TASMANIAN BLACKWOOD
— ITS POTENTIAL AS A TIMBER SPECIES

By C.D. Gleason

Abstract

Tasmanian blackwood (Acacia melanoxylon) is an erect Aus-

tralian forest tree which in exceptional conditions may reach

130-150 cm diameter at breast height, 40-45 m in height and live

over 200 years. The species prefers a mild temperate climate and

moist soils, but will tolerate low fertility or gleyed soils. It develops

best on sheltered sites and in the presence of a nurse species or

may be grown in "light wells" or canopy gaps.

The species has had a reputation since the 19th century for pro-

viding high-quality ornamental timber for use in turnery, cabinet

and furniture making and as panelling. The dark heartwood,

which forms early, is particularly sought after. Logs are readily

sawn or sliced for veneer; the timber is easily seasoned.

As an exotic it has been most extensively grown in India and

South Africa and shows promise in New Zealand, especially on

the West Coast of the South Island. Rotations of 40 years should

produce trees of 50-60 cm dbh and with an acceptable amount of

heartwood. Pinhole borers and the ghost moth, found in Northland,

may prove limiting.

Much interest has been generated in Tasmanian blackwood

(Acacia melanoxylon R. Br.) following its inclusion as a des-

irable species in the New Zealand Forest Service Policy for

speciality timbers (NZ Forest Service 1981). Blackwood is a

species capable of satisfying many of the end-uses met by in-

digenous woods and imported timbers. It has been promoted

as an intrinsically high-value species with better economic

prospects than radiata pine in some situations.

Information from an Australian Study tour together with a

review of available literature is presented in this paper to

establish the history of blackwood and a perspective for its

promotion as an afforestation species with particular rele-

vance to forestry on the West Coast of the South Island.

BLACKWOOD REVIEWED

Description

Blackwood is an erect tree when forest-grown but inclined to

become bushy when open-grown. Bark is furrowed, rough

and dark brown when mature; the boles of larger trees may

develop flanging and fluting. The olive-green foliage of black-

wood makes a sharp transition from feathery bipinnate

juvenile leaves as a seeding to straight slightly curved

lanceolate phyllodes that predominate from the second grow-

ing season. Creamy-white flowers, attractive to bees and flies,

appear in early summer and the small shiny black seeds

mature by late summer even on quite young trees (de Zwann

1980b).

Ecology and History in Australia

Blackwood is native to south-eastern Australia and wide-

spread as a shrub/small tree in many forest associations of

Queensland, New South Wales, Victoria and South Australia

(Bean et al 1981). Large trees are found only where soil moisture

is plentiful. The species shows optimal development in the

swampy bottom-lands of North-West Tasmania (Hall et al

1970) and though once more widely distributed, sizable stands

are now restricted to Smithton District. Blackwood forests of

this region occupy variably-textured, sometimes gleyed soils,

that require drainage for successful conversion to pastoral

farms. During winter these low-lying forests are often inun-

dated for weeks at a time and log extraction is restricted to the

driest months.

Tasmania's "blackwood swamps" are intricate mosaics of v

arious phases of blackwood regeneration, tea-tree (Eucalyptus

obliqua) and swamp gum (Eucalyptus ovata). Virtually all of

these areas are regrowth forest arising from earlier milling,

fires or abortive farming.

Pre-settlement swamp stands were sparsely dominated by

blackwood though regrowth areas are now frequently densely-

stocked (R. Mesibov pers. comm.). Browsing of blackwood

regeneration by wallabies can be very severe and local re-

searchers regard fire-induced dense tea-tree as important

"natural-fencing" and a precursor to successful regeneration.

Tea-tree also encourages development of straight branch-free

boles, the blackwood eventually "crowning-out" over their

natural nurse.

... substantial quantities of blackwood

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Tasmanian blackwood found its way to

19th century markets in the United

Kingdom, New Zealand, South Africa,

United States, Denmark, Holland, France,

Germany and South America.

At maturity Tasmania's blackwood may reach 130-150 cm
dbh with heights of 40-45 m on the best sites (Arthur River),
more commonly 75-90 cm dbh and 30-35 m height.
Longevity on the best sites can be 300+ years but trees over
120 years old are exceptional. In swamp forest viewed by
the author, standing mortality appeared common amongst
trees about 80 cm dbh.
Throughout most of its natural range the climate experi-
enced by blackwood is mild temperate or nearly sub-tropical

with yearly rainfalls of 800-1800 mm and winter frosts rarely


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exceeding a few degrees Celsius. Well-established young trees planted in Canberra, A.C.T., were killed outright along with hundreds of other native and exotic species in an abnormally cold dry winter (Powell 1971) but overall the Australian distribution of blackwood seems more determined by moisture availability than temperature.

