FARM FORESTRY NOTE 7/98

Farm Forestry in the Adelaide Hills/Fleurieu Peninsula

FIREWOOD GROWING IN THE ADELAIDE HILLS AND FLEURIEU PENINSULA

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This Farm Forestry Note provides an introduction to firewood growing within the region:

- the species to grow
- planting designs
- harvesting
- marketing.

The Adelaide Hills and Fleurieu Peninsula are well suited to firewood production because of:

- productive growing conditions
- proximity to the Adelaide market
- scope for plantings to address landcare concerns
- benefits when integrated with conventional farm pursuits.

A firewood enterprise offers several advantages:

- firewood production is quicker to generate returns than sawlog production — generally 10–12 years from planting to harvest
- you can add value by harvesting and marketing your own resource
- you can produce firewood on sites of lower productivity than required for sawlog production
- once established there is little need for further management such as pruning and thinning — you only need to sit back and watch it grow
- if you use species that coppice from the cut stumps you can avoid the expense of replanting a second crop.

Wood quality

The majority of firewood burnt currently still comes from old slow growing trees — mallee, red, pink or blue gum, sheoak or box species from Victoria and New South Wales. Their slow growth rate yields dense slow-burning firewood.

They are however a finite resource. Market adjustment and education will be needed over the next few years to encourage acceptance of plantation grown firewood. This faster grown wood will still burn well but will not have the slow burning characteristics of old growth trees. The heat yield or calorific value *per tonne* will be the same; it's just that your firewood stack will be a little larger!

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Prospects for the future

The last survey undertaken by the Australian Bureau of Statistics (1989) found that one in five households used firewood as their main form of heating and that 415 300 tonnes of firewood was used in South Australia in 1989. While this figure was for the whole of South Australia the largest proportion was presumably consumed in Adelaide.

If supplied from plantation grown firewood on a sustainable yield basis with a 10 year rotation, this would require a plantation area of around 27 000 hectares.

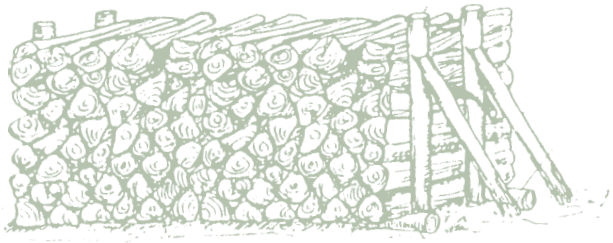
Although gas heating is relatively cheap and convenient, firewood consumption continues to rise. However, this does not mean the price will rise under the law of supply and demand. The home heating market is notoriously fickle and consumers frequently switch as one form or another goes out of favour or becomes more expensive. This was highlighted by the switch from oil heating in the 1970s. Firewood prices — and hence returns to the grower — are therefore capped by the costs of alternative heating fuels.

If environmental legislation were passed requiring reduced smoke emissions firewood could quickly go out of favour. However, the industry hopes that the development of more efficient burning systems and education programs on efficient use of slow combustion heaters may avert the need for legislation.

The fact is that growing firewood is potentially very profitable but there is some uncertainty and the market risk requires individual consideration.

Firewood species should:

- be quick growing
- be able to coppice
- give a dense wood
- be easy to split
- burn well leaving little ash.



Design

Firewood is best grown in woodlots or belts of trees at least six rows wide. Tree planting density, growth rate and species selection are largely governed by soil moisture availability and rainfall. Where rainfall is greater than 600 mm then 1100–1600 trees per hectare are desirable. On drier sites, (450–600 mm rainfall) 800 to 1100 trees per hectare are a better proposition. These initial stocking rates allow for seedling mortality of up to 10% without requiring any subsequent replanting, except perhaps where a number of consecutive trees fail within a row or adjacent rows.

The most common mistake made in establishing a woodlot is to plant the trees too close together. This means high seedling costs, excessive competition between trees for moisture and nutrients, resulting in many spindly stems too small for harvest and sale.

Management options

Three broad options exist for firewood production:

Specialist woodlots

Plantings which are specifically established and committed to the growing of firewood. These are commonly established at 1100–1600 trees/ha, with a row spacing of 3–3·5 m enabling tractor access.

