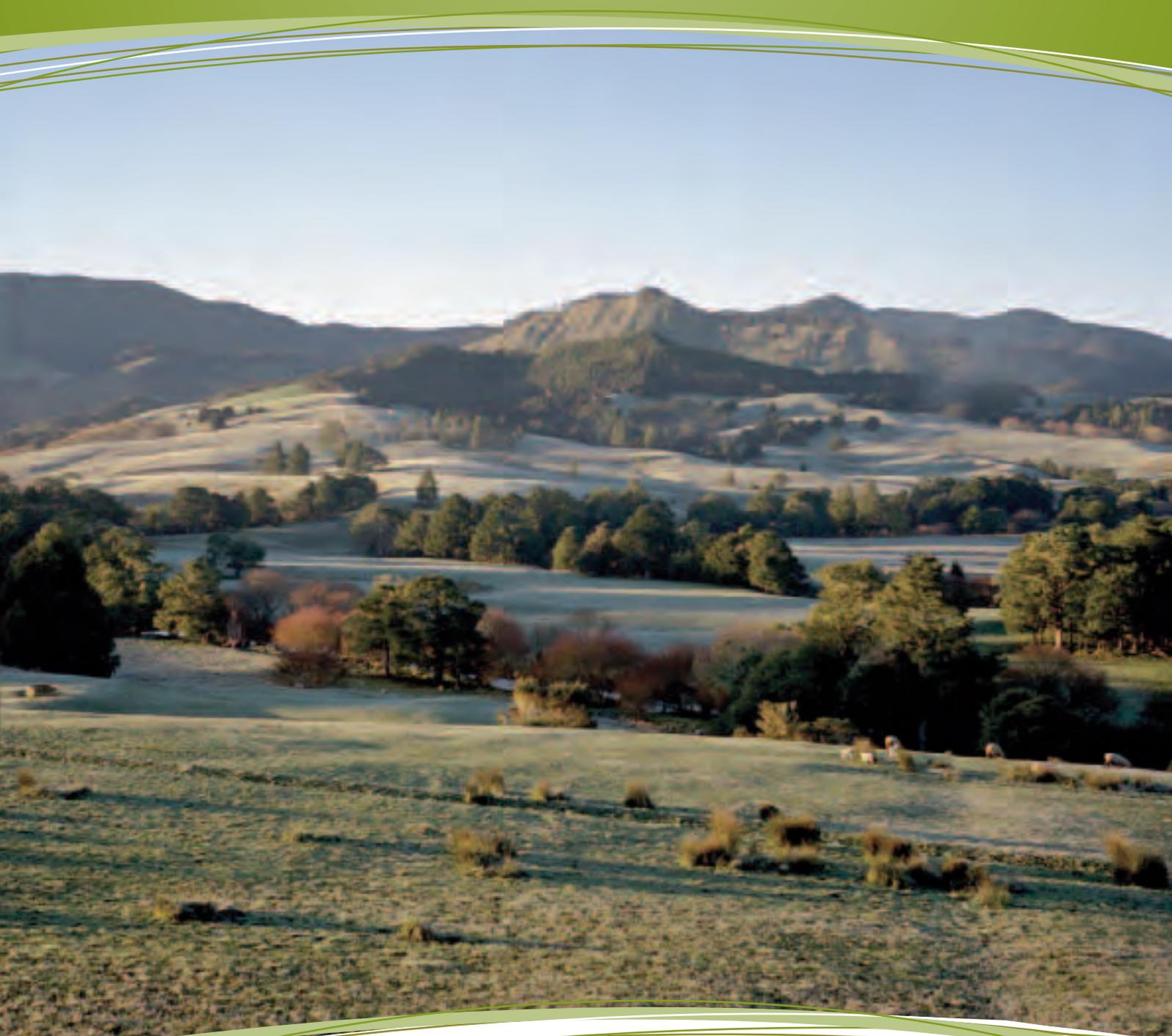


Trees for the Land

GROWING TREES IN NORTHLAND FOR
PROTECTION, PRODUCTION AND PLEASURE





FOREWORD

Trees are an integral, highly visible and valuable part of the Northland landscape.

