MINOR TIMBERS AND SPECIALTY USES

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SYNOPSIS

The place of minor timbers in planting programmes is discussed from the standpoint of specialty timber needs with due regard to the resources of such timbers available from indigenous forests. It is necessary to consider the marketing of low grades produced incidentally to the cutting of high-grade stock for such specialty uses as exterior joinery, furniture, veneers, handles and sporting goods. The cypresses and cedars give promise of providing durable, stable heartwood for joinery, and lower grades suitable for general utility purposes, but a satisfactory yield of heartwood of high grade presupposes that pruning and long rotations are practicable. Among the medium density hardwoods which appear to justify attention are ash, walnut and ash-type eucalypts of which the last is of interest also for complementary pulping material. Poplars have a place in the scheme for veneers and pulp wood primarily. The only dense timbers advocated are some of the durable, strong eucalypts for engineering timbers. Planting should obviously be planned to ensure continuity of supply to specially equipped utilization plants. Supplies of specialty timbers which cannot be met from the reasonable range provided by these species and the ones already available in New Zealand should be imported.

INTRODUCTION

A question posed from time to time is, "What is being done to make New Zealand self-sufficient so far as specialty timbers are concerned?" It comes up when shock handles, tools, sporting goods, rifle butts, model aeroplanes, tooth picks, scales (rulers), wood engravings, musical instruments, and divers other items are under consideration. The long list simply reflects the extremely diverse combinations of properties possessed by the enormous range of woods produced and used. Within that range it is possible to find woods of peculiar excellence. Their qualities have roused the interest of many whose native ingenuity has led them to fashion some new item of special utility or beauty of appearance or sound, or capacity to inflict injury. In very many instances the passage of years has failed to reveal any wood substitute that can match the qualities of the wooden article shaped initially by primitive means. Trade among countries with wooden articles was, of course, a stimulus to trying out other woods for the same general purposes. In New Zealand, the Maori people learned to use the local woods for special, as well as general-utility, purposes and the arrival of European tools helped both the Maori and immigrant European to discover the intrinsic qualities of native woods for their sundry needs. Increased trade has displaced many of the items and the intrinsic qualities of minor small trees and shrubs have been forgotten. But whether we import specialty woods or discover unsus-

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pected local sources of them, the fact remains that our way of living is still affected by them in an age of mass production of utility goods.

It will be the purpose of this article to discuss the place which minor woods should occupy in our thinking about wood resources to be developed (or retained) in the forests and woodlots in New Zealand. In general, it is proposed to focus attention upon those minor woods which have properties suggesting specialty rather than general-utility applications.

WHAT ARE SPECIALTY USES?

The definition of specialty uses is by no means simple; but, generally, the writer regards them as those uses in which the ultimate value of the product is very high in comparison with ultimate values on the board-foot basis of woods used for general-utility purposes. It is not easy even to evaluate wood for the latter purposes, but one basis which was put forward in Georgia, U.S.A., for timber used in building is:

Initial value of wood represented by stumpage	$1.00
Costs accrued are:	
Harvesting	$1.50
Primary manufacture	$3.85
Secondary manufacture	$5.45
Transport	$5.35
Construction costs	$7.65
Total	$23.80

The argument was advanced that the appreciated value was $24.80.

If a similar argument is used in relation to hickory for skis, maple for ten-pins, teak for designed furniture, "Swiss pine" for musical instruments, totara and cedar for window sashes, heart matai for sills, black maire and rewarewa for ornamental turnery, kotukutuku for jewellery and ash for tennis racquets, then the significance of the specialty woods becomes apparent. But the appreciation in value during processing of woods for specialty uses is not always of the order of the items quoted, as, for instance, hickory for axe handles, because an adequate return from the processing done is balanced against the need for a continuing market. A question which arises is whether there is any particular group of wood qualities to differentiate specialty woods from general-utility woods. One basis for broad classification of woods is the air-dry density, and it is convenient to recognize the following classes in which type woods may be noted:

(a) Extremely dense — over 55 lb/cu. ft. ..... black maire, rata
(b) Dense — 45 to 54 lb/cu. ft ..... hard beech, tawa
(c) Medium density — 35 to 44 lb/cu. ft ..... rimu heart, kauri
(d) Low density — 25 to 34 lb/cu. ft ..... radiata pine, totara
(e) Very low density — up to 24 lb/cu. ft ..... western red cedar

