



FARM FORESTRY

Better returns from integrating trees into your farming business

These notes accompany the New Zealand Farm Forestry Association workshops held in May 2022 for farmers thinking of growing trees. The workshops will assist farmers to make informed decisions on whether woodlots are a good fit for their farming business. They are supported by Te Uru Rākau – New Zealand Forest Service.

1. Disclaimer

This presentation sponsored by Te Uru Rakau – NZ Forest Service and the NZ Farm Forestry Association aims to provide basic forestry knowledge. This booklet is not intended as a full user's guide. It covers:

- The basics of forestry
- Why trees on farms are useful
- What to plant, where
- What will sell
- Regulations; and
- Other sources of information

Further information is available on the websites of MPI, Canopy and the NZ Farm Forestry Association. Investors seeking professional help should contact a registered forestry adviser through the NZ Institute of Forestry.

- <https://www.mpi.govt.nz/forestry/>
- <https://www.canopy.govt.nz/>
- <https://www.nzffa.org.nz/>
- <https://www.nzif.org.nz/>.

2. Farm plans

Farm environment plans can be used to map parts of your land that are productive, less productive and environmentally sensitive. They allow you to:

- Best align your farm to work with the environment around you.
- Increase sustainability with soil health and water quality.
- Identify opportunities to improve on-farm biodiversity.

A farm environment plan will help make it clear if and where trees should be planted. Help in preparing a farm plan is available from Federated Farmers, Beef+Lamb, most regional councils and some private organisations.

- [https://www.fedfarm.org.nz/FFPublic/Policy2/National/Good Farming Practice-Action Plan for Water Quality 2018.aspx](https://www.fedfarm.org.nz/FFPublic/Policy2/National/Good_Farming_Practice-Action_Plan_for_Water_Quality_2018.aspx)
- https://www.youtube.com/playlist?list=PLJRtPnRSK-og-1UStGdfE_FaESAKLcGwY
- <https://beeflambnz.com/farmplan>
- <https://www.integratedfarmplan.nz/integrated-farm-plan-case-studies>
- <https://wrc.govt.nz/environment/land-use/farm-environment-planning/>
- <https://www.horizons.govt.nz/HRC/media/Media/Land/Whole-farm-plans.pdf>
- <https://www.trc.govt.nz/environment/farmhub/farm-plans/>



3. Planning a woodlot

When planning a woodlot it's important to understand what you want from it, and where you want it. Factors include:

- Site quality, current vegetation and exposure
- Access and the routes of any future roads (bridges, gradients and curves)
- How difficult it might be to harvest (parts might best be left)
- Distance to market
- Pylons, boundaries and waterways that may need clear margins
- Timing, because seedlings must be ordered in advance of winter planting
- The rate of planting, which affects cash flow and labour
- Landscape planning
- Resource consents and other constraints.

It's useful to draw up a forest management plan setting out these decisions and scheduling what has to be done in as much detail as you can. The plan will need regular reviews. Tasks will include:

- Land preparation
- Fencing
- Purchase of tree stocks (source and quality)
- Planting (number of trees per hectare)
- Weed control
- Pruning and thinning; in which years and at what numbers per hectare
- Protection from pests, fire and intruders; and
- Harvesting and marketing.

Further information is available on the Canopy website.

- <https://www.canopy.govt.nz/plan-forest/>



4. Establishing a woodlot

Establishing means preparing the site, planting, and managing the trees until they no longer need help with weed control or protection from animals.

Before you start, check with your local council to see if there are any constraints. Planting close to roads and boundaries may be restricted.

Site preparation may include pre-plant grazing, spraying with appropriate herbicides, hand clearing weeds, burning, and mechanical preparation. Try to control weeds before planting, and be aware of spray drift. If there are flats where frost settles, soil can be mounded to raise the seedlings. Fence out stock, and shoot or poison rabbits, hares and possums that can damage young trees.

Orders for tree species generally need to be made by August a year or so before planting, and nurseries may require a deposit with the order. Planting stock can be seedlings or cuttings, open rooted or container grown. Quality and size affect price. Discuss your needs with the nursery before ordering.

Further information is available on the Canopy website and from the NZ Farm Forestry Association.

- <https://www.canopy.govt.nz/establish-forest/>
- <https://www.nzffa.org.nz/farm-forestry-model/species-selection-tool/>
- <https://www.nzffa.org.nz/farm-forestry-model/the-essentials/forest-establishment-and-maintenance/>.