Blackwood was an early export from Tasmania of some note for being one of the few timbers that could be utilised in thinning or shelterwood treatments. The fewest cuts required to reach commercial tree size' (Rule 1967), and the state became well known for both blackwood and blue gum (E. globulus) production. With hindsight it would appear that early use of the resource was profligate; most land destined for farm settlement was wastefully cleared by fire in advance of utilisation (Hutchins 1916). Nonetheless substantial quantities of blackwood were traded world-wide and the timber became remarkably cosmopolitan. Because it was regarded as a high-quality timber Tasmanian blackwood found its way to 19th century markets in the United Kingdom, New Zealand, South Africa, United States, Denmark, Holland, France, Germany and South America.

Within Australia, blackwood quickly established itself as one of the very best native woods for those reasons that attracted overseas buyers. An especially handsome timber that finishes well, it was employed in quality cabinetwork, coopery and also the met the rigorous specifications of blackwood blackwood and blue gum timber journals and books (Lamb 1948; TRADA 1980). Empire Marketing Board 1932; DSIR 1936; Harrar 1941). Blackwood timber remains remarkably well distributed in Australia, originating as it does almost solely from Tasmania and virtually one processing plant (Britton Bros Ltd, Smithton). Swamp forests generate some of the annual cut but in the short term the bulk of the allowable cut will continue to arise from 'understorey logging' of mixed eucalypt high forest associations in Smithton District and elsewhere in the North-West. Mill logs are supplied in random lengths; logs greater than 700 mm s.e.d. are rare and small diameter material (250-400 mm s.e.d.) is routinely converted.

Dead trees are utilised albeit reluctantly as although the heartwood is sound, it is usually dry and contains pinhole borer damage. Logs are sawn in no special manner, if any, and set the range of tree species discovered in New Zealand of the fastest growing. Most timber appears to be the core supply for the Tasmanian industry which absorbs about 60% of the blackwood cut. Enterprising craftsmen extract minor quantities of limbs and rough toplog material from cutovers for furniture, turnery and sculpturing work, thus capitalising on blackwood’s figure and depth of grain. While small craft enterprises typically season their blackwood by raking under cover for several years, industry’s commercial seasoning practice in Tasmania normally relies on air-drying 25-40 mm boards for 6-8 months down to 20-26% moisture content (m.c.) followed by 3-5 days in a low temperature kiln. Further, urgent supply, kiln drying is used but at A.H. Hasell Limited, the major mainland retailers, pride is taken in natural seasoning and indeed forms a marketing feature for this traditional product. Because blackwood sells at prices some three times that of comparable grade eucalypts or pine, longer seasoning times are tolerable and viable. Research into much faster methods such as high temperature drying has been moderately successful (Cuevas 1974; Fung 1976) but I believe is unlikely to be applied commercially in the near future.

Active management of Tasmanian blackwood, particularly in Tasmania, was advocated by early forestry authorities: ‘The blackwoods, on the other hand, possess the common characteristic of the wattles of reproducing freely, especially after cutting, and of making rapid height growth in the first few years, qualities which, when associated with the excellence of its timber, should ensure that it will be given adequate attention by the foresters of the future, while its partiality for low-lying wetlands which can be rendered suitable for intense settlement only by the application of expensive drainage schemes to some extent guarantees the retention of suitable areas under forest’ (Jolly 1926). Unfortunately, management of the blackwood resource was not pursued to any real extent and in keeping with the best colonial traditions conversion of blackwood forest to farmland proceeded apace. By using certain Ministerial powers, some controls on cutting were instituted (Steane 1937) and a continual yield of blackwood has been possible through to the present day.