While many of us may not give much thought to the many and varied roles of trees in our lives, our reliance on them can not be overstated. Both native and exotic tree species make important contributions to our region – environmentally, socially, culturally and economically.

Pohutukawa – a coastal icon – line our coasts and are much loved and appreciated by locals and tourists alike. Similarly, many of the visitors who come here do not consider their trip complete without a journey to view the giant and majestic kauri of Waipoua, which are of huge importance to Māori. Many Northlanders make their livings working in the forest industry or other industries closely aligned to it and trees also play a crucial role environmentally.

When all these factors are considered, it makes sense that wise land management should include the planting of a variety of tree species, particularly since Northland is an erosion-prone area.

Trees help stabilise Northland's hillsides and stream banks. They help control winter flood flows and provide shelter and shade for the land, rivers and stock. They also provide valuable shelter, protection and food for Northland's flora and fauna.

This publication draws together tree planting information and advice from a wide range of sources into one handy guide. It has been written specifically for Northlanders and recommends trees that will survive well in our sometimes demanding climate.

The Northland Regional Council is committed to the sustainable management and development of natural resources like our trees.

Sensible planting of trees can help us repair some of the damage where there have been poor land management practises in the past.

Whether we simply plant a shelter belt, a major afforestation project or fence out a remnant stand of native trees to allow regeneration, planting trees will continue to make a difference for the future of our region

Craig Brown

Chairman, Northland Regional Council

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Controlling erosion

The use of vegetation to stabilise land and prevent erosion

In Northland, soil conservation and tree planting go hand in hand. The planned planting of trees can prevent erosion while providing many other benefits such as shade, shelter, timber, habitat for native birds and wildlife and stock food. All trees will require some form of maintenance during their lifetime. Mechanical means can be used to stabilise land, but vegetation is generally more economical and, although taking longer for initial control, is more effective in the long term.

Prevention is better than trying to find a cure.

When vegetation is removed from land, the risk of erosion can be reduced by leaving native forest on fragile areas, such as steep slopes and gullies, leaving a buffer zone beside any waterways.

Trees improve land stability in a number of ways. They:

- Bind the soil with their roots.
- Protect the ground from the direct impact of rainfall and drying from sun and wind.
- Remove excess moisture from the ground.

The main types of erosion are:

- 1 Gully erosion.
- 2 Stream bank and river erosion.
- 3 Wind erosion.
- 4 Sheet erosion.
- 5 Slope instability.
- 6 Tomo or tunnel gully erosion.

When cultivating or creating tracks

Cultivation of steep slopes and tracks can start erosion. To reduce the risk of erosion:

- Leave drainage depressions uncultivated.
- Establish a vegetation cover over cultivated land as soon as possible.
- Cultivate along the contour, not up and down the slope.
- Choose the appropriate time and method of cultivation to avoid compacting soil.
- Make sure tracks have enough cut-offs and culverts to slow water down.
- Ensure you have an adequate uncultivated buffer zone between cultivated areas and streams.

1 Gully erosion

Gullies

Gullies only carry water for short periods during, or immediately after, heavy rain. They often extend from rolling to steeper slopes. These should be planted first in any control programme as they often trigger other forms of erosion above and alongside them. If the cause of the gully erosion is treatable, see to that first; treat the problem, not the symptom. For example, fencing out stock or diverting water can make remedial actions more effective.

Planting for gully control

Willows (*Salix spp.*) are well suited to tying up the wet areas of gully systems because they form a fibrous mat of roots which protect bare soil from the erosive power of water. Gully planted willows must be in pairs (directly opposite each other) to confine the water within the channel. Water then flows over the mat of willow roots and does not scour out the bed of the channel. Poplars have a deep tap root and are suited for stabilising the sides and drier areas of gullies. On hillside gullies and wet areas willows do not generally cause problems and their root systems are very effective. Some types of willows or willows planted in the wrong places can be invasive and spread along riverbanks. Get advice from the Northland Regional Council land management staff before planting.