5. Planting

Some species need close spacing to control branching, others don't. Today radiata is generally planted at 1,000 stems per hectare.

Plant between late May and the end of August while the seedlings are still dormant, as soon as you can after receiving them from the nursery. Handle them carefully and don't let the roots dry out.

For planting use a spade with a blade length of at least 30 cms. Cultivate the soil as much as possible with the spade, opening up a hole large enough to contain the roots without distortion. After placing the seedling well into the hole, fill it with loose earth then gently pull it upwards before firming it in to help the roots point down. If you are using a contractor, agree a quality control process before the work starts.

Most farm sites will not need fertilizer but if it is needed, apply it once the roots have had time to develop about two months after planting. Control weeds with herbicides or hand clearing until the trees are tall enough to outreach them.

Keep good records because they help in later management. Include:

- Site preparation notes, including herbicides applied, the rate of application, and the dates of the operations
- A map or aerial photo of the area planted recording the hectares
- The date of planting, and the species and seed source used
- Notes on weed control (releasing) and survival rates.

Further information is available from the Canopy website and the NZ Farm Forestry Association.

- <https://www.canopy.govt.nz/plan-forest/planting-advice/>
- <https://www.nzffa.org.nz/farm-forestry-model/resource-centre/information-leaflets/farm-forestry-association-leaflet-series/no-3-successful-establishment-of-tree-seedlings/>.



6. Managing a woodlot

When you know what you want to achieve, you can adopt a woodlot management strategy (a 'regime') to accomplish it. If you are aiming for high returns, then a safe strategy is to mimic the larger nearby forest owners, who help determine the local market.

Most forest operations are costly, but some will clearly add enough value to be worth doing. Think of the site and climate to assess how the trees might respond; and the terrain and access to assess harvest costs. If you have high harvest costs you will need high value trees, which means work. If you want grazing under the trees, then prune to allow grazing access as well as to add value to the timber.

When you have decided on a regime, schedule the forest operations in your forest management plan (see 'Planning a Woodlot'). Be prepared to change the schedule if the trees grow faster or slower than you expect, or if you change your plans.

Further information is available from the Canopy website and the NZ Farm Forestry Association.

- <https://www.canopy.govt.nz/manage-forest/practices/>
- <https://www.nzffa.org.nz/farm-forestry-model/the-essentials/silviculture/>



7. Pruning

Form pruning is important if you want each tree to have a strong dominant central leader, or to lighten the crown by removing heavy branches to reduce the risk of toppling. Take care not to remove too much foliage or it will affect growth. In general, leave a dominant leader and healthy, regular branches on the top 1/3 of the tree.

Clear pruning will produce knot-free timber, and for most species this means pruning the stem to a minimum diameter of between 12 and 20 cms. As it grows the tree will heal over these pruning scars, and timber grown over the stubs will be valuable clearwood. The interior wood which includes the stubs is called the knotty core, and the wider the band of clearwood over the knotty core, the more valuable the log.

As pruning is expensive it's usually done perhaps two or three times over the first 10 years. Some species like cypresses or blackwood that branch vigorously will need more frequent pruning.

Pruning can be done with long handled pruning shears and jack saws, but nowadays it is usually carried out with small chain saws.

Further information is available from the Canopy website, the NZ Farm Forestry Association and the Poplar and Willow Research Trust.

- <https://www.canopy.govt.nz/manage-forest/practices/pruning-trees/>
- <https://www.nzffa.org.nz/farm-forestry-model/the-essentials/silviculture/>
- <https://www.poplarandwillow.org.nz/farmer-guides/planting-and-management>



8. Thinning

Since it's impossible to know which trees will do well, it's common to plant two or three times as many as you need and select the final 'crop trees' later. Close planting restricts branch size, promotes straight stems, offers wind protection, gives a good selection for the final crop and helps suppress weeds. Later any poorly formed or scrubby trees can be progressively thinned out leaving only the stronger ones. If you are pruning before the final thinning, try to prune only the ones you want to keep.

As the trees develop they start competing for light, moisture and nutrients. Progressive thinning not only allows the trees to improve their root development and wind stability, it gives the Canopy more room and improves tree health, vigour and diameter growth.

When thinning to waste the fallen trees are left on the ground. If small sawlogs are valuable the trees may be production thinned, when the logs are removed leaving the branches and tops. Care must be taken not to damage the remaining crop trees.

Further information is available from the Canopy website and the NZ Farm Forestry Association.