Integrated firewood sawlog production

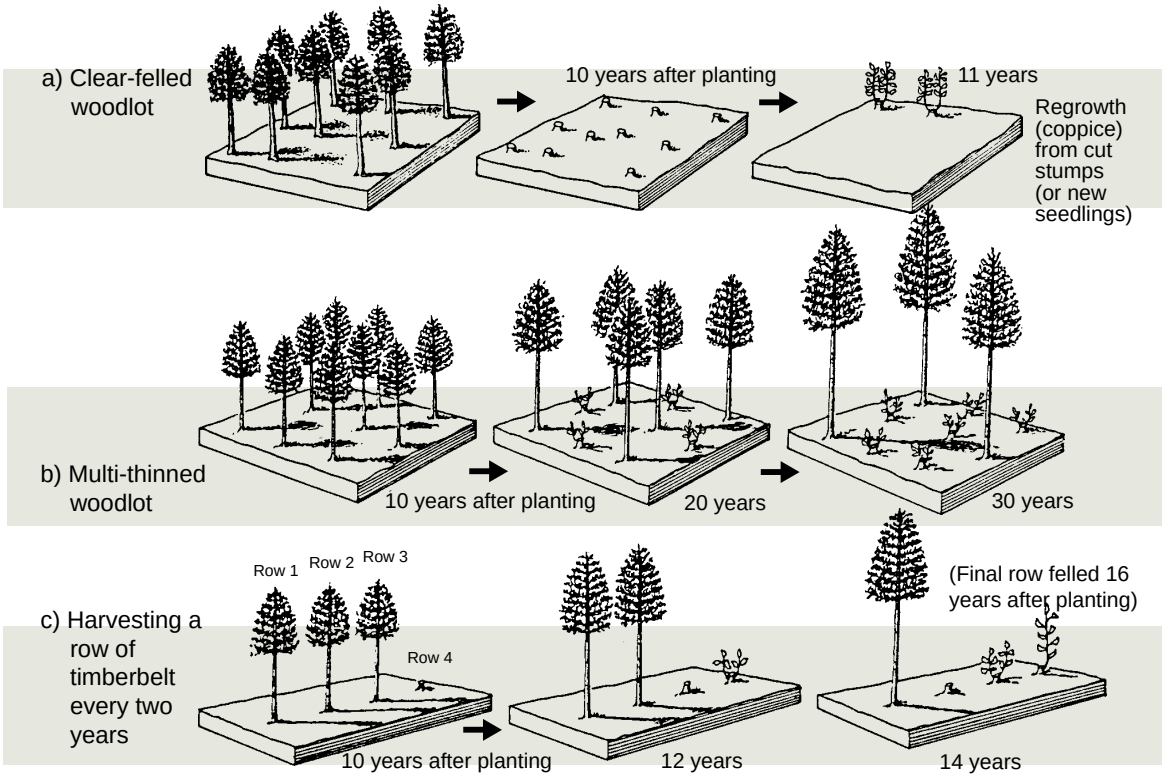
The trees are principally planted for longer term sawlog production. The stand is thinned, removing trees of poor form and vigour at a time when they are large enough for firewood. Firewood is produced at the expense of achieving maximum sawlog growth rates, as trees of low quality are maintained on the site until they reach commercial firewood size. In doing so they compete with the sawlog crop for limited site moisture, nutrients and sunlight.

Care is essential during thinning operations to avoid damaging the potentially high-value sawlogs in the remaining trees.

Low intensity direct seeded woodlots

This system typically uses local species which are established by direct seeding. It is valuable in satisfying conservation and habitat values in addition to producing a commercial crop. 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. To optimise production with direct seeded areas extra work is needed to space the stand by thinning and infilling.

Three different approaches to harvesting firewood



Where to Plant?

As with all crops, the better the site the better the trees. Shallow, stony sites produce slow growth rates, resulting in a long wait for relatively small timber yields and a poor return on investment. You may be tempted by the low agricultural value of these sites but recognise their production limitations.

If you combine shelter and firewood in a belt, plan your harvesting carefully so some shelter remains at all times. The cropping must be part of a comprehensive dynamic shelter system.

If you have saline or wet paddocks by planting interception belts upslope of the problem area you will generally yield high volumes of wood and help lower the watertable.