Tree spacing

The spacing of your planting should be according to severity of the problem. For severe problems, tree pairs should be four to five metres apart. For potentially erodable areas, tree pairs need only be 10 to 20 metres apart.

Gully heads

Sometimes a gully develops a "head", or pronounced drop as erosion moves upstream. To overcome this problem, a flume, which is a wooden or metal chute, should be built to carry the water over the vulnerable edge of the drop. This is a short to medium term measure until plantings can stabilise the area. There are a few key points to note when building a flume:

- Water must not be allowed to flow around the sides or under the flume.
- It must be designed to withstand high flows, or be able to cope with overflows.
- Rocks, concrete or some non-erodable material is needed at the bottom of the drop to absorb the impact of the falling water and to prevent scouring.
- Planting will be required to further prevent erosion and stop any scouring of the sides and bottom.



Pair-planted willows.



Rocks and willows below a flume to protect soil from the force of the water.



To be avoided – stock pressure next to a stream.

2 Streambank and river erosion

Willows have the ability to quickly stabilise eroding gully sides, tomos and stream banks. Unfortunately, the same fast growth rate can lead to tree willows choking rivers and streams, contributing eventually to flooding and erosion.

Questions to ask before controlling stream bank/river erosion in the riparian margin (land beside rivers, streams, wetlands and coast areas) are:

- A** What are the causes of erosion? Possible causes could be water eating away at the toe of the stream bank, an earthflow moving into the waterway, gravel banks or debris in the water deflecting water on to the banks or stock trampling the banks and making them unstable. Planting will not be effective if the causes of the erosion are not dealt with first.
- B** How fast is the erosion proceeding? Is excluding stock to allow native regeneration an option? This will have added benefits for biodiversity. Could the slower growing and shorter shrub willows (*Salix purpurea*) and/or natives be planted to control the erosion?
- C** How wide is the waterway and is flooding a problem? This will determine whether tree species or shrubs should be planted next to the stream.

For more information on stream bank planting, contact the Northland Regional Council on 0800 002 004 for a copy of the booklet 'Clean Streams – A Guide to Riparian Management in Northland'.

Large trees, whether native or introduced, should not be planted within at least five metres and preferably 10 metres of the top of a steep stream bank as their weight when mature can cause bank instability in wet and windy conditions. If their roots fail they are liable to block the river and cause flooding. Further back from the top of the bank, other trees such as puriri, poplars and alders (excluding black alder) may be used for deep stabilisation. These trees will need to be maintained and pruned, especially if the area floods. A range of smaller native plants are often better suited to protecting riparian margins.

Tree willows, even more than most trees, require high maintenance when planted near rivers and streams. They should only be used in areas where there are severe erosion problems and with advice from a land management advisor from the Northland Regional Council. Maintenance is essential to prevent channel blockage and toppling of larger trees into the stream bed.

3 Wind erosion

Wind erosion can be a problem on sandy coastal country and recently cultivated land and requires the use of tolerant plant species and appropriate timing of grazing and cultivation. Specialised technical advice on sand stabilisation and coastal shelter is available from land management advisors at the Northland Regional Council. Further inland, shelter planting is the best way to break the wind and deal with wind erosion (see farm shelter section for details).

4 Sheet erosion

Sheet erosion (or sheet wash) occurs when water runs off slopes in wide sheets. The water becomes concentrated into small channels (rills) which can eventually cause gullies.

Sheet erosion can be a problem on cultivated soil or land with open pasture. Control can be achieved by establishing a dense vegetative cover with pasture. Shelter trees help to reduce the drying effects of wind and allow a denser pasture to develop. If the land is to be retired to native species, planting a dense manuka cover crop can protect the soil.

