore not merely seeking an excuse to dabble, to escape from the tyranny of the economist and the accountant who can rationalise the future only in terms of the past? Desperate indeed were the attempts to prove otherwise before we settled down to a proper elucidation of the problems before us.
The relevant questions slowly became evident:

-- Why diversify at all?
-- If we diversify, how far should we go?
- Why not continue importing?
- What is the state's role?
- What is the role of the private grower?

Why Diversify at All?

Diversification has always been a subject of intense argument, with the case being based on insurance against catastrophe and a range of use-options. Elliott and Levack set out the fate of this philosophy in the first paper. By the end of the first planting boom in 1937, radiata pine was recognised as the plantation species; but, even so, it accounted for only 40% of the exotic forest estate.

The Sirex scare of the post-war years reinforced the interest in an insurance policy, but utilisation favoured radiata pine, and the alternatives (Douglas fir, larch, and ponderosa, corsican and loblolly pines) were very hard to sell. By the time of the second planting boom people were very much more aware of the remarkable silvicultural plasticity of radiata pine, and that the Sirex epidemic had been a result of ill health induced by poor management, not an innate weakness. Indeed, the alternative species had themselves proved to be less resistant to disease. The final death blow to diversity had come with the age of the economist and the philosophy of compound interest, a mechanism designed by those without vision to prove that the future is unnecessary.

In W. R. J. Sutton's view this was no bad thing. What would alternatives do that radiata pine could not do also? Not very much. Radiata pine has deficiencies in some small areas — appearance, surface hardness, and in some extremely demanding situations such as tool handles — but in many other respects it is itself a high quality species. Pathological insurance had proved to be a chimera diverting research effort, and radiata pine had in fact turned out to be more robust than its rivals. Anyway, if we wanted insurance we would need about 300 000 ha of it to be effective.

How Far Should We Go?

J. M. Harris produced an annual domestic demand figure of 60 000 to 180 000 m³ of sawn timber, basing his estimate on the need to find a replacement for indigenous and imported timbers now used for special purposes. But this of course takes no account of export opportunities, which are much harder to
measure. All over the world quality timbers are being used faster than they are grown, and in our region only Indonesia and Papua New Guinea show any sign of a significant ability to increase production in the future. All that could be said of the overseas demand is that it seems very large. Trotman supported this with his contention that even where we use substitutes, we try to make them look like wood, and we return to wood whenever we can afford to.

Why Not Continue Importing?

J. M. Harris and others made the point that, on the world scene, competition for supplies was growing (sapele is now almost priced off the New Zealand market and is being replaced by taun from Papua New Guinea). Trotman, however, contended that for some countries Australia and New Zealand were the natural markets. New Zealand dispensed $25 million in overseas aid to the South Pacific nations in 1977-8, and our trade in forest products with them was many times in our favour. Yet they had good timbers which fitted gaps in our own domestic production, and it seemed logical that we should at least consider buying specialty timbers from them.

What is the Role of the State?

Most speakers quickly identified the state's role as the provider of the core resource on which industry could rely and on which other smaller growers might hang their hats. The resource should be grown in compact areas near existing centres of industry and population, and on a scale sufficient to allow at least one small sawmill to specialise in the use of such timbers (though this final point emerged later in the workshop).

What is the Role of the Private Grower?

I. A. Frost felt that since trees grown for special uses required good soils, which were largely in private hands, the bulk of the specialty timber resource should be grown on private land. The problem here was adequate silvicultural attention and proper marketing.

His views were in part supported by G. J. Molloy, who pointed out that regional and district planning requirements were putting increasing restrictions on bulk afforestation in fertile or well-settled areas. However, forestry on small areas (usually up to 20 ha) was normally a predominant use, and this favoured the private grower.
E. H. Bunn did not entirely agree, holding that it was still the state's responsibility to establish and maintain the core resource; otherwise we would remain where we were, with a vast diversity of randomly located, neglected stands.