- <https://www.canopy.govt.nz/manage-forest/practices/thinning-trees/>
- <https://www.nzffa.org.nz/farm-forestry-model/the-essentials/silviculture/>



9. Measuring

We measure trees to confirm growth rates and adjust management schedules, and also to predict log grades before harvesting and to help in valuations. Owners wanting to measure their trees need a few simple and inexpensive tools: a tree height measuring instrument, a diameter tape, a 20 m tape and a notebook.

To measure the height of young trees use a 6 m pole made up of two 3 m sections that can be screwed together, marked at 0.1m intervals. Taller trees can be measured by sighting along the edge of a 45% set square to the top of the tree, knowing your distance from the tree and using the principle of similar triangles.

'Diameter at Breast Height' is measured 1.4 m from ground level, and if the ground is sloping, from the ground on the uphill side. A diameter tape converts circumference to diameter (one diameter cm =3.14 ordinary cms).

Further information is available from the NZ Farm Forestry Association.

- https://www.nzffa.org.nz/system/assets/5854/p20044coll6_21.pdf



10. Harvesting

Although harvesting may be a long time in the future it is important to understand what's involved.

- Most growers can't get their trees harvested at short notice; it may take several months before a contractor can begin work.
- Log prices are largely set by exports and can fluctuate widely. Bigger trees are more valuable than smaller trees and reduce unit costs, as will good access, dry weather and a short distance to market.
- Pruned logs should be grown to about 30 cm diameter at the small end of the log, but logs for framing timber can be smaller. The usual harvest age for radiata is generally between 25 and 30 years, with pruned trees towards the upper end.
- Harvesting is the most dangerous phase of forestry. It's prudent to develop a pre-harvest plan and decide how the harvest will be managed, and your level of involvement. A professional harvest manager will help with this, and with arranging the necessary resource consents.

Further information is available from the Canopy website, the NZ Farm Forestry Association and the Forest Growers' Research website.

- <https://www.canopy.govt.nz/harvest-forest>
- <https://www.nzffa.org.nz/farm-forestry-model/the-essentials/roads-earthworks-and-harvesting/>
- https://fgr.nz/wp-content/uploads/2019/12/How-to-market-and-harvest-your-forest-woodlot-for-profit_linked.pdf



11. Marketing

A mature tree can produce all three broad classes of domestic logs – pruned, structural and pulp logs.

- Pruned logs are sawn or peeled to make appearance grade timbers used in plywood, joinery, cabinetry and weatherboards. There is a strong local market.
- Structural logs are sawn for building timbers, where strength and durability count.
- Pulp logs are chipped and used with sawmill residues for paper, cardboard and panel products like particle board and MDF.

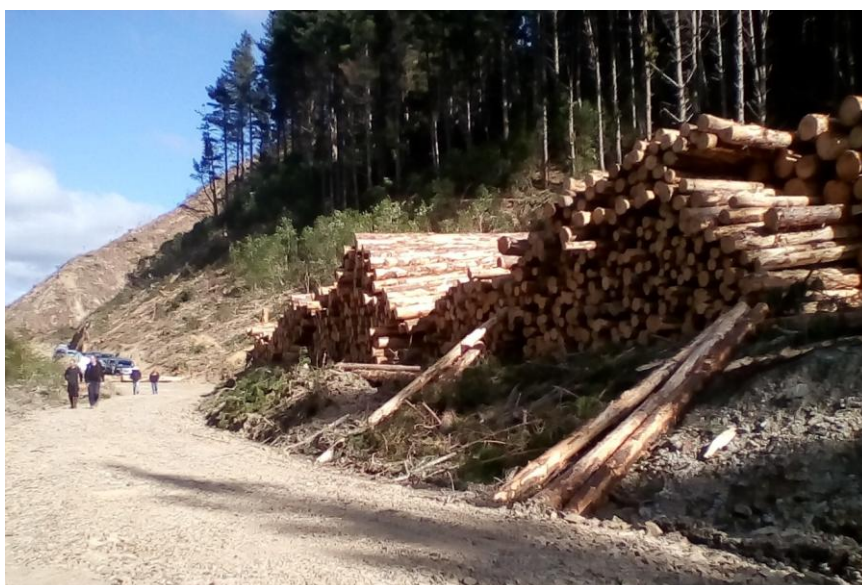
Domestic log prices generally reflect export log prices. These fluctuate due to a wide range of factors including shipping, exchange rates, global construction, political instability and pest incursions.