5 Slope instability – slips, slumps, earthflows

There are various ways of dealing with slips, slumps and earth flows, depending on the severity of the problem. In all cases the speed of the erosion is accelerated by water.

Deal with any water problems first by:

- A** DIVERTING water coming from above, including road or track run-off.
- B** DRAINING any water ponding on the slope. This may require tapping and piping water away or planting a wet area around any springs.
- C** PROTECTING with planting any gullies on or below an eroding area.

Remember:

- Retain any existing trees which are helping stabilise the area.
- Gully erosion can remove support from slopes above.
- Water from springs or wet spots on a slope can lubricate a slipping plane below the surface, reducing friction and allowing the waterlogged material to move downhill.
- Earthworks can remove support from a slope or dumped fill can add extra weight.

Extra planting will be needed to reinforce any water control works.



Actively eroding gully.



Open planted poplars to control mass movement erosion.

Planting methods

For less severe problems:

- A** Open plant poplar or willow poles at 6-10 metre spacings (between trees) with the aim of thinning to 10 to 15 metre spacings when the trees are fully grown. These trees will require fencing from stock until well established.
- B** Plant forestry trees at 4-8 metre spacings using species from the list at the end of the next chapter. These trees will initially require fencing from stock.
- C** Plant or encourage the regeneration of native species. Plant at 1-1.5 metre spacings over all or part of the area, for habitat and/or timber.

For more severe problems:

- A** Restrict grazing. Depending on the species planted, grazing will need to be restricted until the trees become established. Use close planting with poplar and/or willow stakes. These will require fencing from stock and planting at 2-4 metre spacings at the bottom or toe of the movement moving to 6-10 metre spacings further up the slope. If using poplar or willow stakes, grazing may be an option once the trees are out of the reach of stock and the roots are well established.
- B** Retire from grazing for production forestry. These areas will require fencing from stock and may be planted with a combination of *Eucalyptus*, *P. radiata*, *Alnus*, *Acacia melanoxylon*, totara and/or poplar. Species used will depend on individual site conditions. Spacings usually range from 2-3 metres between plants at the bottom of the movement to 6-8 metres further up. Future maintenance by thinning will be needed to allow light to penetrate the canopy and encourage understorey vegetation to become established.
- C** Retire from production. Plant as above or allow to regenerate in native forest species.

A combination of the above options may be practical. For example, the more erosion-prone slopes may be retired from production and allowed to regenerate to native forest while the more stable sites that are easier to manage might be put into production forest.



Open planted poplar poles for slope stabilisation.

6 Tunnel gully erosion

Tunnel gullies are formed when soil conditions allow a tunnel to develop below the land surface. This is a problem on Waiotira clay soils in particular. The underground gully eventually collapses the soil surface, leaving a hole or series of holes down a slope connected by a tunnel.

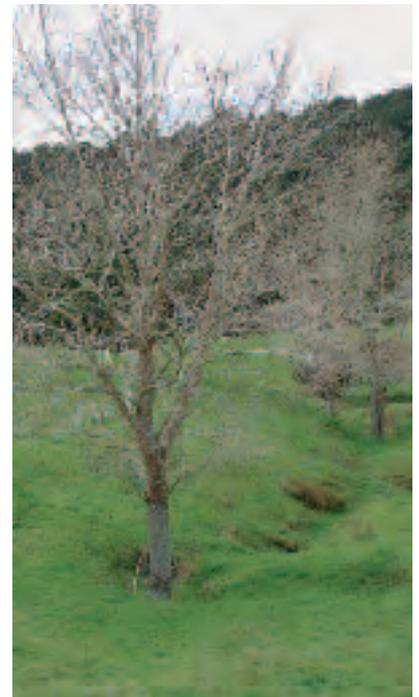
It is difficult to predict where these holes will develop, but the roots of trees planted along the suspected line of the gully will help bind the soil.

