Growing Firewood in South Australia

Introduction

This fact sheet outlines key considerations for growing firewood in South Australia. It covers species selection, planting design, harvesting, and marketing of firewood.

A firewood enterprise offers several benefits. These include:

- income generation faster than from sawlog production
- biodiversity conservation, management of salinity and water logging issues, and the creation of shade and shelter on farms
- value-adding through harvesting and marketing
- opportunities to better utilise sites of lower productivity
- reduced need for management practices such as pruning and thinning
- reduced establishment costs through the selection of coppicing species (re-shooting from cut stumps) instead of replanting

Despite the potential benefits of a firewood production enterprise, some uncertainties and market risks remain that need consideration.

Demand and supply of firewood

Wood heaters are popular for home heating, with nearly a quarter of Australian homes using firewood as an energy source. A similar proportion of South Australian homes also use wood for heating (Romanach and Frederiks, 2020). Wood is an effective, renewable fuel when burnt efficiently. However, wood heaters can be a major source of air pollution if they are poorly designed or operated incorrectly.

Popularity of firewood is likely to continue. There are a range of tools and resources for minimising wood smoke pollution including:

- adherence by wood merchants to the Voluntary Code of Practice for Commercial Firewood Suppliers, which encourages sale of well-seasoned wood; and
- the development of more efficient burning systems and education programs about the effective use of slow combustion heaters.

Most firewood is currently supplied from older slow growing tree species (mallee, red, pink or blue gum, sheoak or box species) from Victoria and New South Wales. They are, however, a finite resource. Therefore, market adjustment and education are needed to encourage acceptance of plantation-grown firewood, which burns well but with different burning characteristics.

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Figure 1. Four-year-old sugar gum woodlot (source: PIRSA)

Characteristics of good firewood species

The following characteristics are beneficial for firewood species:

- quick growing
- coppicing
- producing a dense wood
- easy to split
- slow and steady burning with minimal ash production

Tree species considered to have the most potential for plantation firewood production are listed in Table 1, along with their burning properties, site requirements and growth attributes.

Establishment considerations

As with all crops, site conditions directly affect the quality of trees grown. Shallow, stony sites produce slower growing trees, resulting in a long wait for relatively small timber yields. On the other hand, deeper, moist soils support faster growing trees.

Firewood is best grown in woodlots or belts of trees, at least six rows wide. A planting density of 800 to 1400 trees per hectare is suggested in areas where average annual rainfall is greater than 600 millimetres (mm). On sites with lower rainfall, 400 to 800 trees per hectare is usually suitable.

A common mistake in establishing a woodlot is to plant trees too close together. This increases seedling costs and results in many spindly stems too small for harvest and sale.

Management options

Three broad options exist for firewood production. The selection of an appropriate management regime will depend on the site and aims of the tree grower.

Firewood specific woodlots

Plantings that are established specifically to grow firewood.

Integrated firewood and sawlog production

Trees are principally planted for sawlog production. The woodlot is thinned to remove trees of poor size and form at a time when they are large enough for firewood. Remaining trees are grown on for other products, with sawlogs as the final product. Care is essential during thinning operations to avoid damaging the potentially high-value sawlogs produced from the remaining trees.

Low intensity direct seeded woodlots

This system typically uses local species which are established by direct seeding. In addition to producing a firewood crop, it satisfies conservation and habitat (shade and shelter) values. This regime is best suited to the supply of personal firewood or large, low yielding plantings in lower rainfall situations. Direct seeding of more productive species in higher rainfall zones allows large areas to be established at lower cost than planting seedlings.

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Harvesting

The optimal time to harvest plantation trees can be determined through regular measurement and monitoring and the demand. Generally, firewood growers base their harvest decisions on tree age and size, market demand, and the timing of other farming operations.

In areas receiving an average annual rainfall of greater than 600 mm, fast growing tree species are likely to be large enough for firewood harvest in 10 to 15 years. Three different approaches to harvesting firewood are shown in Figure 3. Firewood specific woodlots are likely to be clearfelled, while selective felling would be used in integrated firewood and sawlog production. Row felling may be carried out if firewood production is combined with biodiversity conservation, soil management, or shade and shelter purposes.