The forest may be sold as standing timber in which case the buyer meets the harvesting costs; or as logs over the weighbridge in which case the grower meets the harvesting costs. If it's sold as standing timber it must first be valued: the yield of logs must be estimated and priced, and the harvest costs estimated and deducted. This requires professional help. If it's sold as logs it need not be valued, but it's important to keep track of every load taken from the forest.

If others in the area have woodlots of a similar age, there can be advantages in jointly negotiating better terms with the harvesting contractor and the log buyer.

Further information is available from the Canopy website and the NZ Farm Forestry Association.

- <https://www.canopy.govt.nz/market-forest>
- <https://www.nzffa.org.nz/farm-forestry-model/the-essentials/milling-drying-and-marketing/>



12. Choosing a species

Trees generate a range of benefits and the right species for you will depend on the site and the outcomes you want. These typically include

Carbon credits	Timber	Firewood	Flood protection
Erosion control	Water quality	Stock fodder	Shelter
Rapid growth	Long life	Appearance	Attracting wildlife

Common species include Totara, Blackwood, Cypress, Douglas fir, Eucalypts, Paulownia, Poplar, Radiata and Redwoods.

Special interest groups associated with the NZ Farm Forestry Association are developing improved genetics, management regimes and harvesting and marketing strategies for several of these. Cypress in particular is showing great promise as a valuable timber species.

Further information is available from the Canopy website and the NZ Farm Forestry Association.

- <https://www.canopy.govt.nz/plan-forest/choosing-right-tree/>
- <https://www.nzffa.org.nz/farm-forestry-model/species-selection-tool/>



13. Indigenous

Native trees are an important alternative to exotic plantation trees. They can generate income, with some species such as totara grown in plantations for timber production. They can also earn New Zealand Units under the Emissions Trading Scheme.

Native trees and shrubs may be planted for riparian protection, erosion control, amenity and to improve habitat for native birds and insects. There are over 250 species to choose from offering a wide range of attributes, sizes and growth rates.

When planting native trees, it helps to begin with tough colonising species that grow naturally in the area, such as manuka, kanuka or some of the small branched coprosmas. Once shade and shelter has been established these can be inter-planted with larger less-robust native trees. You can also plant in the shelter created by non-natives such as eucalypts or tree lucerne.

Natural regeneration is often a good option on land which is fenced from grazing with a native forest nearby as a seed source. It does take a while to establish, but you do not have to pay for the plants because the wind and birds will bring them in for nothing.

Further information is available from MPI, the Canopy website, the NZ Farm Forestry Association and Tane's Tree Trust.

- <https://www.canopy.govt.nz/establish-forest/looking-after-native-seedlings/>
- <https://www.mpi.govt.nz/forestry/native-indigenous-forests/>
- <https://www.nzffa.org.nz/farm-forestry-model/species-selection-tool/species/indigenous-species/>
- <https://www.tanestrees.org.nz/>



14. Funding

There are funding programmes to support the planting and protection of trees, particularly among regional councils. Other entities (e.g. Trees that Count) may also help. Ask your regional council Land Management Advisor for the most up to date information.

Where it's appropriate, subdividing off a lifestyle block may generate more than enough money to plant a small forest. Registered with the ETS the forest will earn carbon credits, which may be sold to improve the farm or plant more trees. Some valuable species like cypresses will yield small sawlogs after 15 years, providing further income.

Borrowing may be possible but you will need headroom under your existing mortgage, which may rule out borrowing from anyone but your existing bank.

Investors like the early payback from carbon credits and may want a lease or joint venture to share the benefits. Be aware however that the liabilities rest with the land, and will remain there long after the investment has finished.

15. Regulations

Most of the rules around forestry are administered by local Councils or MPI. Before you plant or harvest your forest, it's a good idea to contact your local council to find out what applies for forestry activities in your area. Some activities will be permitted while others may require resource consents. The District and Regional Plans that contain many of these rules are guided by national policy statements and national environmental standards, which set out the Government's minimum standards for all Councils in terms of water quality, indigenous biodiversity and plantation forestry.

If you're planting a new indigenous forest that you intend to harvest, you will need a permit from Te Uru Rākau – New Zealand Forest Service to mill any timber that you take from it.

When seeking professional advice on your forest, be aware that from August this year all forestry advisers must be registered and operate within a set of rules and code of ethics. Take advice only from a registered professional.

If you are employing staff to work in the forest, be aware of the health and safety requirements.

Further information is available from MPI, local Councils and Worksafe.