The great bulk of general-utility woods used for building purposes, for containers and farm purposes, for disintegrated wood re-

formed into boards or paper, for utility plywood and other glue-assembled products, and for the great bulk of furniture used in homes and offices are in classes (c) and (d). In most countries, too, the woods for common engineering uses, for telecommunications and power transmission, and for transport and related facilities come from the same groups, although the accident of our proximity to Australia has brought about the use in New Zealand of the extremely dense (class a) group of durable, strong Australian hardwoods, until the recent reversion to treated class (d) woods. Many of the specialty woods occur in the classes (a) and (e) because of qualities associated with extremely high density or very low density; on account of their high density, hardness, and associated difficulties of seasoning and shaping in the one case, and the softness and low strength in the other case, it stands to reason that they are, moreover, not well suited for the general-utility purposes mentioned. The dense woods in class (b) share with class (a) woods some of the qualities that restrict the extent to which they may be used conveniently for general-utility purposes. Finally, the following sections will show that there are woods in classes (c) and (d) which may have specialty uses for clear heartwood and the substantial advantage of general-utility properties for the lower grades. If the choice in planting is to be made between a group (e) wood with heartwood qualities of particular merit and a group (d) wood with heartwood of equal merit, the latter would generally be preferred, provided, of course, that the site was equally favourable to both species.

POTENTIAL VALUE OF MINOR SPECIES IN NEW ZEALAND

Cypresses, Cedars, and Other Conifers with very Durable Heartwood

The woods are in density groups (d) and (e)—*i.e.*, low or very low density. For the major specialty use of exterior joinery, the properties required are:

(1) Moderate durability of heartwood on ground contact basis which is analogous to high durability in the service conditions existing in exterior joinery.

(2) Minimum degree of "working" (high degree of dimensional stability).

(3) Ease of seasoning without warping, "case hardening", spot drying, checking, collapse, or similar degrade.

(4) Ease of machining to good finish.

(5) Good painting and paint-holding qualities.

(6) Light weight for sashes.

(7) Freedom from corrosion of hardware.

It stands to reason that the preferred species will have a high proportion of heartwood in virtually defect-free grade. An assured market for the large bulk of material produced as thinnings or as timber with defects or consisting of sapwood would be another recognized requirement. Foresters will obviously want to know whether the special qualities of the clear heartwood will give these woods any significant advantage over cheaper general-utility woods

which may be preservative treated and given other chemical treatment to minimize shrinkage and swelling in service; it is considered that heartwood has significant advantages over the easily permeable sapwood timbers to which treatment may be applied. While it is probable that the deep cuts made in machining of items such as mullions will not expose inadequately treated wood in the permeable radiata pine, they could do so in some of the less permeable alternative sapwood timbers. Water-repellent treatments of the fully machined joinery in assembled or unassembled form may be expected to improve the dimensional stability, as shown by U.S. practice with ponderosa pine and by studies by the Timber Research and Development Association in England; but technical criticism has been made about painting difficulties in small-scale studies with radiata pine in New Zealand. While it is expected that technical advances will admit the use of sapwood timbers, the costs involved in providing products as good as those made from durable, stable heartwood are likely to be substantial.

In advocating the establishment of limited acreages on suitable sites of the durable heartwood conifers, the writer suggests that production of timber from these species does not require to be widely dispersed. The New Zealand needs could be supplied from one or two sites. Of the species coming within the group, macrocarpa is the best known and good grade material of this species could supply good joinery with outlets for other sizes and grades in weatherboarding, framing, fencing battens (urban), and rails and posts (heartwood); it is a good utility as well as a specialty timber. Other cypresses and *Cedrus* spp. are not as well known in regard to the durability and other properties of the timbers but if there is reasonable assurance of comparability they warrant consideration along with macrocarpa. Further down the density scale is Californian redwood, capable of yielding good specialty timber in a few sites where a substantial proportion of the log approaches the density of redwood in its native habitat; the wood of sub-normal density from the other sites is light, soft and weak, at least for wood up to the age of about 25 years, which constitutes a substantial part of the merchantable bole in trees currently available for examination. Other light, soft, weak timbers with potential value in Clears for exterior joinery and also for weatherboarding are western red cedar, Japanese cedar (*Cryptomeria*), and the white pine (*P. strobus*) group. The lower grades and sapwood are, like low-density redwood, poor material for general-utility purposes.

In all the group under discussion, the specialty timber comes only from Clears, and in planning it is essential to reckon on systematic pruning to reduce the knotty core, at least in the two bottom logs, to a minimum size. For the reasons already stated, the woods of the cypress group are more versatile but the even more important factor to be considered is ease of regular pruning and the response of the different species to such treatment. It goes without saying that volume production in terms especially of clear heartwood is important. Introduction of the white pine group into this discussion of exterior joinery timbers is convenient; clear heartwood in the larger dimensions would logically go into pattern making, intermediate sizes into joinery, boards into weatherboarding, and smaller sizes into specialty woodware.

Medium-density Temperate Hardwoods

In the medium-density upper bracket and extending into the lower bracket of dense woods is a group of species suitable for growth on good land and possessing properties commending them for many specialty uses familiar in their Northern Hemisphere habitats.

