

LAND MANAGEMENT

CONSERVATION TREES

Poplar Agro-forestry

What is poplar agro-forestry?

Poplar agro-forestry is growing poplars in pasture for timber. It is particularly valuable where there is some environmental risk to pastoral production. The main purpose is to improve long term production using both pasture and trees. Poplars become a second tier crop for pasture land.

Where is poplar agro-forestry suitable?

A wide range of poplars are now available which tolerate varying conditions. However, most poplars grow best on deep, moist soils. Depending on the local climate, this can range in Hawke's Bay from flats to moderately steep hills. Areas prone to severe winds, very dry summers, on shallow soil or in high altitude sites are usually unsuitable.

What are the benefits?

Being deciduous broadleaf trees, poplars allow enough sunlight through for continued pasture growth. While shading and tree roots may compete with grass growth, poplars can give an overall

Mixed plantings of Argyle, Toa & Veronese. These provide improved slope stability as well as timber production while pasture is maintained.



increase in production on sites which are very wet or erosion prone.

There are four main benefits of poplars as a second tier crop:

1. Soil erosion control.

On medium to moderately steep hills, well-sited poplars control soil slipping and help control earth flow erosion. Pasture production is improved because topsoil is maintained.

2. Stream bank or gully planting.

Large areas of fertile land can be lost by stream bank erosion and hill country farm access is often affected by eroded gullies. Carefully placed poplars planted back from a water course not only look good, but provide some bank protection while conditions are ideal for tree growth.

Poplar trees, protecting a drain, while providing timber and shade. Puketapu.



3. *Swampy ground.*

There are good examples of unproductive ground being brought into production using poplar agro-forestry to dry out swampy areas. Where this is done, pasture production increases quite quickly and can be maintained long term. Wet areas within a radiata pine forestry block can be cheaply planted with poplar stakes as a productive option. A combination of high timber yields, fast growth rate and low cost harvesting make this type of plantation one of the most economic uses for wet soils.

4. *Shelter belts.*

Farms throughout New Zealand benefit from shelter. Livestock can be saved from cold stormy weather and pasture and crops are less affected by desiccation and wind damage. In areas with light soils, the risk of wind erosion is reduced during cultivation.

How is poplar agro-forestry done?

There are three main ways of establishing poplars on farms: poles, small poles or stakes, or rooted cuttings.

Poplars can be established as heavy three-metre long poles. Provided the poles are protected from animal browse by a plastic guard, the surrounding pasture can be grazed by sheep immediately and by cattle within two years. (See other titles in the Environment Topic series for further information.)

Cheaper stakes or small poles can be used in fenced off areas or paddocks which are taken out of grazing for four to five years or more. These are normally about a metre long and are lightweight, one-year old bud wood.

Rooted cuttings, like stakes, must be kept free of livestock for several years. They have a more reliable strike rate in areas with dry summers, or on exposed hillsides which are more prone to drying out.

Planting Layout

Where 3m poles are planted for soil conservation, space them at their final intended spacing of between 25 and 100 stems per hectare (sph). Depending on the type of erosion, spacings will vary.

On hill country where the poles are for forest establishment and timber, plant small poles and one metre stakes at a higher

rate. An initial planting rate of up to 1000 sph may be used, with thinnings down to a final spacing of 250-300 sph, which is similar to a radiata regime.

On moist, even ground, stakes can be planted at or near final spacing.

Poplars planted as shelter belts should be no closer than four metres apart if timber production is intended. This reduces stresses in the trunk which make sawing difficult.

Weed Control

Poplars planted as three metre poles do not require release spraying. However, stakes and rooted cuttings should be release sprayed and follow-up sprayings may be required.

Glyphosate is the safest, but it is short-term. Caragard applied at up to 6 litres per sprayed hectare on well drained sites is only effective for six months or more. Glyphosate should be sprayed on wet sites.

Gardoprim is also suitable at similar rates of active ingredient to Caragard. These chemicals are not able to be sprayed over the top of poplars, nor should they be used at radiata pine forestry strength.

Agro-forestry spaced poplars are unlikely to control weed growth through shading, so problem woody weeds such as gorse and blackberry should be eradicated before planting poplars. This will also give better access for grazing livestock.

Livestock Control

Three metre poles can be protected from livestock browsing damage by using plastic sleeves. However only sheep should be grazed amongst poplars for the first two years, after which cattle may be brought in with some caution.

Survival will be improved by using large diameter poles, good planting technique, maintaining pole firmness in the ground by ramming and monitoring cattle damage.

Lighter material such as stakes and rooted cuttings cannot be individually protected, so must be kept free of all grazing stock for four to five years and possibly longer if smooth-bark varieties are grown.