The discussion that followed the papers took a little time to become effective, while people attempted to sort out whether or not it was necessary to define a demand before growing the resource. I. D. Whiteside claimed that J. M. Harris's figures were grossly inflated; while others were in favour of W. R. J. Sutton's projection of radiata pine as a sort of sylvan Danny la Rue — all things to everybody in the proper circumstances. There was discussion of the need for market surveys, but these only measure the present situation and they are very difficult and expensive to carry out.

The first session then ended with a review of planned accomplishment. Only three conservancies actually have specific special-use-species working circles:

— Auckland, which is establishing (i) two *Eucalyptus saligna* working circles of 1000 ha, to ultimately yield 1200 m³/year; and (ii) a kauri working circle.

— Rotorua, which is establishing two eucalypt working circles: 3000 ha of *E. saligna* on the East Coast and 5000 ha of *E. saligna*, *E. fastigata*, and *E. regnans* in the Bay of Plenty.

— Southland: A silver and mountain beech working circle.

N.Z. Forest Products Ltd is working towards an annual planting of 800 ha of eucalypts for pulp, but the meeting questioned whether this was "special use" within the terms of discussion.

THE QUALITIES OF SPECIAL USE SPECIES

This subject, being more of fact and less of opinion, engendered less discussion than the previous one, but provided much useful basic information. Papers by J. A. Kininmonth and C. R. Hellawell, and D. H. Revell, set out the core of the matter. Kininmonth and Hellawell's paper dealt with the properties of special use timbers and the species that provide them. They defined a special use timber as one that has the capacity to meet certain specified critical end-use requirements, and pointed out that this may reflect on scarcity as much as intrinsic worth. Kauri was one of our first general purpose timbers, and it is only scarcity that makes us now see it otherwise — as, for instance, a special boat-building timber. Teak and the ash eucalypts have had a similar history in their own country.
While every product requiring a special purpose timber has its own particular limiting specification, the whole range of requirements is probably covered if we find timbers suitable for (i) furniture and cabinet work, (ii) turnery, (iii) handles, (iv) ladders, (v) exterior joinery, (vi) decorative veneer and plywood, (vii) poles and cross arms. These provide the whole range of strength, density, working properties and appearance that we may need, but not find, in the general purpose conifers.

There is of course a very wide list of species with woods suitable for some of these uses. However, the chosen species obviously must grow well in New Zealand and be suited to a wide range of sites.

There are some general rules, too, one of which is that species of doubtful density in their native land will be of even lower density here in plantation, and thus should not be grown on a large scale for production purposes. The sequoia species, Japanese cedar, and western red cedar fall into this group.

This paper lists the species considered suitable for the uses referred to above. While some species obviously cover more than one use, others are more restricted. A simple addition of the number of uses for which each species is suitable shows the following (out of a possible 7):

6 — *Eucalyptus regnans* (and other ash-group eucalypts).
5 — silver beech
  radiata pine
4 — red beech
2 — Douglas fir
  rata
  tawa
  hard beech
  *Eucalyptus saligna*
  black walnut (*Juglans regia*)
1 — kauri
  kanuka
  mangaeo
  blackwood (*Acacia melanoxylon*)
  macrocarpa (*Cupressus macrocarpa*)

Obviously this is a simplification, since some of the uses (e.g., handles and ladders) are very small, while others are correspondingly large. Also, in almost every case, radiata pine needs special attention (either in very careful grading, tending or treatment with preservative) to meet the specifications. The only lists radiata pine does not occur on are for turnery and handles, though of course there are some furniture uses, such as fine chair legs, for which it is not suited.
D. H. Revell looked at the sawing of exotic hardwoods and the implications that this had for their silviculture. In general, the eucalypts should be quarter sawn (though this was disputed later on for E. saligna), and this means a minimum log mid-diameter of 50 cm. Additionally, collapse is unavoidable in the ash eucalypts, and reconditioning is therefore a routine operation. This is not necessary for E. saligna and E. botryoides. Sawing trials with locally grown eucalypt logs of various species have shown that the output of the better grades (e.g., better than "building") ranges from 40 to 95%, with the higher end of the scale favoured.

