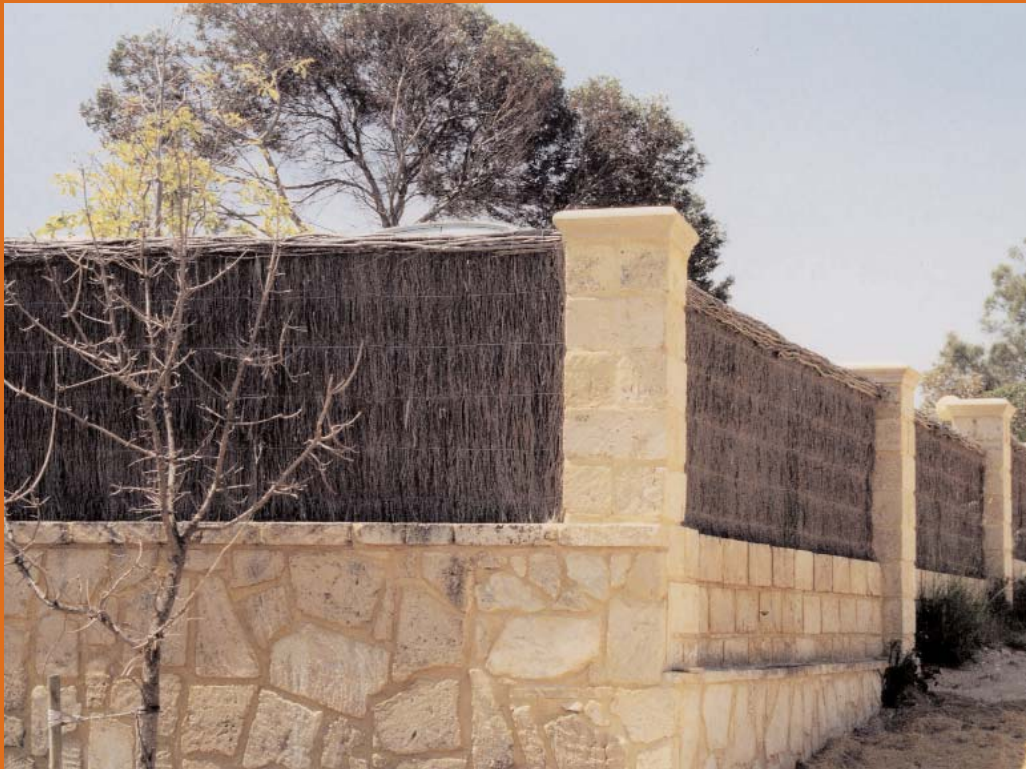


Growing Broombush:

*for Fencing Products on Cleared Farmland
in Southern WA*



*By Chris Robinson and Tim Emmott
Greening Australia (WA)*

*The opportunity exists to cultivate broombush (*Melaleuca uncinata* and related species) on cleared agricultural land in southern WA, for the sustainable production of brushwood fencing material. Broombush can be grown on land that is not highly productive for conventional agriculture, including sites that are marginally saline and seasonally waterlogged.*

This information aims to provide an overview of suitable species, production and establishment techniques and opportunities associated with producing broombush for brush fencing.

INTRODUCTION

A number of *Melaleuca* species can be used in the construction of brushwood fencing in Australia. These species are often collectively referred to as "broombush". The most common across southern Australia is *Melaleuca uncinata*, originally collected by Robert Brown at Port Lincoln in South Australia in 1802. It is a hardy, bushy shrub that grows to 4m tall, with little or no main trunk. It has many long, thin, vertically orientated branches which are strong and hard, topped with a canopy of long thin hook-tipped leaves. It is widespread in the drier woodlands, mallee and heath, where it is generally slow growing. Most forms have the capacity to resprout from an underground woody stem (lignotuber) after fire, drought or physical damage.