Sharp interest in blackwood forest management has kindled in Tasmania (Forestry Commission of Tasmania, Annual Rpts. 1971–81) and recent research studies, evaluations and surveys have resulted in firm proposals for management of Smithton District swamp forests (For. Comm. of Tas. 1981). Concurrently the Commission reduced and centralised the allowable cut of blackwood to one plant and raised royalties the 1980/81 Annual Report states: “Premiums for blackwood...increased as a reflection of Commission’s policy of increasing sawlog values and achieving margins for quality species like blackwood...” Their potential blackwood working circle is perhaps up to 10,000 hectares, principally in the North-West; a sustained yield of 1.2-1.5 m³/ha/yr has been calculated by the Commission based on clearfelling and supplementary planting, shelterwood systems, and production thinning of dense regrowth stands. Blackwood timber/veneer combinations may be viewed in “up-market” end uses in Melbourne and Sydney, typically decorative cabinetwork, furniture, panelling and quality restoration. The demand seems to greatly exceed the tiny supply but when market prices are only 10% of the Australian sawlog/veneer production (Dept. Primary Ind. 1983) – and I suspect the disparity will increase as alternative timbers become scarcer (for example, native mainland rainforest species and more expensive for example, imported tropical hardwoods).

**Cultivation as an Exotic (outside NZ)**

Foresters: arboriculturists and nurserymen were quick to extend the range of tree species discovered in New World continents and the far Antipodes. The eucalypts, for instance, were very rapidly introduced around the world and no doubt the distribution of other potentially valuable tree species was facilitated by colonial linkages. Australia’s blackwood, for instance, was established in South Africa by 1863 (de Zwan...
India
In the temperate Nilgiris region of India, blackwood was well naturalised by the turn of the century and is now utilised for fuelwood and utility timber while the foliage is harvested for cattle fodder (Samraj and Chimmanai 1981; Sekhar and Kukreti 1979). Natural re-establishment can reinstate harvested areas but ubiquitous grazing encourages supplementary planting preferably using potted stock. Given the site requirements of blackwood, its palatability and growth rate, it would seem unlikely that the species will be actively promoted beyond Nilgiris.

Hawaii
Establishment trials with blackwood in the wide-ranging sites available have shown erratic results. From a survey of blackwood plantings throughout Hawaii (Nelson and Schubert 1976), and the five and ten year results of extensive replicated species trials (Whitesell and Walters 1976; Whitesell 1976) it appears that establishment is typically mediocre or a failure but occasionally excellent with annual growth of 1.2 m and diameter growth of 1-1.5 cm per annum. Merchantable stems have been harvested; in fact the timber closely resembles that of the prized native Hawaiian acacia, Acacia laur.

South Africa
Of little significance at first in plantations, in so far as extent and yield are concerned, blackwood has been described as a "species of minor importance" (Peyton 1957). There is mention of blackwood in early annual reports (Dept. For. S.A. 1937, 1940 — earlier reports not available) but statistical summaries of South African forestry do not present area tables for blackwood nor wood removals till 1959 (Dept. For. S.A. An. Rept. 1959). Merchantable timber trees can develop in the higher rainfall areas from the Cape to Northern Transvaal but commercial supplies come almost exclusively from the George-Knysna locality of South Cape where blackwood was planted amongst debilitated indigenous forest.

Native forest covers about 0.5% of South Africa and timber shortages were a problem from the earliest days of European settlement. Aforestation for the large wattle bark industry began in the 1880s but the severe timber shortages of World War I stimulated a crash programme of plantation establishment based on fast growing exotic pines (including P. radiata) and eucalypts. Supplementary planting of blackwood appears to have been a facet of a general forest conservation policy. Indigenous forests had supplied the pioneers with both utility and specialty timbers and South Africans today place great value upon period architecture and furniture and consequently traditional woods, particularly stinkwood, Ocotia bullata and yellow wood (Podocarpus falcatus and P. latifolius). The relatively recent development of a very strong demand for blackwood timber and the consequent interest of forest growers are linked with the fortuitous similarity of blackwood to stinkwood — thus in local descriptions: "The wood varies in colour from almost black through brown to a light grey. In general, it is well figured, mainly on account of the growth rings. It closely resembles stinkwood at times and is in fact gradually being substituted for this more valuable wood, though it lacks its characteristic sheen" (Perry 1973); from another author: "Acazia melanoxylon is nevertheless one of the few exotics which yield a good furniture and flooring wood, the heartwood being of excellent quality and not unlike walnut or stinkwood" (Grut 1965).