Where a tunnel gully has collapsed and broken the surface, trees (usually poles) need to be planted along it and should be angled out of the reach of stock or cut longer (to 4-5 metres) to avoid browsing. Where there is permanent running water, the tunnel gully should be treated as a gully and pair-planted with willows.

Points to Remember:

- Earth slips and slumps require planting from the bottom up as the majority of control is achieved in the bottom third. Plantings should extend on to solid ground above, below and to the sides of the movement.
- Do not plant in cracks in the ground, as these will dry out and open up during the summer, causing the tree roots to dry out.
- Plant on higher ground that does not pond water to help survival. In areas where water ponds, only plant species that can survive wet feet. If the land is fenced and sheltered, natives such as cabbage tree, flax (harakeke), pukatea and kahikatea are well adapted to these conditions.
- If fencing is required, it must be completed before planting. Goats and horses take no prisoners with trees and cattle and sheep will cause damage if given the opportunity.
- When planting pole material, use damper depressions and avoid stock tracks. This will greatly assist survival over the first couple of seasons.
- Plant poles deeply (at least 0.75 metres in depth) and ram well, several times in the first year if necessary. Driving poles into the ground gives better survival rates.
- To continue to achieve ongoing control over erosion where land is still required for grazing, trees MUST be maintained by thinning, pruning, fertilising and replanting. This will promote good tree health and prevent the canopy closing over and creating bare areas through shading.
- For native plant cover, the main objective is to get quick canopy closure to exclude weeds and promote fast plant growth.

Look after the trees and they will look after the land.



Poplars planted to control tunnel gully erosion.



Timber production

The world's timber resource is rapidly diminishing. Over 95% of world needs come from unmanaged (virgin or regrowth) forests and many of these supplies are running out. Timber is the only market where world demand is increasing and supply decreasing, especially in hardwood timbers.

Supplies of our own native species, particularly kauri and rimu, are becoming difficult to obtain and unless more native species are managed for timber, exotic hardwoods or softwoods such as *Pinus radiata* will be required to fill the gap.

Growing a timber crop in association with farming has many benefits, not only financial. Shade, shelter and erosion control are but a few. New Zealand has the land and the climate to produce high quality timber and it is up to us to take advantage of what nature has given us.

For many people, the planting of trees for timber conjures up a picture of large, dense blocks of radiata pine. However, the small scale grower may do better by growing fewer trees and managing each one for a greater proportion of high value timber. Almost every species has some timber value and trees planted for other reasons such as erosion control or amenity can eventually yield valuable timber or wood for some other use. If managed totara (*Podocarpus totara*), both from natural regeneration and planted trees, has excellent potential to produce high quality timber.

Before you plant - matters to consider

Before you put any trees in the ground, do your homework.

1. Forest rights legislation

Land ownership changes often and a common statement from potential planters is, "Why should I plant trees when I may shift? I'll get nothing from them". The Forest Rights Registration Act has been in place since 1983. This Act allows a block of trees and any agreement, for example a joint venture concerning the trees, to be registered against the title of the property involved. This means that if the land is sold the party or parties who have registered the trees retain the felling rights to those trees. With this legislation the forest area can be defined within property boundaries using a diagram or aerial photo, thus avoiding the high cost of surveying.

2. Product types - what do you want to produce?

- clear wood
- pulpwood
- framing timber
- firewood
- farm timber, using durable species for posts and for building
- native timber for high value uses such as furniture, woodturning etc.

3. Time - for high returns trees MUST be well tended

How much time now and in future years, will you have for tending your trees? Can you afford to use a contractor? The labour input for planting is approximately 8-12 hours per hectare. For pruning, it increases to 60+ hours per hectare over 2-3 years. Plan your yearly planting to make use of available labour.

4. Land available and species to use

Work out what species you can grow on your land and how far the planting sites are from a road or good farm track. The further from the road, the larger the area of forestry you will need to plant to make it economical to extract those trees when they mature.