The stems have been much favoured for the building of fences and other structures around domestic buildings, particularly in south and eastern Australia. A small domestic brushwood fencing industry has been operating for several decades using broombush material harvested from the wild. However, as wild harvesting is restricted by conservation authorities in Western Australia, South Australia and Victoria, the expansion of the brushwood industry is constrained. The supply to WA of ready made fencing panels and bundles of brushwood, has recently been supplemented by wild harvest from western NSW, with small quantities harvested from native stands on private property in WA.

The harvesting of broombush from natural stands is either restricted or illegal in most Australian states. The long term sustainability of the industry relies on the development of broombush plantations that will complement and eventually replace the wild harvesting. An increase in the available supply of broombush would provide opportunities to expand local and export markets.

Dryland salinity is an enormous economic, environmental and social threat in the agricultural region of WA. Being a long-lived perennial species, broombush plantations can help to prevent or alleviate salinity, protect waterways, bolster biodiversity in remnant vegetation and provide an opportunity to diversify farm income

SPECIES OVERVIEW

Broombush is a myrtaceous shrub belonging to a group of species which comprise the *Melaleuca uncinata* complex. Recent field work and taxonomic study of the *Melaleuca uncinata* complex (Lepschi) has shown that the complex includes at least eleven species. Observations have shown that several species can co-occur at any given location in the wild. Many of the species are capable of resprouting (from lignotuber: a swollen woody stem at ground level) after the aerial stems are removed by physical damage (such as cutting), drought or fire. True *M. uncinata* occurs from near Munglinup in WA, east to at least the Eyre Peninsula in SA. In WA there are another ten closely related species. However, not all of these species of broombush can be considered suitable for construction of brushwood fencing.

The preferred material for brush fencing typically has long, thin straight stems (at least 1300mm long) with a persistent smooth, dark bark. Species with short, crooked stems or papery bark are not as desirable. However, the conditions under which the broombush species are grown will affect the growth rate and form which may determine usefulness for manufacture of brushwood fencing. In WA, the species most useful for brushwood fencing are *M. uncinata* and two forms of *M. atroviridis*, although the generally slower growing *M. hamata* (widespread), *M. osullivanii* (Swan coastal plain) and *M. concreta* (northern wheatbelt) may also be suitable.

Investors seeking to grow broombush for commercial purposes must ensure they have the best species for their specific site conditions. The origin of seed used by nurseries to produce seedlings (or seed used for direct seeding) should be verified as suitable. If in doubt, contact an industry representative or your local Greening Australia (WA) or CALM office.

COMMERCIAL PRODUCTS

The major commercial use for broombush is brushwood fencing. The durability of brushwood fencing is highly dependent on the quality of construction. Traditionally, in SA and Victoria, bundles were cut from wild plants and transported to the cities where skilled tradesmen would construct fences on site. This involved densely packing the stems in a supporting frame of uprights and horizontal wires that were neatly trimmed and capped with steel or brushwood. It is not uncommon, especially in rural areas to see amateurishly constructed fences that sag, and have visible gaps with stems falling out. In Western Australia, brushwood fencing can often be seen in some of the newer, more exclusive residential developments.

As brushwood fence packing is not a traditional craft in WA, the fences are usually constructed using panels, which have been packed, wired and trimmed to consistent specification in a factory. The panels are transported to the construction site and erected on a sturdy concealed steel framework.

Brushwood may also be used in gazebos, pergolas and gates, and other decorative landscape structures.

SITE SELECTION

Sufficient experience already exists to suggest that *Melaleuca* species can be commercially cultivated to produce brushwood fencing material. With good management on favourable sites, brushwood should be profitable and may provide opportunities for regional value adding.

Selecting species best suited to specific site conditions is critical to the commercial viability of a broombush plantation. Broombush species grow naturally in a wide range of conditions from cracks in rocks, to shallow rocky soil on hill-tops to deep mid-slope sands and the saline margins of

drainage lines. Improved growth and commercial outcomes will result from better growing conditions. It is important to ensure adequate depth of soil for any broombush plantation site.