- <https://www.mpi.govt.nz/forestry/getting-started-forestry/forestry-rules-regulations/>
- <https://www.lgnz.co.nz/local-government-in-nz/new-zealands-councils/>
- <https://www.worksafe.govt.nz/managing-health-and-safety/getting-started/introduction-hswa-special-guide/#lf-doc-22804>

16. Income tax

The Income Tax Act distinguishes between growing trees for timber and growing trees not intended for harvest. In the Act 'foresters' grow trees for timber while 'farmers' grow trees for other purposes. There are differences in the deductibility of costs for

- Fencing
- Land clearing
- Planting, weed and pest control
- Tracks, roads, culverts and bridges.

Some accountants may not be totally familiar with these differences, or with the tax implications of the sale of standing trees.

Further information is available from Inland Revenue and the NZ Farm Forestry Association.

- <https://www.nzffa.org.nz/farm-forestry-model/resource-centre/information-leaflets/information-leaflets-2019/taxation-of-forestry/>



17. Why trees

Trees are important for climate change as they store carbon and reduce the use of fossil fuels by producing timber, firewood and new materials. As the need to mitigate climate change becomes more urgent demand for all of these outputs is rising.

Trees also protect farms through diversifying earnings, reducing erosion and flooding, and providing shade and shelter. Well chosen trees also provide a habitat for wildlife and increase the appeal of the landscape.

Further information is available from the Canopy website and the NZ Farm Forestry Association.

- <https://www.canopy.govt.nz/plan-forest/why-plant-trees/>
- <https://www.nzffa.org.nz/farm-forestry-model/why-farm-forestry/>



18. Emissions Trading Scheme

The Emissions Trading Scheme offers an incentive to grow forests by issuing carbon credits to forest owners. In order to qualify, the land must be Post 1989 (P89) eligible land, that is, land that was not in forest cover as at December 31st 1989. Once a forest that meets the ETS forest definition has been established on eligible land it can be registered.

The forest must be at least a hectare in size and capable of growing a tree crown cover of more than 30% in each hectare with an average width of at least 30m, from forest species that can reach at least 5m in height when mature. Examples of exotic forest species that can be registered in the ETS include P.radiata, Douglas fir and Redwoods; and indigenous forest species include regenerating manuka / kanuka scrubland.

A forest registered under carbon stock change carbon accounting will earn carbon credits annually, but when the forest is harvested much of that carbon will need to be returned.

New P89 forests established since 2019 can be registered under 'Averaging' and earn carbon credits up to a particular age, after which they may be harvested and replanted without any liability. As long as the forest continues a rotational cycle the issued credits need never be returned. For a forest on a 28 year rotation, the average age for which you will be able to claim carbon will be approximately 16 years.

The MPI website holds the authoritative information on the ETS.

- <https://www.mpi.govt.nz/forestry/forestry-in-the-emissions-trading-scheme/forest-land-in-the-ets/>
- <https://www.mpi.govt.nz/forestry/forestry-in-the-emissions-trading-scheme/registering-post-1989-forest-land/>
- <https://www.mpi.govt.nz/dmsdocument/44371-Providing-information-to-support-your-application-to-register-post-1989-forest-land-in-the-Emissions-Trading-Scheme>
- <https://www.mpi.govt.nz/forestry/forestry-in-the-emissions-trading-scheme/permanent-forests-in-the-ets/>
- <https://www.mpi.govt.nz/forestry/forestry-in-the-emissions-trading-scheme/stock-change-accounting/>
- <https://www.mpi.govt.nz/forestry/forestry-in-the-emissions-trading-scheme/averaging-accounting/>
- <https://www.mpi.govt.nz/dmsdocument/4762/send>



19. He Waka Eke Noa

He Waka Eke Noa offers farmers a system for measuring and reporting on emissions, a mechanism for pricing emissions, and guidance on carbon sequestration. Sequestration will earn credits to reduce the farm's emissions liability, although it's unlikely that the cash offset will totally cancel it.

Sequestration will rely on woody vegetation on the farm, which will be classed as 'cyclical' (orchards, shelterbelts, and woodlots too small for the ETS); or 'permanent' indigenous forest. At the moment it looks like exotic forests will be excluded from the 'permanent' category.

Cyclical vegetation would be rewarded by recognising the long-term average carbon stock after considering losses from harvesting and gains from replanting. There would be different sequestration rates and averages for different types of vegetation.

Permanent forests would earn credits as long as the carbon stock kept increasing. Fencing and pest management would be important to protect the trees.

Any loss of woody vegetation in the scheme would have to be reported and would reduce any cash offset. Penalties would apply for non-compliance.