Studies of black walnut have been few, since there are few trees and people tend to keep them. The results of such trials as have been done are comparable with American experience, and the sawn timber appears to be of an equally high quality.

He went on to make some general comment on the species themselves, particularly the eucalypts most likely to be favoured.

_E. saligna_ is restricted, by its aversion to frosts and exposure, to sheltered lowland sites in the North Island.

_E. regnans_ essentially likes cool climates and rolling hill country, though its provenances and ultimate range require further investigation. Where successful, it is often the largest of the eucalypts, and the one with the widest general prospect for success in New Zealand.

_E. delegatensis_ has been widely planted, but long-term success is low. The reasons for failure are not known but are probably a mixture of climatic stress, disease and mis-siting.

_E. fastigata_ and _E. obliqua_ are vigorous species, but high quality use is restricted by branching defects.

Much of the secret of success with eucalypts lies in proper establishment. Generally, they are the prima donnas of production forestry, requiring meticulous nursery and planting techniques, soil cultivation, fertilisation, and freedom from weed competition. They tend to give trouble in pure stands because of the difficulty of keeping the final crop trees growing fast; interplanting or the use of mixtures may be advocated. Whatever the method,

— a minimum breast height diameter over bark of 75 cm is required at clearfelling age;

— a mean annual diameter increment of 2 cm should be maintained by the crop trees for the duration of the rotation;

— a crown diameter/stem diameter ratio of between 12 : 1 and 15 : 1 is necessary to maintain this rate of growth.
I. Nicholas then outlined the prospects for blackwood and American black walnut. Both are essentially North Island high-fertility-demanding species with the potential to produce very high quality decorative furniture and turnery wood, with an established international demand. Both species have shown that they can produce such wood in New Zealand. Blackwood is a forest species that does not do well in plantation, preferring a light-well situation; but little is known of its silvicultural or establishment requirements.

American black walnut is an easy species to raise in the nursery, but it is extremely sensitive to weed competition in the first years after planting. It is also extremely site sensitive, tolerating only the best-drained sites. It should be open grown, in a park or group situation.

The cypresses, in contrast, are an easy group to grow, and produce good easy-working, stable timber. The favourite, because of its general vigour, is Cupressus macrocarpa, but problems do occur with it. The natural stand in California is small, and thus provenance is not important; but the tree has a very variable form and seed should be collected only from the best trees. Unfortunately, it has often been the practice to collect a year's supply from one convenient tree, and many bad properties have thus been perpetuated. There is also the question of hybridisation with other cypresses. Particularly in the north this may improve form, but it also induces an undesirable variability of timber quality.

Silviculturally, C. macrocarpa should be grown in a situation where height growth is encouraged in early years and branch growth controlled. When there is a long length of stem below the green crown, the crop trees should be pruned and freed from competition to grow as fast as possible. The species is believed to enjoy most vigorous growth and freedom from disease in cooler southern climates.

The sterile hybrid C. leylandii had its advocates for vigour and for resistance to salt winds. However, we were reminded of the susceptibility to disease of species propagated from cuttings with a narrow genetic base, and though apparently the species is healthy now, its widespread use in plantation should be regarded with distrust.

THE FIELD TRIP

Field trips consolidate thinking, giving a chance for discussion and judgement on the effectiveness of ideas presented so clearly and logically in the meeting hall. They do not usually produce ideas of their own.
This field trip was no exception. The morning was given over to touring various wood-using industries in Auckland, and the afternoon to seeing some of the trees themselves on farms nearby, and in visiting a small sawmill that specialised in sawing specialty timbers.