5. Water and soil values

Make sure that on your chosen site it will be practical to extract thinnings and/or the final crop without damaging the soil and allowing silt into waterways. Protective strips of vegetation should be left alongside watercourses. Make sure that your planted area will not be prone to erosion when harvested.

If in doubt seek advice from the Northland Regional Council before choosing the site. Advice is readily available from the Northland Regional Council, the Farm Forestry Association, private consultants and knowledgeable locals. Make sure that people advise you on what to do, not tell you, because it will be your planting. Once the advice is given, make your own decisions.

Spacing methods

There are many opinions about the best final spacings for clear wood production. These generally range from 200 stems per hectare to as high as 500, depending on species and whom you talk to. To combine trees with grazing, for example, the final spacings should be less than 150 stems per hectare to encourage grass growth right up to the base of the tree. The trees should be pruned to six metres or higher to maintain grass growth.

Initial planting - how many do I plant to achieve the desired final crop?

More trees are planted initially than are needed for the final crop because this:

- 1 Allows for any losses
- 2 Gives a chance to select trees with good form for the final crop
- 3 Forces the trees to grow upwards and restricts side branching
- 4 Gives options for the final crop use, for example, using thinnings for pulp, framing or fencing timber.



High pruning radiata.



Pruning existing farm totara.



Timber stacked for drying.

In the past, when tree quality was lower, spacings were as close as 2.5 x 2.5 metres or 1600 stems per hectare or higher. To get down to a final spacing of 5 x 6 metres (350 stems) involved a lot of thinning and unnecessary pruning. Such a system is economical only if the thinnings can be used for posts or pulp etc. With improvement in tree quality and higher labour costs, initial planting densities are generally lower now. If grazing is desired after the trees are well established, it is advisable to plant fewer trees.

Planting methods

Grid planting

Trees are usually set out in grid patterns. Depending on spacing, pruning may be carried out on as many as three times the final crop number. If there is no production thinning (for posts, pulp or timber) then money and time have been wasted. Usually this system is better for higher stocking rates in plantation forestry, where there will be less thinning required, rather than for agroforestry.

Gap planting

Using this system, high value trees such as *Acacia melanoxylon*, eucalypt, black walnut, alder, totara, kauri or rimu are planted in lines cut in tall scrub or gorse. This provides the seedling with a light well and encourages the tree to grow straight for the light, without many heavy side branches. Trees planted in this situation will generally have a trunk free of branches to the height of the surrounding scrub. This is by far the best site to plant *Acacia melanoxylon*, because if they are planted in the open they develop many leaders and require large amounts of pruning to produce a straight stem.



Pruned cypresses grid planted.

Definitions and terms

1. Planting systems

- **Agroforestry:** Combines stock grazing with wide spaced timber planting. This system maintains grazing underneath for part or all of the life of the tree crop depending on species. This provides a multiple use for the land and often has erosion control, shade and shelter benefits. Even under an intensive forestry regime there is still significant grazing during the first few years. Final spacing may be between 100 and 200 stems per hectare. Species used have included radiata pine, eucalypt and poplar.
- **Woodlot:** This system concentrates on managing the land for a timber crop only, with final spacing of 250 to 500 stems per hectare.
- **Timberline:** A shelter belt is managed for timber. Final spacing may be about 30 stems per 100 metres.

2. Clearwood

This is formed as the diameter of the tree grows outwards, laying down new wood with no branches on the outside to cause knots in the timber. Clear wood may be used for furniture, veneer, panelling and other high value products. Knotty timber does not generally command such a premium and will normally be used for construction, although with some timbers such as cypresses the knotty timber is used for panelling and sarking.

3. Defect core

The defect core is all the deformed wood in the centre of the tree that forms as new wood grows around branches. When branches are pruned the healing over process (occlusion) starts and the new wood laid down immediately over the pruned branch stubs is distorted.

4. DOS

Diameter over stubs. This is measured after pruning, over the top of the pruning wound. A good DOS to aim for is 130 to 190mm. This will give a defect core of between 190 to 250mm. The difference between these measurements is the wood laid down over the pruning wound.