A firewood harvesting operation can be broken down into the following components:

- **tree felling and delimbing** - trees are felled, then the branches and heads are removed, creating a bare log. The leaf and branch litter are best left on site to return nutrients for the next crop.
- **extraction** - whole stems are taken out of the plantation to an adjacent area before being cross-cut into shorter lengths, or whole stems may be cross-cut within the forest before being taken out.
- **cross cutting** – cross cutting green wood into firewood billets (30 centimetre lengths) is easier than cutting dry wood. Shorter lengths of wood also dry faster. Many commercial firewood processing machines cross cut and split the timber in the same operation.
- **stockpiling for drying** - firewood must be sold by weight with an internal moisture content of less than 25%. Multiple factors affect drying times of newly processed firewood including, species, age, diameter, percentage of heartwood, and exposure to temperature and wind while curing. Smaller diameter wood with little heartwood is likely to need harvesting at least six months in advance of anticipated use to ensure adequate drying, whereas older slower grown timber with greater heartwood could take up to 12 months or more to dry sufficiently. Smaller, partly covered stacks, raised off the ground and exposed to air-flow are best for drying processed firewood and fungal growth.
- **splitting** - dry wood is generally easier to split than green wood and for this reason, splitting has traditionally been combined with loading to reduce double handling. However, many modern firewood processing machines crosscut and split logs in one action, which is best done on green logs.
- **loading and transport** - small scale operations are generally loaded by hand to separate wood from unwanted bark. Larger operators often use a conveyor belt loading system and stack the wood to reduce transport costs.

Figure 2. Mechanical timber harvester processing Tasmanian bluegum (Source: PIRSA)

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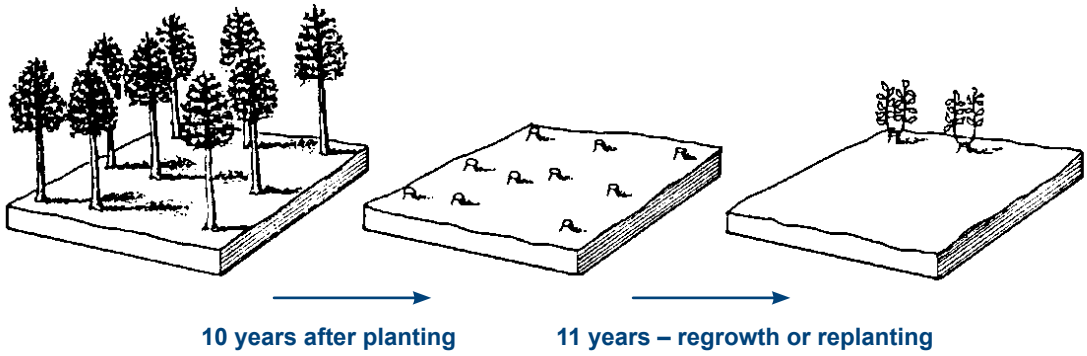
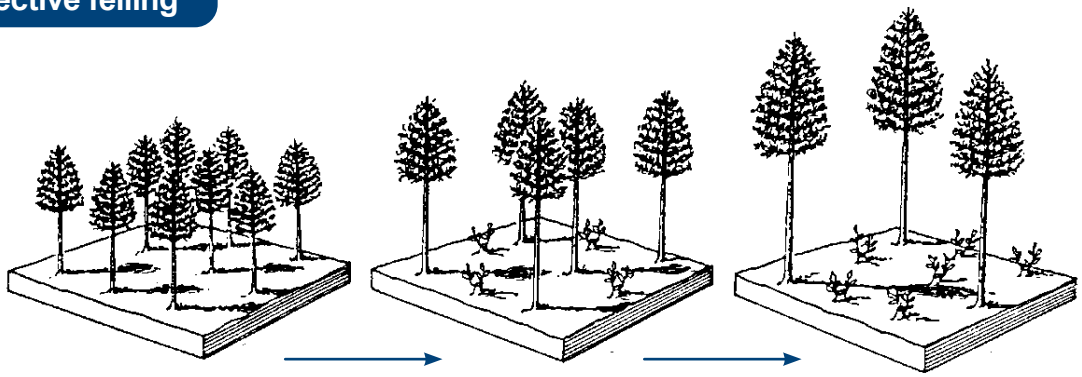
(a) Clear-felling