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Experience in New Zealand

Early introductions of blackwood to New Zealand date from mid-19th century. Systematic development of plantations by the Afforestation Branch of the Lands and Survey Department placed considerable emphasis on quality hardwood planting. Early planting in the Rotorua District, begun in 1896, established the pedigrees of the stands of Catalpa species and Acacia melanoxylon, the latter promoted for eventual end uses in — “Furniture, shop fittings, pianos, railway purposes, billiard tables, etc.” (Dept. Lands 1909). Interestingly, radiata pine did not appear on the early list of desirable timber species and as of 1909 more blackwood had been established at Rotorua than P. radiata and P. miroaria combined! The Royal Commission on Forestry (NZ Parliament 1913) acknowledged the intrinsic worth of blackwood and other species but pragmatically decided to push strongly for radiata pine. With the formation of a separate New Zealand Forest Service in 1921 and the quickening appreciation of impending timber shortages, the view that “quantity beats quality” became axiomatic and participants in the 1925-35 planting boom probably never paused once to consider afforestation with species such as blackwood.

Nevertheless, foresters and private landowners maintained some interest in blackwood, encouraged by authorities who extolled the qualities of the species, such as Mathews (Mathews 1905) who wrote: “This species requires deep soil with a cool moist bottom to do well. It is probably the hardiest of the large growing eucalypts, and one that should be largely planted in this colony.”

Consequently blackwood is not infrequently encountered in older homesteads, parks and gardens and the scattering of trees about the country is no doubt testimony to its aesthetic qualities as much as to perceived timber value.

During the 1950s, New Zealand Forest Service directed trials and operations into indigenous cutovers, especially podocarp-hardwood types, with the aim of “enriching” these areas with introduced species of greater productivity. Acacia melanoxylon was selected for enrichment trials by the Forest Research Institute in 1960/61 as the species was seen to possess some of the desirable characteristics for such a role, especially high value, rapid early growth and a degree of shade tolerance (NZ Forest Service 1962). Blackwood proved a successful enrichment species at the Manukau Forest trials (NZ Forest Service 1970) though management operations never really developed in their wake. Similar investigations were launched in West Coast beech and podocarp-hardwood forests employing eucalypt species and blackwood. The early plantings of blackwood in 1966, 1967 and 1968 were very severely browsed by possums, resulting in low survival, variable growth and poor form (D.A. Franklin pers. comm.). The degree of damage was far greater than anticipated from earlier work (NZ Forest Service 1960) and occurred for more than just one season. Wire netting around seedlings obviated such early browsing but the alternative eucalypt species required no such protection and further trials in enrichment and/or supplementary planting did not include blackwood. Possum numbers have reduced dramatically from those times, however, and similar intensity browsing has not been experienced in comparable operations over the past few years in Westland (NZ Forest Service 1982a).

Early afforestation with blackwood did not produce appreciable stands and most plantings were poorly tended. Nonetheless utilisation experience with New Zealand grown timber proved favourable (Weston 1957; Anon. 1961; Buchanan 1964; Foley 1970; Barr 1966, 1978) though the fraction of recoverable sawlogs has been small to the point where at least one stand was felled to waste (Gibson 1978). Successful establishment proved elusive in many situations (Hinds 1969; McKellar 1971); and this tempered enthusiasm for blackwood (Chavasse 1970). Blackwood did quality for afforestation grants under the Encouragement Grant Scheme (Thomson 1971), but its selection was not really a reflection of field achievements, though sustained efforts were made in some localities with notable success in the Auckland Regional Authority Hunua Forests. A comprehensive survey of North Island blackwood by the Forest Research Institute (Nicholas and Grallels 1978) illustrated clearly the constraints to blackwood silviculture but engendered confidence that the species could be successfully cultivated in New Zealand (NZ Forest Service, 1978). When in early 1979 the Forest Service organised a workshop on special purpose timber species, blackwood was receiving well, despite scant management experience of its establishment and tending requirements (Purey-Cust 1979).