Generally the preferred sites on previously cleared farmland will be mid to lower slopes where there is a depth (at least 250 mm) of sand, sandy loam or gravelly loam over clay with run on of fresh water. Sandy and more transmissive soil allows rapid penetration of rainfall through to the plant roots and clay at a deeper level allows accumulation of moisture at depth, which will be available to the deeper roots over summer. Some species are tolerant to more saline conditions, but higher levels of salinity will retard growth and hence harvesting rotation will be longer. The fresher the run on of water the better. Sites experiencing prolonged water-logging should be avoided unless mounding can ameliorate these conditions.

Broombush species grow naturally over a wide variation in rainfall. Commercial broombush plantations are probably best suited to 350 to 600 mm annual rainfall zones in southern WA. Individual site characteristics (especially soil depth), combined with annual rainfall, will determine growth rates and time to commercial harvest.

SPECIES SELECTION

Mid slopes - duplex soil

Melaleuca uncinata is lignotuberous and grows naturally on shallow red loams over granite and is one of the most desirable forms of broombush. It will grow well on mid slope duplex soils, deeper loams and sandy loams as long as there is plenty of fresh water run on and the soil is not less than 300 mm. Shallow soils over granite can be very soggy in winter, but will dry out over summer causing stress and stunted growth or plant death.

Deep sands

The lignotuberous form of *Melaleuca atroviridis*, grows high in the landscape in the northern central wheatbelt, and is ideally suited to deep, pale yellow, acidic sands

Sandy flats along saline watercourses

The larger, upright form of *Melaleuca atroviridis* is widespread through the central and southern wheatbelt, has ideal stems for brushwood production and grows vigorously on shallow sands adjacent to saline river courses. It is ideally suited to the sandy margins of saline flats. Mounding may be desirable to improve drainage and growth. It may also grow on more saline soils but cannot be expected to grow with comparable vigour. The tree form is non-lignotuberous, but will sprout from the trunk if cut well above ground level.

Swampy Coastal plain

Melaleuca osullivanii is native to the coastal plain between Perth and Busselton and is sometimes used as capping on brushwood panels. It grows naturally on grey sands over clay in seasonally waterlogged areas. As wild trees they may have an unruly, straggly form but dense cultivation in ideal conditions should produce commercial stems.

Other

Melaleuca hamata is a lignotuberous species which is widespread across the wheat belt, occurring in a diverse range of soil types from shallow rocky soil to clay and sandy clay loams. In good conditions it may produce good stem form for brushwood, although its growth rate may not match other species. Considerable variation in plant form occurs between different localities, necessitating care in selection of seedlots for brushwood production. It may be used where additional landcare objectives and the desire to use local species may outweigh commercial growth rates.



Remnant *Melaleuca concreta* Wongan Hills, WA

M. concreta which grows from the the lower Murchison River district southwards to the Cataby-Regans Ford district, can also produce fine brushwood material if provided with suitable growing conditions.

PLANTATION SIZE

A minimum of 5 hectares is suggested for a commercial plantation. This should ensure that the producer will have a sufficient quantity of material (at least one semi trailer truck load of 20 tonnes) at harvest to be useful to manufacturers, and that there will be a substantial investment incentive to ensure good management. Bigger plantations, 100 hectares or over may allow sufficient annual turnover from staggered planting and harvesting to constitute a stand alone enterprise.

PLANTATION DESIGN

Broombush species are somewhat susceptible to grazing by stock, particularly in the initial years of establishment. Plantations should be fenced to avoid physical damage and opportunistic grazing. Broombush plantations will be better suited to block type plantings, where specific soil types can be targeted, and plantations easily fenced. Wide belt plantings, can be considered along creek lines or existing fence lines. Alley type systems may not be suitable, as extensive fencing would be required if stock are to graze between the alleys.

Consideration should be given to accessibility for harvesting and maintenance operations. This includes a suitable network of vehicle access lines, adequate firebreaks and sufficient turning space for operations such as spraying. Very steep or rocky sites may not be suitable.