The first point which arises is how these timbers compare with the indigenous woods which are likely to continue to be available in New Zealand for a good many decades and which are similar in density grouping. Among the latter are the slow-seasoning denser beech timbers and tawa; the record of utilization practice with them is not very inspiring in that all of them have been converted along with indigenous softwoods, have tended to go into use as substitutes for them, and have gained a rather poor reputation because they are more difficult to handle than the softwoods. The prospects for a recent venture into conversion of oak, ash, and messmate looked promising, and good grade oak and ash appear generally to have been well received. The furniture market for oak and ash is probably restricted because these woods are denser, more difficult to machine, and heavier than the preferred woods for furniture, which are especially sapele (West African), Japanese oak, Japanese sen, rimu, and Southland silver beech. For locally grown ash of good quality, a limited market exists for sporting-goods manufacture, for which ash is imported from Britain and Canada; another potential market is for light-duty shock handles as a complement to imported hickory for heavy-duty shock handles and to indigenous woods such as tawa, silver beech, mangeao, and kahikatea for non-shock handles.

Other hardwoods warranting mention include walnut, for which the obvious market for figured wood is sliced veneer; supplies have been too irregular and the one operating slicer is too remote from sources of supply to create interest. The specialty use of walnut for rifle butts and other wooden parts has been developed to a slight degree in New Zealand but this specialty market is small. Indigenous mangeao and Southland silver beech are useful alternatives to walnut for the purpose but scarcely match the decorative qualities of the latter timber for sporting as distinct from service rifles. Birch and beech have few advantages other than wood colour over the indigenous beeches in most specialty lines, and the same may be said about the maples, of which the favoured one — hard, sugar, or rock maple — for specialty markets in New Zealand has not been established satisfactorily.

In summary, the writer considers that there is justification for limited planting of ash on suitable sites conducive to reasonably but not excessively rapid growth for specialty uses, especially handles, sports goods, designed furniture, and veneer; but it should be recognized that markets for the substantial proportion of low grades are very limited. Of the other medium-density temperate hardwoods, it may be expected that walnut will be grown in any case for its nuts and that a continuing market could be developed for over-age trees in furniture, veneers, gun stocks, and turnery. Justification for growth of oak other than for sentimental and aesthetic reasons is more limited, especially if it can be shown that the more durable and stronger Australian hardwoods can be grown with equal ease. The medium density "ash type" Australian hard-

woods, too, must not be forgotten as they may well be planted in bulk to provide complementary pulping material; as timbers they could provide for most but not all the uses noted for true ash. It is difficult in forest planning to justify growing of European beech, birch, or elm. Sycamore if grown well could provide a versatile specialty timber for turnery and wooden ware as well as excellent veneer; but the fine, even-textured indigenous woods such as kauri, kahikatea, and silver beech can provide alternative material.

Dense Temperate Hardwoods

In considering this group, the primary preoccupation has been with hickory as the exceptional wood for heavy-duty shock handles, skis, and a few other items; the total requirements for the carefully selected wood amounting to a small proportion of the log are small and one is concerned again about disposal of low grades — preservative-treated railway sleepers is one substantial use in the United States. Evidence of the ability of the commercial hickories to grow well in New Zealand seems very restricted indeed and continuing importation for the most critical uses is likely to be necessary. It might conceivably be more practicable to give serious regard to the growing of kanuka and kowhai, of which the former especially is an excellent tough wood.

For those localities where the dense, strong, durable Australian eucalypts can be grown well, there is certainly justification for their planting, more especially for engineering timbers.

Low to Very Low Density Temperate Hardwoods

The good poplars are of primary interest, for utility rather than specialty uses. Good-form logs are well known already as peelers. Veneer is especially useful for interior layers in plywood but both figured and plain veneers can be used effectively for faces. Poplar veneer could supplement and eventually replace kahikatea as a veneer for berry boxes and other products requiring taint-free containers. The match industry is another outlet; aspen is the preferred species for splints and skillets. Sawn timber has been used in New Zealand for containers and to a limited extent for building; sapwood is treatable. Woodwool of good quality is a limited specialty market. Finally, the wood is valuable for certain types of pulp.

Tulip-tree wood (American yellow poplar), although in the same general class as the poplars, is superior in finishing qualities and therefore commands more of the specialty markets.

CONCLUSIONS

Several groups of exotic species have been the subject of comment. Many of them require good-quality land, and the durable heartwood group of conifers needs intensive silvicultural treatment if their specialized role is to be fulfilled. In a country which has been slow to appreciate the value of its indigenous hardwoods, one is not very confident about recommending substantial plantings of exotic hardwoods, because, like many of the native hardwoods, they require more care in processing and marketing than the familiar softwoods. If that care is not exercised, the woods cannot hope to command prices commensurate with their specialized

properties. Plantings should obviously be planned to ensure continuity of supply to utilization plants, which need to be equipped and staffed to handle the specialty lines.

The theme upon which this paper started, namely, the great diversity of wood uses met by a wide range of species, has not been lost sight of, but the writer has come to the conclusion that continuing imports of some specialty lines are justifiable. With the exotic species whose planting is advocated to supplement existing resources, New Zealand should be able to show a satisfactory balance in its overseas trade.