Following the 1981 release of the Forest Service Policy on specialty timbers, blackwood has been planted out on many forestry in both the private and state sectors. Further guidelines and reports are now to hand, especially through FFRI researchers (NZ Forest Service, 1982a,b; Barr 1982) and new forest trials are in the ground and provenance-testing of blackwood has commenced (M. Wilcox pers. comm.). The implications from earlier survey findings of Nicholas and Grallels regarding blackwood seem more or less unaltered by the past few years’ experience viz:

(a) Blackwood is remarkably site-tolerant in terms of temperature, rainfall and soil moisture but good form trees develop only where they are sheltered from wind by topography, nurse-vegetation or mutual protection;
(b) Best results are achieved where trees grow in light-wells or canopy gaps which encourages straight stems, light branching even to some extent self-pruning;
(c) Pure stands or mixtures with compatible nurse crops are alternative management regimes but in either instance silviculture must be flexible, sensitive to site and stand differences and attentive to variable tending treatments;
(d) On good sites rotations of 40 years should produce trees of 50-60 cm dbh though shorter rotations may be possible;
(e) Damaging agents occur of which the most significant are purini or ghost moth (Aenetus virens) and native pinehole borers (Platypus spp.).

Thorough research into New Zealand-grown blackwood is constrained by the limited extent and age distribution of plantings. Local data for wood density and shrinkages (Haslett 1983; B. Young and D.L. McConchie pers. comm.) differ little from quoted overseas values (Greenhill 1937; Kingston and Risdon 1961; Bolza and Kloot 1963; Van Vuuren, et al 1978) with similar wide variation in between-tree basic density.

In an exhaustive seasoning trial using timber from Whaka State Forest Park stands, Haslett (1983) confirmed blackwood’s straightforward drying properties although drying rate proved quite variable. Haslett’s recommended two-stage drying (air drying to 30% followed by kiln drying without reconditioning) is routine international practice for seasoning hardwoods.

**EVALUATION**

(With emphasis on the West Coast)

Private and State foresters accept the spirit of special purpose timber species establishment but are reluctant to commit resources of land and finance to substantial programmes, particularly when the choice lies between relatively unknown species and easily-managed, well-known and readily marketable radiata pine or Douglas fir. Progress towards achieving afforestation targets of the 1981 Forest Service Special Purpose Timbers Policy has been well below expectations, indicating a general lack of confidence in the pursuit of special purpose working circles and/or difficulties in justifying them. In Westland as in other regions, tree-growers’ apparent faith in utility softwoods such as radiata pine reflects a scepticism that specialty species will necessarily return sufficient revenue margins to compensate for the greater costs and efforts incurred in growing them. The history of timber utilisation in New Zealand supports such conservatism. If one reviews the utilisation of native woods, most...
notably the hardwoods, the industry-market complex has been rarely discriminatory with regard to special purpose wood quality but very strongly influenced by timber species' suitability for construction end-uses and ease of seasoning. In making a critical evaluation of blackwood's potential it seems sensible to employ three criteria — commercial value and acceptability, silvicultural characteristics and growth, and utilization features.

**Commercial Value and Acceptability**

Blackwood timber has demonstrated an enviable marketability, initially in far-flung export markets and at home, then subsequently maintaining an elevated status as a semi-cultivated species in Australia and South Africa. It is significant that the value of blackwood timber is not tied to superior characteristics of an old growth resource such as availability of large-sized quality logs, plentiful supply, low production costs, nor proximity to markets — quite the reverse applies. Certainly there appear to be cultural influences that are price-supportive: in Australia the species is historically linked to an earlier Victorian/Edwarian period of rich wood-furnishing and colonial well-being similar to the "nostalgia margin" experienced in New Zealand by kauri; in South Africa a fortuitous resemblance to the much-valued traditional stinkwood undoubtedly favours blackwood considerably. Nonetheless judging by the wood consumption tastes of New Zealanders, there is every reason to expect locally grown blackwood to receive similar appreciation though value margins seem unlikely to match South African figures. The darker colour of blackwood will handicap its across-the-board marketability during periods of preference for lighter timbers though the same constraint could be laid against traditional stinkwood. In most instances early height growth of planted stock is rapid (0.7-1.0 m).

(b) Trees can be established successfully in the face of competing vegetation including side-shading if given a "light-well" space — it is a proven enrichment species in terms of growth (Fig. 1).

(c) Blackwood appears tolerant of our winter cold (up to 8-10°C frost at least) and will grow in soils of relatively low fertility and considerable gleying. Over a range of sites, diameter growth of 10-15 mm per annum appears achievable and given rudimentary tending, crop trees of 50-60 cm dbh should be realised on 40-year rotations.

(d) Heartwood, the substance of value, forms at an early age and trees grown on rotations of 40 years should contain an appreciable heartwood content in their butt sections. Growth habit in blackwood facilitates formation of large branchy crowns above single butt logs, thus maximising production of the desired end-product and minimising toplogs.