Three year old brushwood plantation, Central Wheatbelt

ESTABLISHMENT

There are two main methods for establishing broombush; nursery raised seedlings and direct seeding. Different site preparation methods are required for each establishment method. Direct seeding offers the potential for lower establishment costs, however reliable direct seeding methods for broombush have not yet been proven. The most appropriate method to use will depend on site conditions, available equipment and finance and the acceptable level of risk to the investor.

SITE PREPARATION

Individual site characteristics influence site preparation methods. Heavy grazing and spray topping in the year prior to establishment can be effective in reducing weed burden and accumulating soil moisture for sites where seedlings or direct seeding techniques are to be used.

Seedlings

For establishment using seedlings, planning is required to ensure seed of suitable provenance is available to your preferred nursery. Nurseries will need to have seed by November-early December to ensure suitably advanced seedlings are available for the planting season in the following year (June - August). When planted, seedlings must have a well developed root ball and ideally be at least 100mm tall.

Weed control in the year previous to planting will allow soil moisture to accumulate.

On lighter textured soils, machine planting in a one pass rip/scalp/plant operation is efficient and effective. Scalping, where the surface layer of the soil containing weed seed is mechanically removed, can provide effective weed control in the year of planting. Alternatively, sites can be rip/scalped and then hand planted. On sites prone to heavy weed infestations, the application of a knockdown herbicide 2-4 weeks prior to scalping is recommended. However, some weed cover between scalped lines may be desirable on sites at risk of wind erosion.

On heavy textured soils, or sites prone to seasonal water-logging, ripping and mounding is recommended. April is generally a suitable month to construct mounds, while the site is relatively dry. Ensure that the mounding equipment includes a roller to flatten lumps on the mound. A smooth, flat surface will greatly improve chemical weed control. Following the first weed germination (typically around late-

May), apply a knockdown/residual herbicide mix. A mixture of glyphosate and simazine (at recommended rates) has been found to be highly effective for controlling a wide range of weed species on many sites. A second knockdown herbicide treatment may be required just prior to planting if additional weed germination occurs. Care must be taken when planting into ground previously sprayed with pre-emergent herbicide as soil moisture and level of organic matter will determine location and activity of the chemical.

Aim to plant seedlings between late June and early August. Upland, free draining sites are suited to earlier planting, while seasonally wet sites can be planted later in the year. Ensure that nursery seedlings comply with recommended quality specifications and are healthy and well-watered immediately prior to planting. It is advisable to ensure that the moisture filled root ball is planted at least 20mm below ground level.

Planting design

Optimal seedling densities for the production of brush fencing material have not been fully researched. High stocking densities will encourage more upright growth, whilst lower stocking densities on less favourable sites will allow maximisation of individual plant height. For establishment using seedlings, the economic attractiveness of planting seedlings will diminish substantially as stocking density is increased.

A target establishment density of 2,000 to 5,000 plants per hectare is recommended to achieve a workable compromise between growth rates, plant form and establishment costs. It is possible that stocking densities could be increased further on prime sites, however the increased seedlings costs may offset any productivity gains. Establishment costs using seedlings, inclusive of all required operations, are typically in the range of 50c-80c per planted seedling.

To achieve a stocking density of 5,000 stems per hectare, plantations can be established with rows 4 metres apart, and seedlings 500mm apart within the rows. At this density, the planted cost will be between \$2500 and \$4000 per hectare.



Melaleuca atroviridis seedling plantation at 5000 per hectare

Direct seeding

Direct seeding offers scope for the establishment of high density broombush plantings at relatively low cost. However, fine seeded species such as broombush have proven to be difficult to establish reliably using conventional direct seeding methods. Improved methods are being actively investigated.



Eight month old direct seeded *Melaleuca hamata*

A typical seeding rate for broombush is approximately 0.5 kg of seed per hectare. Unselected seed generally costs between \$400 and \$600 per kg. Specially selected seed may cost over \$1000 per kg. Therefore, if seeding at 0.5 kg per hectare, seed will cost up to \$500 per hectare. Higher seeding rates can be used, which is still cheaper than buying nursery grown seedlings.