Selected Firewood Species for the local region matched against suitable site types (Yield in dry tonnes/ha on a 10 year rotation)

Species	Common name	Site requirement	Tall Stringybark	Manna gum/Candlebark	Blue gum	Red gum	Short Stringybark	Pink gum	Peppermint box
Single purpose maximum volume firewood production									
Eucalyptus globulus	Tasmanian blue gum	high rainfall, productive sites	150-250	150-250	100-200	100-200	60-100	60-100	x
Eucalyptus grandis	Flooded gum	high rainfall, productive sites	150-250	150-250	100-200	100-200	80-120	x	x
Acacia mearnsii	Black wattle	high rainfall, sandy soils	150-250	150-250	100-200	x	120-150	100-120	x
Eucalyptus cladocalyx	Sugar gum	drier harsh sites, ridges, shallow soils, lower rainfall	120-160	120-160	80-120	80-120	50-100	50-80	50-60
Integrated firewood/sawlog enterprise (volume of firewood harvested/volume left remaining in sawlog stand)									
Corymbia maculata	Spotted gum	productive sites	80/80	80/80	70/70	60/60	x	x	x
Eucalyptus saligna	Sydney blue gum	productive sites	100/100	100/100	80/80	80/80	x	x	x
Eucalyptus globulus	Tasmanian blue gum	productive sites	130/120	130/120	100/100	100/100	x	x	x
Low productivity - local species production									
Eucalyptus camaldulensis	Red gum	wet sites	60	60	40	50	x	x	x
Eucalyptus leucoxylon	SA Blue Gum	mid-slopes	50-80	50-80	30-60	40-60	x	20-40	x
Eucalyptus fasciculosa	Pink Gum	ridges, shallow soils, exposed sites	30-50	30-5	3-50	30-50	20-40	20-40	20
Allocasuarina verticillata	Sheoak	dry sites, low rainfall	20-50	20-50	20-50	20-50	20-40	20-40	20

x = not suitable

When is it time to harvest?

The most efficient time to harvest for maximum volume of wood is when the average rate of growth of the stand is at its maximum. This is when the current rate of growth becomes less than the average rate of growth since planting. *(see fig graph: Time versus growth , CAI, MAI)*

This is only a guide and the stems must be of appropriate diameter — neither too skinny nor so large that they require splitting. However, you may have personal or market reasons for cutting firewood earlier or later than the point of maximum average wood production.

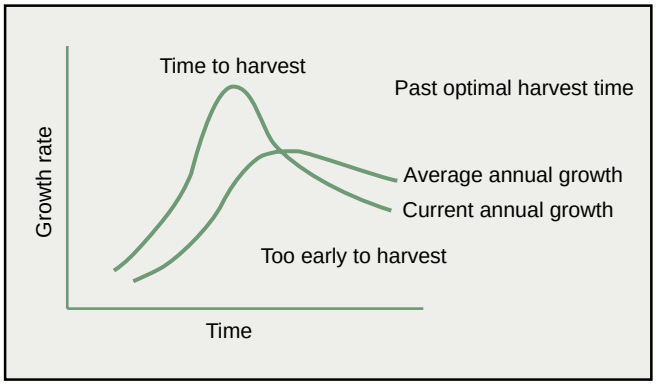
Although growth can be followed closely by measuring the trees you may not feel it is worth the effort and base your "time to harvest" decision on the age and size of the trees.

Typically the rotation length will be 10–12 years in areas receiving greater than 600 mm annual rainfall and 2–3 years longer on drier sites or those with poor soils.

The total volume of wood produced is given by the following equation:

Total Volume = Rotation length in years x Mean Annual Increment*

Time versus growth



* given in dry tonnes/ha/year for the selected species and matched to an indicator site quality species in the table above.

Marketing

Three marketing options exist for the firewood grower:

Sell the standing crop to a cutter or merchant.

This is the easiest option, offers the least amount of work but the lowest return — $10–25/tonne. 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 a lower price.

Harvest and transport yourself and sell to wood merchant.

This can be very profitable but don't underestimate the amount of labour required and the cost of machinery needed. Merchants usually require delivery by the truck load —ie 10 or 20 tonnes — and the wood to be dry, cut to length, split where necessary and bark free. The current price is $95–105/ tonne.

Harvest and retail yourself.

This is the ultimate in value adding! Prices depend on how far afield you sell and may vary from $100 to $160/tonne. Firewood is generally sold in under four-tonne lots, delivered to the householder. This will overcome the need for heavy transport equipment but you may still require a small truck or tipping trailer. Remember, to be legal firewood must be sold by weight so you will need a weighbridge ticket.