(b) Selective felling



(c) Row felling

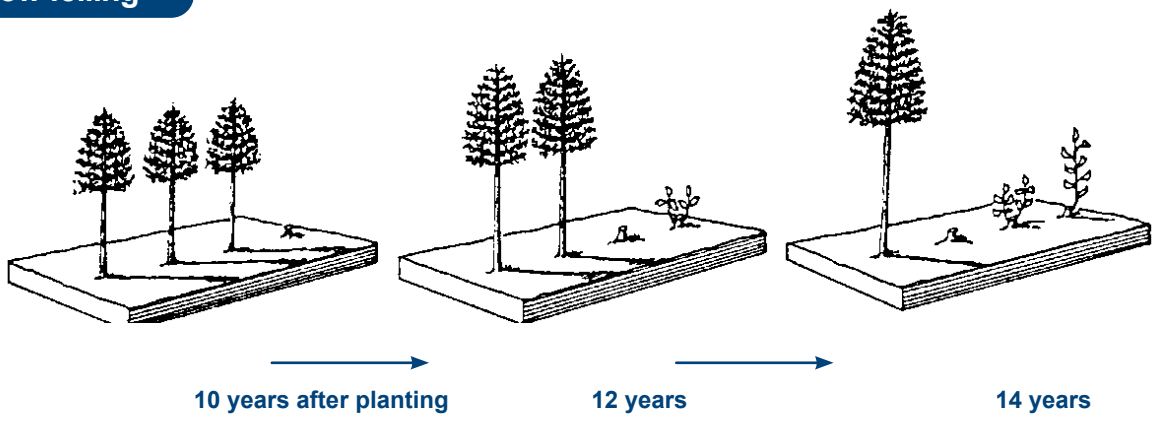


Figure 3. Three different approaches to harvesting firewood (adapted from Bulman,1995)

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Table 1. Potential firewood species for South Australia and their requirements and attributes (adapted from Bird, 2000; Sonogan, 2002; and Measki, 2003)

Species	Firewood attributes				Site requirements		Growth attributes				Other potential uses
	Splitting	Ignition	Coaling	Sparks	Minimum rainfall	Soil type	Growth rate *	Frost tolerance	Salt tolerance	Ability to coppice ^	
Sugar gum *Eucalyptus cladocalyx*	Difficult	Poor	Excellent	Few	350 mm	Prefers sandy clay loam with moderate drainage	Moderate	Low	Low	Excellent	Panelling, heavy construction, building framing, decking, internal flooring
Swamp yate *Eucalyptus occidentalis*	Difficult	Poor	Excellent	Few	350 mm	Prefers sandy clay flats, tolerant of poor drainage, drought and salt	Moderate	High	High	Good	Fencing posts/poles, heavy construction
South Australian blue gum *Eucalyptus leucoxylon*	Difficult	Poor	Excellent	Few	450 mm	Prefers moist sandy clay	Moderate	High	Moderate	Good	Fencing posts/poles
Early black wattle *Acacia decurrens* **Late black wattle** *Acacia mearnsii*	Excellent	Excellent	Good	Few	500 mm	Tolerant of poor drainage, grows on most sites, prefers sandy clay loams	Fast	Moderate	Low	No	Tanning bark, fencing posts/poles
River red gum *Eucalyptus camaldulensis*	Difficult	Poor	Excellent	Moderate	500 mm	Tolerant of a wide range of conditions, waterlogging and salinity	Slow	High	High	Good	Furniture, bench tops, fencing posts/poles, heavy construction, internal flooring
River she-oak *Casuarina cunninghamiana*	Good	Poor	Excellent	Few	500 mm	Prefers deep sandy or gravely soil	Moderate	Moderate	Moderate	No	Furniture, panelling, fencing posts/poles
Tasmanian bluegum *Eucalyptus globulus*	Fair	Fair	Good	Few	600 mm	Prefers heavy loam clay, grows on a range of sites	Fast	Moderate	Low	Excellent	Fencing posts/poles, building framing, internal flooring, woodchips
Silver wattle *Acacia dealbata*	Excellent	Excellent	Good	Few	600 mm	Prefers deep clay loams in valleys	Fast	High	Low	No	Panelling, furniture, veneers