Some soil types and sites will be more suited to direct seeding than others. Direct seeding will be less effective in fine textured, dry soils, which can blow away with the seed or be blown over and bury germinating seedlings. Sites with uncontrolled heavy weed burden should not be considered for direct seeding and deeper sandy sites may dry out too fast for young seedlings to establish.

Direct seeding is most likely to succeed in weed free sites where the soil is well structured with larger particle size, which can hold seed in place, retain moisture and will not blow.

Direct seeding should be conducted using purpose built equipment which seeds into a scalped bed from which the topsoil and associated weed seed bank has been removed by a scalping blade. A number of direct seeding machines, designed to be towed by a medium sized tractor, are available for purchase or hire in WA. Press wheels are important to provide good soil to seed contact. Residual herbicides should be used with great care if sprayed in the year of establishment. Soils with high organic matter that lock the pre-emergent near the surface can be scalped off.

Seedlings emerging from direct seeding can be susceptible to attack by redlegged earth mites, insects or vertebrate pests. Regular monitoring is warranted to provide early detection of pest activity. Control measures, such as the application of registered insecticides, may be required.

Successful direct seeding can result in many seedlings germinating per metre of rip line in spring, and establishment of at least 10,000 per hectare. An ideal direct seeding result would provide at least two plants per metre of rip line (evenly distributed) at age one year. Row spacing at this density will determine overall plants per hectare. If insufficient seedlings establish, nursery seedling planting may be required in the second year to achieve stocking densities.

Second Year Weed Control

The growth of broombush will be improved if weeds are controlled in the second year of establishment. This can be achieved by spraying between rows with a Simazine based residual herbicide at the break of season. If some weeds have already emerged, a low rate (<250g per hectare active ingredient) of a Glyphosate based herbicide can be added to the inter row spray application.

A number of other selective herbicides may be suitable for the control of specific problem weeds.

POTENTIAL YIELDS

The number of plants per hectare, management, time to first harvest and site conditions will determine the yield.

Observations in trial plantations and revegetation in WA indicate variation in potential yields, but time to first harvest is expected to be about five years. One private brushwood fence building company promoting plantation establishment, estimates 30 tonnes per hectare of brush is achievable at the first harvest. However, bigger plants in roadside revegetation have produced 25 kg each, which at a low density of 1000 per ha would produce 25 tonne/ha.

The prospectus of a private investment company's brushwood project forecasts a yield of 6 kg of brush material per plant at first harvest at age five years, which equates to 48 tonnes per hectare. This estimate was made from extensive sampling of established brushwood in the northern wheat-belt.

Brushwood, when bundled, may wholesale on current markets for between \$120 and \$300 per tonne, which results in a gross return of between \$3,000 and \$7,500 per hectare at first harvest for a mid range yield of 25 tonnes per hectare. The price paid per bundle will depend on the quality of the brush in terms of the stem length, thickness, degree of branching, leafiness, nature of the bark and current market demand.

The time between the first and the second harvest may be shorter, due to the plants having an established lignotuber and root system, but will depend on annual rainfall as stored groundwater will have been used by the growth to initial harvest. To date, the ability of different broombush species to resprout under a regular harvesting regime has not been well researched.



Bundles of wild harvested broombush

HARVESTING TECHNIQUES

Broombush is traditionally harvested by hand using a machete or shoulder mounted mechanical brushcutter and then bound in bundles of 25kg to 35 kg. The establishment of bigger plantations could facilitate the development of mechanical harvesting and bulk handling of brushwood.

Harvesting should be carried out when there is sufficient soil moisture to sustain resprouting, such as late winter or early spring. Late autumn harvesting may also be considered but resprouting may be slow through winter. Harvesting in summer may result in drought deaths.

