UTILISATION OF THE BEECH TIMBERS

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SYNOPSIS

The beech timbers, with the exception of Southland silver beech, have been lumped together as "make-weights" by the timber industry and as substitutes for rimu by users. Substitutes are invariably assumed to be inferior. The introduction of grading rules following the rimu pattern may perpetuate this lack of status. Many of the exacting uses for which one or other of the beech timbers is the best available timber are not catered for by the rimu-type grading rules. Their individuality must be recognised also because the problems associated with their preparation for market—sawing, seasoning, and machining—vary with the species. A marketing association in the Westland-Buller districts is advocated. Research work is currently directed towards sorting out the variation with locality of density and the associated strength properties, assessing dimensional stability, modifying and accelerating seasoning, and instituting trials for critical uses.

INTRODUCTION

It is felt by some of those interested in the beech-forest resources that ground is being lost rather than gained in securing sound and stable markets for the products. Production has declined in all districts except Southland, reflecting the high reputation which Southland silver beech has built up in comparison with that of the beeches elsewhere in the South Island. The critical market is in Canterbury which receives about one-fifth of the Southland production and over three-quarters of the total beech production from other South Island districts. With certain notable exceptions, it appears that members of the timber trade share with the Forest Service a measure of responsibility for beech timbers other than Southland silver beech having been relegated to the role of substitutes. The challenge therefore is to seek means by which the several timbers may be established as quality timbers in their own right.

In the North Island the main commercial resources are relatively inaccessible and the marketing of beech timbers has been localised and sporadic.

Research studies at the Forest Research Institute, Rotorua, on properties and processing of the timbers are proceeding in parallel with endeavours by the timber industry to introduce national grading rules. Unpublished Conservancy and F.R.I. reports and a record of proceedings at a recent meeting of a Standards Institute Grading

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Rules Committee are drawn upon in this paper. An obvious prerequisite to sound development of the trade in beech timbers is improved sawing and handling of the several timbers.

OBSTACLES TO TRADE DEVELOPMENT

Some of the obstacles to trade development stem from:
(a) Lack of status for the individual beeches.
(b) Sawmill practice and marketing.
(c) The “substitute” approach to grading.
(d) Preservation and seasoning difficulties.
(e) “Pinhole”.

Possible ways for overcoming these difficulties are suggested below.

Lack of Status

Status may be defined, in relation to wood use, as the state of “being accepted”, on the grounds either of proven excellence or of traditional use. Thus one may quote “standard” timbers and uses in New Zealand:

(i) Heart kauri for boat planking and timbers.
(ii) Heart matai for sills, flooring, and weatherboards.
(iii) Ironbark for bridges; brush-box for decks.
(iv) Jarrah for sleepers.
(v) Japanese oak for furniture.
(vi) Rimu as “the maid of all work”.

One or other of the beeches has been used for each of the quoted uses, but always appears to be the substitute rather than the standard. One of the reasons has been the tendency to lump the several species together as “birch” or beech. Recognition of their separateness is essential even if we find it convenient to bracket two species for specific uses.

Silver beech produced in Southland was given a satisfactory status, by dint of much hard work, as a very good timber for motor-body building, implement manufacture, turnery, and furniture. The diminishing market for the first two categories calls for a reappraisal of the specialty market by a well organised industrial group before the industry commits itself to large-scale competition for the building market against the indigenous and exotic softwoods. In other words the value of Southland silver beech will be depreciated by reducing its status from a “factory hardwood” to a building timber substitute. It has been shown that silver beech from other localities in the South Island could be given a status similar to the Southland product. Acceptance of the North Island product is more or less contingent upon the South Island development.

Red beech presents a more difficult problem than silver beech because it seasons slowly and is subject to degrade when handled or
stored carelessly. In considering its peculiar combination of properties and the uses to which it should logically be put to obtain the best monetary return, one is attracted to finishing and factory items in preference to items requiring good strength and durability under conditions of severe exposure. There is an overlap with silver beech, but that is reasonable enough, especially for the mild, medium-density type of red beech. Those factory and finishing items subjected in service to a moderate decay hazard should be heartwood. Sliced-veneer production would further enhance the suggested status for red beech and also silver beech.