Profitability

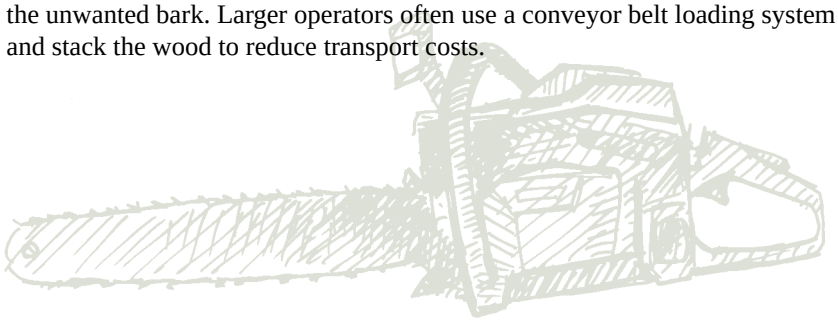
Don't work out the profitability of your enterprise by simply multiplying the total volume by the current retail price. The retail price is not what you will bank as it includes the costs of harvesting, transporting and retailing the wood.

Harvesting

Usually in a firewood harvesting operation all the trees are felled. Where the stand is to be grown on for sawlog, a thinning operation removing the poorer trees will yield firewood material.

A firewood harvesting operation can be broken down into component operations:

- tree felling and delimbing — trees are felled with a chainsaw, then the branches and heads are removed. The leaf and branch litter is best left on site to return nutrients for the next crop.
- extraction — there are many options and variations for extraction. After delimbing, whole stems can be extracted before cross-cutting into billets for extraction or cross-cutting into final product dimensions before extracting from the forest.
- cross cutting — cross-cutting green wood is easier on equipment than handling dry wood. Cross-cut wood will dry more quickly than longer billets. A bench saw is cheaper and more efficient to operate than a chainsaw.
- stockpiling for drying — firewood must be sold by weight Wood must be cut at least six months in advance of anticipated use to ensure adequate drying Smaller stacks open to the wind and sun are best
- splitting — dry wood is generally much easier to split than green wood and so splitting is often combined with the loading operation to reduce double handling. Hydraulic tractor mounted splitting equipment is available.
- loading and transport. — generally loaded by hand to separate the wood from the unwanted bark. Larger operators often use a conveyor belt loading system and stack the wood to reduce transport costs.



Coppice management

The ability of a species to coppice (produce new growth shoots from a cut stump) is a valuable attribute for a firewood species as it saves on the purchase cost of seedlings for a second crop.

Appropriate management of a coppice crop can be laborious. You should allow coppice growth to reach 60 cm in height before thinning to the three strongest shoots on each stump. When growth is approximately 1·5m high undertake further thinning to one shoot per stump. Alternatively you can leave the coppice growth to look after itself, but you will achieve a more uniform crop from an actively managed coppice stand.

Some points to note:

- coppicing 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.
- shoots should be knocked off with the back of an axe rather than cutting, to prevent reshooting.

For further information:

FFN 1/98	*Introduction to farm forestry in the Adelaide Hills and Fleurieu Peninsula*
FFN 2/98	*Farm Forestry: Frequent questions and common myths*
FFN 3/98	*Farm Forestry: Establishment Guidelines*
FFN 4/98	*Woodlots and Wide-Spaced Agroforests*
FFN 5/98	*Timberbelts*
FFN 6/98	*Pruning guidelines for farm forestry*
FFN 8/98	*Farm Forestry Species for the Adelaide Hills and Fleurieu Peninsula*
FFN 9/98	*Protecting your forest plantation from fire*

Enquire as to more recent publications

Farm Forestry, Harvesting and Marketing– Guidelines for pine plantations in the Adelaide Hills and Fleurieu Peninsula, David Hanna Forestry SA 1998

Farmtree$ for the Mount Lofty Ranges: A Regional Agroforestry Handbook by Peter Bulman, Primary Industries and Resources SA 1995.

FS Land Capability in the Mt Lofty Ranges

All available from PIRSA offices, State Tree Centre, State Flora outlets, Mount Lofty Ranges Catchment Resource Centre (Mount Barker) and community landcare resource centres.

Environmental management guidelines for plantation forestry in SA, 1997

Mt Lofty Ranges Farm Forestry Industry Plan 1997

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