The first fact to emerge in the morning was that though we might be talking of alternative timbers, we were not talking about an alternative life style. The processes were every bit as regulated as might be found in any sawmill or pulp mill. Only the scale was slightly smaller, but the dependence on a uniform raw material that would allow automated production was the same.

The furniture manufacturers at the more expensive end of the market are resolving in ingenious ways the problem of a diminishing supply and rising cost of traditional woods. On the one hand, where traditional styles (delicate legs, etc.) have in the past required that at least 20% of the timber used have strength properties greater than radiata pine, the answer is a style change. "Country" is in, with everything whittled out of a "4 x 4", and gaping joints a merit rather than a fault. The fact that the use of pine insinuates an American country style rather than a New Zealand one probably escapes the 10-acre squire as he pursues his Marie Antoinette-like view of rural life, but it saves both the manufacturer and overseas funds.

On the other hand there is fibreboard. Wood in large sizes and central heating do not go well together, and the artificial boards of the time were not up to the aesthetic standards required. Fibreboard, with its ability to hold an edge moulding, is, and so once more the dining-room suites and coffee tables flow into the suburbs without splitting apart at the seams.

The afternoon visit to West's Sawmill showed that the sawing of special purpose species does not require special purpose mill machinery, though obviously an inquiring, experienced, and adaptable management is a distinct advantage. The trees themselves, when we came to them, were magnificent though, we were assured, grown completely incorrectly!

THE USE OF SPECIAL PURPOSE TIMBERS

The session devoted to the trade produced a great range of ideas, many seemingly peculiar to the experience of individual sawmills. However, a number of comments made by the wood users seem to sum up the problems that they feel need attention.

— The lack of contact between the grower, the sawmiller, and the user.
— A lack of knowledge of (and consequently a need for research into) all aspects of thinning, seasoning, purchasing and marketing specialty timbers.

— The need for suppliers to adjust to the manufacturer's requirement for accurately cut component stock. He is working to tight specifications, and near enough is not good enough.

— Transport costs and a lack of export restrictions make Sydney the best place to buy good quality tawa and silver beech.

— Specialty exotic timbers are spasmodic in supply and of highly variable quality. The grower invariably has an inflated idea of value.

The case was advanced for specialty woods for poles (Corsican pine because of its lack of taper) and veneers. Rimu was still the bread-and-butter species for slicing, but we had exported *Eucalyptus regnans* to Australia to panel the Norwich Union building in Sydney, and a great range of other exotic species, often in job lots, are being tried. Elm had come out very well.

The question of market penetration by radiata pine was raised. At one furniture factory we had visited, 82% of all wood used was radiata pine. Could we not go even further with finger jointing and lamination? Apparently there are difficulties here because of mismatching of components, and because pieces of wood with different densities dry and move differently, causing the composite piece to crack. Also, it is a question of taste — not everyone likes pine.

**THE GRAND FINALE**

At the end the experts dominated again, sorting out the chosen species and how to handle them.

We were asked again the three core questions:

— What needs do we have that radiata pine and Douglas fir do not fill?

— What species will provide for these unfilled needs?

— What is the size of the resource that we should plant?

From then on there was little disagreement. The need is for medium density, stable, light-coloured (because light can be made dark if necessary — but not the reverse) woods for use mostly in the furniture, turnery and veneer trades. These would be basically *Eucalyptus saligna* in the northern half
of the North Island; the "ash" eucalypts, preferably *E. regnans*, from the pumice plateau south; *Cupressus macrocarpa* wherever it would grow well (favouring the South Island, but on special sites in the North Island); and black walnut and blackwood.

In every case we would be looking for fast-grown, vigorous trees.

As to how much we wanted: no one claimed second sight, but the minimum would seem to be enough to allow a small sawmill to specialise in the use of the timbers, to fill the local market and to allow for export. And for silviculture: grow the trees well, concentrate the resource, and market the timber properly.

A very good meeting that, for once, answered more questions than it asked, pulling the threads together in an admirable way. A policy should not be hard to find.