Livestock damage to trees often happens if the trees are smaller than 300mm in diameter, and is probably caused by a shortage of some nutrient and/or fibre in

the animal diet. Mineral supplements should always be available to livestock in planted areas as well as providing something solid and rough to rub on.

Rubbing can be caused by irritation from external parasites which is also likely to affect animal health. Mineral supplements and parasite control will benefit both livestock and trees. Monitor trees closely for damage and remove cattle as soon as damage occurs.

Pest Control

The main pests are goats and possums, and both are adequately controlled by shooting. Poisoning may be a better option for possums, so call a Regional Council pest control supervisor for advice.

Thinning and Pruning

As with radiata pine, the best returns will come from the clear wood portion of the tree at harvest. Value is more likely to be gained from logs which can be peeled or sawn, as poplar is suitable for both processes. This means pruning to a height of at least six metres and keeping small branch sizes on the upper portion of the

tree.

Prunings are palatable to livestock and will be a useful feed source during drought, so pruning should be scheduled for summer. A local market for poplar timber is not well established yet, however some sales of this internationally acceptable timber are being made. Until poplar timber requirements are better known, it would be wise to use similar management to that used by radiata pine foresters. Trees should be thinned, if planted at a rate of 350 sph or more, and pruned. Most modern poplar varieties grow straight without competition, but their branch size above the pruned log can be kept small by keeping trees at a spacing of six to seven metres apart.

Widely spaced poplars may not have a marketable saw log above the pruned height, but this could be offset by additional pasture production. Wood from the upper part of these trees is suitable for pulping but is currently low in value.

Some poplar varieties will sprout new shoots from pruned areas of the trunk. These will have to be removed each year, but the problem is only likely on widely spaced trees.

What are the costs and returns?

The following table illustrates comparative establishment costs in 1997.

Table 1: Comparative costs of establishing poplars for agro-forestry (1997 prices).

	Planting rate/ha	Tree cost	Sleeve cost	Planting cost	Cost per hectare
3m poles* with Netlon sleeves	100	\$3.80*	\$2.20	\$1.50	\$750
3m poles with Dynex sleeve	100	\$3.80*	\$3.45	\$1.30	\$855
Rooted cuttings	800**	\$1.70		\$0.50	\$1760
Stakes	800**	\$0.80		\$0.50	\$1040

The costs of fencing and transporting trees from the nursery have not been included in the table.

** This planting rate is recommended for uneven hillsides. Moist, even sites can be planted at lower rates.

* If planting Kawa, use \$4.50 as the pole price.

Returns

Because few export sales of poplar have been made in recent years, it would be misleading to quote figures. However information from poplar experts suggest large quantities of quality poplar logs would have a similar export value to radiata pine saw logs.

A major benefit of poplar, despite the relatively high establishment costs, is its short rotation length compared to radiata pine. Where radiata pine can take 25-30 years to mature, poplar can be millable in less than 20 years. This advantage has a major impact on improving the internal rate of return over other commodity timbers.

Other costs and benefits are more difficult to assess. These include the positive and

negative effects of trees on pasture growth, animal shade, shelter, nutrition and also any erosion control benefits.

Poplars though, are one of the few timber species which can support grazable pasture throughout the life of the forest. Hence poplars are ideal to help increase production on erodable areas of medium hill country.

Where can trees be obtained?

The Hawke's Bay Regional Council's poplar and willow nursery sells poles and stakes for soil conservation and agroforestry. Other commercial nurseries often have rooted cuttings for sale and there are some private growers of poles as well.

Which varieties are recommended?

The following table shows good performing varieties presently available.

Table 2: Proven poplar varieties suitable for timber production

	Density (kg/m ³)	Disease resistance	Wind tolerance	Possum resistance	Minimum moisture
Kawa	360	high	medium	medium	medium
Veronese	340	low	high	low	low
Eridano*	330	high	low	high	high
Tasman	330	high	high	low	high

*This variety is the only one which produces timber free of black heart. Eridano should be planted thickly, in moist, sheltered areas and thinned to obtain straight logs and good yields.

Potential additions to the timber list include Toa and Argyle and many new varieties are being field tested.

DISCLAIMER: The information regarding chemicals does not necessarily appear on the labels of the products concerned, therefore the Hawke's Bay Regional Council shall not be liable to anyone in respect of any damages suffered as a result of their reliance on the information contained in this document. Mention of product trade names implies neither endorsement of those products nor criticism of similar products not mentioned.

For further information

For further information on poplars, ask for the other titles in this series or contact Land Management Officers at the Hawke's Bay Regional Council for advice:

Wairoa 06 838 8527
Guppy Road, Napier 06 844 2495
Waipukurau 06 858 8636
TOLL FREE 0800 108 838