* Growth Rates for firewood production: Fast 10 -15 years, Moderate 15- 20 years, and Slow 20+ years.
^ Species that coppice readily should be chosen if a long-term enterprise is planned.

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Figure 4. Coppice regrowth on harvested sugar gum stump (source: PIRSA)

Coppice management

The ability of a tree to coppice is a valuable attribute for a firewood plantation as it saves on the cost of seedlings for a successive crop.

The management of a coppice crop, however, can be labour intensive. Coppice growth should reach 60 centimetre in height before thinning to the three strongest shoots on each stump. When the growth is approximately 1 to 5 metres high, further thinning to one shoot per stump should be undertaken. Alternatively, coppice growth can be left to look after itself, but a more uniform crop is achieved from an actively managed coppice stand.

Some points to note:

- the ability to coppice declines as stumps age
- coppice regrowth is likely to reach harvestable size 10% quicker than the original planting because of the existing developed root system
- stumps should be cut to a height of half their diameter to aid wind firmness
- stumps should be cut on an angle rather than flat to avoid water ponding which causes decay

Marketing

The following three marketing options currently exist for the firewood grower:

Sell the standing crop to a harvester or merchant

This is the easiest option, offers the least amount of work but the lowest return. Sale price depends on the volume to be harvested and the ease of harvesting. Difficult sites with a low volume are least attractive and will attract lower returns.

Harvest and transport yourself and sell to merchant

This can be very profitable, but the amount of labour required and the cost of machinery should not be underestimated. Merchants usually require delivery by the truck load (10 or 20 tonnes) and the wood to be dry, cut to length, split where necessary and bark free. Most merchants abide by the Voluntary Code of Practice for Commercial Firewood Suppliers, and would require the same of their suppliers.

Harvest and retail yourself

This approach maximises value adding, even though returns depend on how far afield it is sold. Firewood is generally sold in lots of under four tonnes and delivered to the households. This overcomes the need for heavy transport equipment, but a small truck or tipping trailer may be required. Importantly, since firewood is sold by weight, a weighbridge ticket is also required.

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Figure 5. Plantation bluegums with coppiced stems and fresh coppice growth (source: PIRSA)

References:

Bird, P.R. (2000) *Farm Forestry in Southern Australia: a focus on clearwood production of specialty timbers.* The State of Victoria, Department of Natural Resources and Environment.

Bulman, P. (1995) *Farmtree$ for the Mount Lofty Ranges: A Regional Agroforestry Handbook*. Primary Industries SA.

Measki, B.(2003) *Farm Forestry Species for South West Victoria.* Agriculture Notes. Victoria Department of Primary Industries.

Romanach, L. and Frederiks, E. (2020) *Residential Firewood Consumption in Australia*. CSIRO, Australia.

Sonogan, B. (2002) 'Plantation Grown Firewood for Home Heating! What are the Obstacles?', *Agroforestry News,* Autumn, pp 16-17.

Further Information:

Australian Government, Department of Industry Science and Resources

Information on selling firewood by weight, volume or lot is available at **industry.gov.au/national-measurement-institute/trade-measurement/selling-firewood**

Farm Forest Line

Information on tree and forest measurement is provided at **farmforestline.com.au**

Firewood Association of Australia

Voluntary Code of Practice for Commercial Firewood Suppliers is available at **firewood.asn.au**

Tree measurement manual for farm foresters

agriculture.gov.au/abares/forestsaustralia/publications/tree-measurement-manual

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