Details are available on the He Waka Eke Noa website.

- <https://hewakaekenoa.nz/>.

20. Demand

Global demands for all of the benefits of forestry – clean water, erosion control, shelter, timber, carbon sequestration and biofuels – are rising. In particular timber, sequestration and biofuels will be critical tools in adapting to climate change, and moving to low carbon technologies.

The Forestry and Wood Products Industry Transformation Plan is designed to assist this, encouraging more domestic processing and the development of regional log supply catchments. These should increase the number and size of local markets for logs and improve the profitability of small woodlots.

Progress is reported on the MPI website.

- <https://www.mpi.govt.nz/forestry/forest-industry-and-workforce/forestry-industry-transformation-plan/>.



21. Trees protect farms

On steep country it can be hard to maintain good pasture cover, particularly in dry years. When soil is partially exposed rain can wash it away, and heavy rain can lead to slips.

Trees and plants of all sizes protect soil from wind and rain. Leaf litter slows the rain; tree roots break up the soil allowing the water to soak in; and networks of roots bind the soil together. In this way forests prevent erosion and reduce run-off and flooding. Being permeable, forest soils release water in the dry season helping streams run year-round.

If floods are common it's useful to have a thick buffer of vegetation between the riverbank and paddocks. Good examples have networks of native trees and plants of all sizes with Booth and Moutere willows at the water's edge. As a rule the more room you can allow the river and the wider your vegetation buffer, the better.

Further information is available from the Canopy website, the NZ Farm Forestry Association and the Poplar and Willow Research Trust.

- <https://www.canopy.govt.nz/plan-forest/why-plant-trees/soil-conservation/>
- <https://www.nzffa.org.nz/farm-forestry-model/resource-centre/tree-grower-articles/may-2013/trees-for-protection-native-or-otherwise/>
- <https://www.poplarandwillow.org.nz/farmer-guides/streambank-gully-erosion-control>.



22. Trees diversify income

Various reports have compared the average earnings of pastoral farming against production forestry. These generally conclude that the earnings per hectare from commercial forestry, with or without carbon credits, are less than dairy farming but higher than hill country sheep and beef farming.

These reports give steady-state comparisons and of course one cannot switch from grazing to production forestry overnight. However a farm plan that shows pastoral returns paddock by paddock is a useful tool for deciding whether all of them should be kept in grass.

Experience shows that pastoral earnings can be maintained or improved in some cases by retiring the low-performing land to forestry. This can reduce costs and improve stock management, as well as earn carbon and (later) timber income.

Farmers who have taken this approach have found that diversifying their farm income has added value to their property and reduced the financial stress of poor seasons.

A Price Waterhouse Coopers report on The Economic Impact of Forestry in New Zealand is available from MPI. The NZ Farm Forestry Association has videos of farmers describing their own experiences.

- <https://www.mpi.govt.nz/dmsdocument/41911/direct>
- <https://www.nzffa.org.nz/farm-forestry-model/resource-centre/videos/trees-on-farms-videos/videos-by-category/returns-from-harvesting/>



23. Trees help stock – shade, shelter, fodder

Trees on farms are useful for animal well-being. Shelter belts and woodlots reduce wind chill and offer shade in summer. Poplar and willow, useful for erosion control, can also be pruned for stock food. The leaves, twigs and small branches are palatable to both sheep and cattle with a nutrient value similar to lucerne hay.

Poplar and willow are similar species. Willow is commonly used for wet areas and riparian planting while wide spaced poplar is useful for holding slopes. Both are deciduous and relatively open-crowned, allowing sunlight on to the pasture in winter but offering shade in summer. Being deciduous they provide shows of colour in autumn, while some varieties of willow also provide spring flowers that are attractive to bees.

Normally planted as poles, young poplar and willow are palatable and must be protected from stock with tree sleeves or fencing. Mature trees may be harvested for timber, which is very strong, flexible, light and semi durable.

Many Councils advise on poplar and willow and several offer planting stock at subsidised rates. Further information including video footage is available from your local Council, the Poplar and Willow Research Trust, the NZ Farm Forestry Association and Beef+Lamb NZ.

- <https://www.lgnz.co.nz/local-government-in-nz/new-zealands-councils/>
- <https://www.poplarandwillow.org.nz/>
- <https://www.nzffa.org.nz/farm-forestry-model/species-selection-tool/>
- <https://beeflambnz.com/knowledge-hub/PDF/trees-farm.pdf>