Until the sawing, machining, and seasoning problems associated with hard beech are better understood, and practice is improved, factory items cannot be expected to absorb any significant proportion of the higher grades. Industrial flooring is one of the best high-priced items. With strength superior to red beech and durability at least as good, the timber should logically continue to find a good market in bridge and similar construction sizes.

Mountain beech has very good strength qualities which may provide an incentive to industries to accept and overcome its machining difficulties. Its status, too, would become that of a factory timber, lower grades going to constructional and similar uses for undressed material.

The attention paid to status in the foregoing paragraphs is warranted, as a change of attitude by the timber industry to the beech timbers is vitally necessary. What has been achieved in the Southland silver beech trade and by one or two Canterbury merchants with silver, red, and hard beeches from the Nelson and West Coast areas, in promoting high-quality uses for high-grade stock, is surely not beyond the capabilities of the timber trade in general. The primary objectives are high grades in long lengths, and short clears from “cuttings” grades allowing a very low percentage of waste, but that does not imply that a substantial proportion of the sawn production will not continue to be used for buildings, heavy construction, farm purposes, and low-priced items.

Sawmill Practice and Marketing

The reaction of an informed Australian visitor to the present situation as seen in a range of mills in the Reefton and adjacent northern Westland area was to draw attention to results achieved in production of myrtle beech along with associated eucalypts and minor hardwoods and softwoods in northern Tasmania. Sawn timber, especially for factory use, together with veneers and plywood are being produced and marketed while chipped waste and small or irregular logs go into pulpwood products, the series of industries forming an integrated unit. As a variant of such a scheme, the desirable set-up for the Reefton-Westland area would certainly call for a large central mill in place of the numerous small units, a plywood and
veneer plant, and a plant for turning and specialty lines. Protected storage at the plant and in transit to areas of lower equilibrium moisture content would be essential for the precision dried and manufactured products. There appears unfortunately little prospect of achieving such a set-up, but the move by a representative group of millers and merchants to seek acceptance under the N.Z. Standards Institute of national grading rules for beech timbers might well be followed by a marketing association for the Buller, Westport, and Greymouth districts to include sawmillers and merchants. Objectives might reasonably be:

1. Acceptance of the status of the beeches as quality timbers in their own right—not “make-weights” for units set up to convert rimu and similar easily converted softwoods.

2. Acceptance of the need to install and maintain sawing equipment specifically for the beech timbers. Hard and mountain beeches with their significant silica content and “reaction wood” would call for special attention.

3. Acceptance of species branding and segregation at the mills.

4. Exploration of the possibilities of baulk production at bush mills for resawing with precision equipment prior to seasoning. Bush mills provide the means for reducing logging waste and for conversion of short and defective logs.

5. To give serious attention to improved sawing procedure. The experience of some Southland millers in achieving maximum production of high-grade timber provides suitable guidance for the conversion of silver and red beech timbers—cutting off the back (following the log taper) and avoidance of mixtures of flat-sawn and quarter-sawn timbers to minimise uneven and unsatisfactory seasoning.

6. To meet the problem of attack on freshly sawn timber by pinhole borers by the use of contact insecticides such as BHC.

7. Specifically to develop markets for “pinhole” beech timbers affected by attack in the standing tree.

8. To route small sizes and short clears to a central depot for turnery and chair manufacture.

9. To develop the market for peeled and especially for sliced veneers to provide matching material for sawn beeches used in furniture and fitments.

10. To ensure correct seasoning practice, preferably by air drying in the producing district rather than in the harsher Canterbury climate.

The “Substitute” Approach to Grading

In the same way that beech sawing is too often subordinated to the sawing of rimu, so too is the current approach to grading rules subordinated to the existing rules for building grades for rimu. As already pointed out the primary grading requirement for the two principal beech timbers (silver and red) and for tawa also, is for hardwood grades to provide for:
(a) “Clears” or Bending grades.
(b) Two or more “cuttings” grades for boards, squares, and turnery (the last mentioned allowing defects which are removed in turning, e.g. bark strips).

The reasoning behind the suggested relegation of building grades to a secondary role is:

(i) Furniture manufacture requires the widest possible sizes, consistent with satisfactory seasoning, and admission of a few scattered defects in wides is better than supply of narrower widths free from defects.

(ii) Heart rimu and heart matai used for flooring have been regarded overseas as equivalent to hardwoods and sold as such for decorative floors on the one hand or heavy industrial flooring on the other. With their decreasing availability the time is ripe to introduce Finish Flooring in strip flooring (end matched for preference) and blocks for these purposes in heartwood of rimu and matai along with red beech, hard beech, and tawa.