MAINTENANCE

To ensure survival of plantations after establishment, owners need to ensure that they are adequately protected from fire by careful site planning and establishment and maintenance of firebreaks. It may be practical to spread larger plantings into smaller discrete plantings to protect from the potential of total loss to fire. A minimum firebreak of 20 metres of bare earth should be considered between block plantings of five hectares. Local authorities and fire services can also advise on firebreak requirements.

Leaf chewing insects, such as spring beetles, are another potential hazard capable of reducing plant productivity. Insecticide treatments may be required for sites that are repeatedly attacked.

REGIONAL VALUE ADDING

The profitability of broombush will be affected by distance from markets. Unprocessed brush material has a low bulk density, which makes it poorly suited to efficient, low cost transportation. The prospect of value adding close to the plantations may be attractive and feasible. Most broombush sold in WA today is marketed as ready made panels which could be constructed in regional factories and transported as a much higher value end-product.

Some commercial panels are 1.8x 2.2 metres and require about 100 kg. Assuming a yield of 25 tonnes per hectare of brush produced in 5 years, this could be value added to 250 new panels. If each panel retails for around \$125, a retail value of \$31,250 per hectare after five years could be achieved.

Government control Regulation

In WA, the Department of Conservation and Land Management is responsible for protecting and conserving the natural flora and through its Wildlife Protection Branch ensures that any commercial harvesting of native species is conducted in a sustainable manner. Currently the department is not issuing licences to harvest broombush from crown land due to concerns of overcutting and limited ability of natural stands to recover after harvesting. Harvesting from wild plants on private land is technically possible; however harvested material cannot be sold without licence from the Department of Conservation and Land Management. Licences to harvest from wild plants on private land will not be issued without inspection to determine if the proposed harvest area is likely to recover. Currently there is very little broombush supplied from private land in WA.

A licence to harvest broombush cultivated on private land (previously cleared farmland) is obtainable from the Department of Conservation and Land Management. Landholders and investors considering growing broombush for sale should discuss the matter of licencing for harvest

and sale with their local Conservation and Land Management office.

Current Commercial Planting

In recent years in WA a broombush industry based on cultivated plantations has begun to develop. Brushwood Australia, a company based in Jandakot and involved in the manufacture and construction of brushwood fences, has been actively involved in promoting cultivation of broombush to wheatbelt landowners. The Rewards Group Limited, based in West Perth, has raised prospectus capital and established commercial plantings on behalf of investors in the central wheatbelt. There are also numerous small private plantings. Some revegetation consultants can supply broombush seed and direction on establishment and broombush form selection.

ACKNOWLEDGEMENTS

Thanks

- Daniel Huxtable from the Department of Conservation and Land Management Revegetation Systems Unit - for providing useful information on all aspects of the industry;
- Stephen Darley of Brushwood Australia - for providing valuable information on form selection, harvesting, processing and fence construction;
- Geoff Cockerton of Landcare Services - who was a great source of practical information on plantation establishment and the brushwood industry; and
- Wayne O'Sullivan - who gave freely of his knowledge of the many species which make up the broombush complex.

References

- Brushwood Australia. Brushwood Fencing. Kwinana, 2001.
- Bulman, P P Beale and A Knight. "Growing Broombush for profit and land protection" Bulletin Jan 1998 Primary Industries and sources. South Australia, 1998.
- Forest Rewards Ltd. Brushwood Project 2001. West Perth, 2001.
- Lepschi, Brendan and Lyn Craven. Field work and taxonomic study of Melaleuca uncinata complex. Centre for Plant Biodiversity Research, Commonwealth Government, Canberra, 2004.

Contacts

Chris Robinson
Greening Australia (WA) Albany Office
(08) 9892 8486

Tim Emmott
Greening Australia (WA) Northam Office
(08) 962 12400

Disclaimer

This information is provided in good faith, and was considered correct at time of printing.

Greening Australia (WA) recommends that readers carefully evaluate the accuracy, currency, completeness and relevance of the material in this document for their purposes.

This document is not a substitute for independent professional advice and readers should obtain any appropriate professional advice relevant to their particular circumstances.