(e) Young trees may be green branch-pruned and leader-pruned without particular caution or prophylactic treatment.

(f) The species seems remarkably healthy and vigorous over a wide range of world environments particularly temperate climates.

On the other hand blackwood is handicapped during establishment years by its palatability to possum, deer, goats and domestic stock. Much more attention to animal control is needed for blackwood afforestation than most other timber species.

As with many hardwoods, blackwood is vulnerable to common weedicides used about conifers (2,4,5-T, hexazinone, etc.), and off-site spray drift damage to blackwood must be guarded against. All weedicides, pre-planting or otherwise employed, must be judiciously applied amongst blackwood with so little empirical knowledge to hand.

Although regenerated stands have established in spot locations (Bartlett's stand at Silverdale for example) there is no evidence from New Zealand to indicate the species poses a weed threat, least of all amongst indigenous forest (NZ Forest Service 1983). A more significant unknown is the potential influence of ghost moth and the pinhole borers (Zandvoort 1983) — attack by these insects can reduce the eventual output of quality timber or veneer products. Ghost moth is found only in the North Island and damage, though frequent, appears to be confined to the natural defect core of logs. Serious pinhole attack similar to that experienced by eucalypt species has not occurred in older enrichment plantings but close monitoring is warranted.

Blackwood is form-sensitive. Although mixtures with nurse species are probably advisable for open country in Westland, there is scope for establishing blackwood as a supplement amongst second-growth indigenous forest as a viable silvicultural alternative to more intensive clearing for plantations of other utility or specialty timbers. West Coast soils are rarely fertile and often gleyed but low fertility and high soil moisture levels seem only marginal limitations to blackwood.

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**Utilization**

The described timber properties of blackwood, physical and aesthetic, are well documented; judging by them and established end-uses it is certainly a special purpose timber par excellence. Desirable wood properties of blackwood are not
confined or concentrated just to large-sized old growth material but are repeated within regrowth trees including relatively young trees grown on shorter rotations outside blackwood's native range. Likewise the disadvantageous features of blackwood timber, pronounced variability in colour and density. are also repeated in cultivated stands. They will constitute an irritation to New Zealand processors and end-users but are not a serious fault inhibiting eventual utilization.

No special techniques are required to saw blackwood; small diameter, fast-grown logs do not develop the growth stresses of some eucalypt species and good sawn conversion can be expected from trees grown on 40-50 year rotations. More importantly, seasoning blackwood timber presents few of the problems often associated with hardwoods such as surface checking, cupping, and internal collapse. Simple two-stage drying, air drying for 12-20 weeks followed by conventional kiln or dehumidifier drying should produce quality material commensurate with quality end uses although some drying degrade may develop where sawlogs contain appreciable tension wood.

There is every reason to expect concomitantly greater returns for logs and/or in stumpages from New Zealand blackwood via a vis utility pines that should adequately compensate planters for higher growing costs, lower volume production and longer rotations. Domestic and export markets appear open to blackwood timber products.

CONCLUSION

The timber properties of blackwood are recognised as encompassing the features of a versatile special purpose hardwood. The species has demonstrated its suitability for such end uses in demanding and competitive world markets and in this arena has attracted high prices.

There is every reason to expect concomitantly greater returns for logs and/or in stumpages from New Zealand blackwood via a vis utility pines that should adequately compensate planters for higher growing costs, lower volume production and longer rotations. Domestic and export markets appear open to blackwood timber products. The species is relatively easy to saw and season or produce veneer from and no special utilization skills or facilities are required. Siting of blackwood is critical and success or failure of plantations may rest on the ability of growers to recognise appropriate sites. Attack by pawheas boreris an important problem that is probably the least serious limitation to blackwood forestry in New Zealand and this matter warrants close monitoring. Suitable locations for relatively extensive stands of blackwood appear widespread on the West Coast of the South Island particularly within some indigenous cutover areas. The predominance of low fertility soils with variable gleying in a mild wet climate is no great constraint to blackwood cultivation.

REFERENCES


Harrison, C.M., 1974. Heartwood Content Patterns in Acacia melanoxylon in the Southern Cape. Forestry in South Africa 15: 31-34.


APPENDIX I

Published blackwood log production and prices from Tasmania 'crown tenures' and South Africa:

<table>
<thead>
<tr>
<th>YEAR</th>
<th>VOL S</th>
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