(iii) With flooring and furniture thus provided for, the Dressing grade (Building grade rules) would provide for covered flooring and for weatherboards and similar painted woodwork.

(iv) Mouldings, architraves, and skirtings should be specialised products of a beech-marketing group.

To sum up, the suggestions for grading give predominance to hardwood “cuttings” grades and to special lines from silver beech and red beech, with building grades tied to the National Grading Rules (N.Z.S.S. 169) as subsidiary. Structural grades for red beech and hard beech are necessary. For hard beech, special lines (especially strips and blocks for industrial flooring) are envisaged in addition to building grades.

Preservation and Seasoning Difficulties

There are too many unknowns in the preservative treatment of sawn beech timbers to warrant consideration of many uses contingent upon such treatment. Diffusion treatment of natural rounds for mine props illustrates the relative ease of treatment of red beech sapwood, but facilities for boron diffusion are not readily available in beech-production areas in the South Island. In the meantime it is reasonable to use heartwood of red beech (and in some instances of hard, black, or mountain beeches) where the decay hazard is moderate, and to accept the sapwood of beech timbers as having low susceptibility to attack by the common insect borers for a wide range of other uses. More harm than good has come from use of heartwood of the durable beeches for conditions of high hazard; what is admissible in the light of local experience with local timbers is often dangerous as a generalisation.

Seasoning difficulties are considerable with the beech timbers but they appear to be equally so with many overseas hardwoods of high
repute. Organised marketing was necessary to establish Southland silver beech as a dependable timber, and the seasoning procedure developed at the central depot had no small part to play. Good yard layout, firm foundations, end coatings for all wide stock, and minimum delay from sawing to filleting were basic requirements. They are equally important for silver beech from the Nelson-Westland areas, and for red and hard beeches even more attention must be given to stack roofs, sun shields, thinner fillets and generally to means for retarding rate of seasoning under the severe climatic conditions obtaining in Canterbury. A marketing body should look closely into the practicability of seasoning in the milder conditions near the points of production. Useful progress has been made with seasoning studies at F.R.I. The principal findings by Kininmonth (unpublished) to date are summarised below.

1. Silver beech sapwood 1 in. thick ranging in density from 28–50 lb/cu. ft. (air dry) seasons rapidly in the air and may be kiln dried satisfactorily after air seasoning to 40% m.c. Collapse, checking, and distortion are recorded as negligible in the test shipments. Heartwood is slower-drying than sapwood. Kiln drying green off the saw will be the subject of further test. From earlier experience it should be mentioned that in stock thicker than 1 in. quarter-sawn material kiln dried much more slowly than flat-sawn.

2. Red beech heartwood, 1 in. thick, ranging from 32 to 40 lb/cu. ft. (air-dry average) was uneconomically slow to kiln dry green off the saw (1 to 2 months) and developed severe collapse, and some surface checking and distortion; good recovery from collapse was achieved by reconditioning. Kiln drying from 25% or lower m.c. is recommended. Quarter-sawn timber is again reported as very much slower to season than flat-sawn. Sapwood seasons readily. Air seasoning to below 30% m.c. takes from 50 to 200 days and the final kiln drying to 12–14% takes about 6 days.

3. Hard beech is more prone than red beech to develop seasoning checks and severe collapse, especially at the junction between heartwood and sapwood. Kiln drying should not be attempted unless the timber is pre-dried to under 25% m.c.

4. Black beech and mountain beech develop worse collapse than the other commercial species and again such collapse is worst at the heart-sapwood junction.

Pinhole

Pinhole with the encompassing streak is not easily confused with attack by the common house borer. It is much more difficult to explain away the type of pinhole attack which occurs in freshly sawn timber. Ready availability of insecticides suggests that consideration should be given to spray treatments during the flight season. Again such action would be more practicable for a central depot than for individual small mills.
RESULTS OF RECENT WORK ON SOME PROPERTIES OF BEECH TIMBERS

Density Variation

An extensive survey by Harris of the Forest Research Institute has provided data which has been used in the preceding discussions on marketing, grading, seasoning and use of the beech timbers. As the results of the study have not yet been published remarks are confined to correction of some of the relevant sections of the publication “Beech Timbers”, and to mention of a few significant features of locality variation.

(a) Silver Beech (material from 99 trees from 32 sites)

(i) North Island material is confirmed as being denser than South Island material. The average air-dry density is about 43 lb/cu. ft. with only one locality yielding material below 41 lb/cu. ft. However, the survey has not included wood from the Wellington area previously noted as being more akin to Nelson wood.

(ii) South Island wood shows a moderate density range from 33 to 41 lb/cu. ft. with a single locality (1 tree only) up to 43 lb/cu. ft. There is some suggestion that the material above 40 lb/cu. ft. comes from high altitudes or from stream-side sites suggesting high altitude origin. One high Westland value (45 lb) was previously recorded.

(iii) The pattern of density range in Southland is not markedly different from that of other South Island localities, for which the overall average is about 36 lb/cu. ft.

(b) Red Beech (material from 85 trees from 23 sites)

(i) Average density values for localities (other than the Murchison-Reefton group) range from 38 to 45 lb/cu. ft., with an overall average of about 41 lb/cu. ft.

(ii) The Reefton-Murchison group of localities is notable for its density range of 34 to 36 lb/cu. ft. and for associated qualities of “mildness” in sawing, seasoning, and dressing.

(c) Hard Beech (material from 43 trees from 10 sites)

(i) The survey has so far included only one North Island locality (Matawai); it yielded wood of surprisingly low density (41 lb/cu. ft.) which is matched only by one South Island locality (Hukarere).

(ii) Very dense timber (49–50 lb/cu. ft.) previously recorded from Mamaku came also from Rai Valley (Nelson) and the Paparoa (Westland) area.

(iii) The overall average density is approximately 45 lb/cu. ft.

(d) Mountain Beech (68 trees from 18 sites)

(i) In contrast to the wide spread of values recorded previously, the wider survey shows 14 sites with air-dry density 40 ± 2 lb/cu. ft.

(ii) Large-leaved Southland type is denser than average at 43 lb/cu. ft.

(iii) Shipment from Piano Flat (Southland) has sub-normal density 35 lb/cu. ft.; similar wood came previously from North Canterbury and central North Island.
(e) Black Beech (15 trees from 6 sites)

(i) Two North Island sites and two Nelson-Marlborough sites produced wood ranging from 43 to 45 lb/cu. ft., which is substantially below values previously recorded (49 and upwards).

(ii) Material obtained from Canterbury with values 40–41 lb/cu. ft. may be suspected of being mountain beech. The delineation of the two entire-leaved species and suspected hybrids is difficult.

An Approach to Assessing Dimensional Stability

One property of red beech heartwood which is currently receiving attention by Harris at F.R.I. is its dimensional change associated with increasing moisture content (within the air-dry range) when atmospheric conditions are changed from 60% relative humidity to 95% R.H. It has been remarked that the response of red beech heartwood after 24 hours at the high relative humidity is very slight indeed, and the timber appears to be significantly superior to such stable timbers as matai heartwood and Californian redwood heartwood. If further tests support this contention, red beech heartwood could be considered as a teak substitute for certain service conditions where minimum dimensional change is required in timber exposed to rapid atmospheric fluctuations. Uses which come to mind would certainly set a hallmark of quality upon red beech, subject of course to its receiving the necessary care in sawing and seasoning, e.g. sills (laminated), flooring, curtain walling and exterior joinery.

CONCLUSIONS

To ensure their correct use, each of the beech timbers must be recognised as being better than other timbers for certain uses, and the species should be segregated for most important uses of the higher grades.

Good seasoning practice is all important, and should be a primary objective of the suggested marketing association. Centralised facilities are envisaged also for veneer slicing, salvage of short clears and turnery, and for storage and processing.

Research into seasoning, density and strength variation with locality and other basic properties of beech timbers should continue.

Grading should not be tied to an outdated scheme developed for and dominated by indigenous softwoods. Hardwood grades with provision for special lines are needed for silver and red beeches.

Unjustifiable claims for high durability of heartwood of several of the beeches under extreme service conditions can do much to discredit the timbers. Corrosion of metal fasteners also should not be overlooked. There is much to learn still about possible applications of preservative treatments.

Pinhole attack after sawing can be reduced by the use of insecticides.

The properties of the timbers justify faith in the future of management of beech forests, but one objective should surely be discouragement of hybrids.