5. DBH

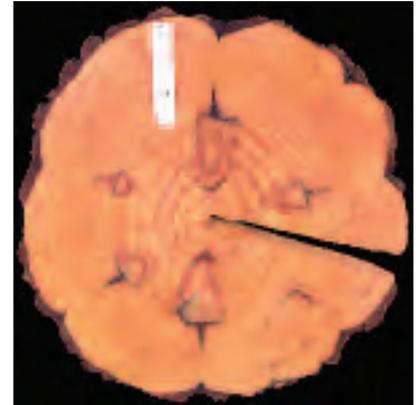
Diameter at breast height. This refers to the measured diameter at around 1.4 metres off the ground, taken from the uphill side of the tree.

6. Stems per hectare (SPH)

The number of trees per hectare.

7. Final crop

The number of trees intended for harvest once all thinning has been carried out.



Large knots showing in an unpruned radiata.
Forest Research Photo.



Kauri planted and pruned for timber production.

Sequence for planting

- **As early as possible:** Order seedling trees. Some varieties may be sold out up to two years ahead, so the sooner trees are ordered the better.
- **March-May:** Control possums, hares or rabbits and complete fencing. Undertake weed control with residual herbicides.
- **April-May:** Spray spots with non-residual weed killer where you intend to plant individual trees and/or graze the area hard with stock to reduce weed competition.
- **June-August:** Plant when the ground is moist.
- **October:** Release trees by clearing the grass from around them using mechanical or chemical means to remove the grass if necessary. Fertilise except on fertile farm sites.
- **March:** Check for survival. Release again if necessary, then start again for next year.

Suitable timber species

<i>Agathis australis</i>	.....	kauri
<i>Alnus cordata</i>	.....	* black alder
<i>Acacia melanoxylon</i>	.....	Australian/Tasmanian blackwood
<i>Cupressus lusitanica</i>	.....	Mexican cypress
<i>C. macrocarpa</i>	.....	Monterey cypress
<i>Cupressocyparis leylandii</i>	.....	Leyland cypress
<i>Dacrydium cupressinum</i>	.....	rimu
<i>Eucalyptus botryoides</i>	.....	southern mahogany
<i>E. globoidea</i>	.....	white stringy bark
<i>E. microcorys</i>	.....	tallow wood
<i>E. muellerana</i>	.....	yellow stringy bark
<i>E. pilularis</i>	.....	black butt
<i>E. saligna</i>	.....	Sydney blue gum
<i>Gleditsia triacanthos</i>	.....	honey locust
<i>Pinus radiata</i>	.....	radiata pine
<i>Podocarpus totara</i>	.....	totara
<i>Populus spp.</i>	.....	poplar
<i>Quercus robur</i>	.....	English oak
<i>Robinia pseudoacacia</i>	.....	robinia, black locust
<i>Sequoia sempervirens</i>	.....	Californian redwood

* Do not plant along waterways.

For more information on native trees for timber, see page 30.

Farm shelter

Throughout the year, whether the wind is warm and drying or cold and wet, shelter is essential to improve conditions for stock, pasture and people alike. Because there are many different types of shelter belt, this guide will cover only the main types and the principles of shelter planting. Requirements will differ greatly with individual sites.

Principles

- 1** The aim of a shelter belt is to filter the wind and slow it down, not stop it entirely. A solid obstruction or a very dense shelter belt tends to create turbulence on both sides and accelerates wind speed on the downwind side which defeats the purpose of the shelter belt.
- 2** Planning is essential. It is best to work with a farm map and where possible use existing fence lines. Design all the shelter, work out what results it will deliver, and decide on a priority order of planting.
- 3** To achieve a good even shelter belt, care needs to be taken with grass and weed control, tree health and species selection. A shelter belt must be managed to give good results. Some species such as *C. macrocarpa* or *C. leylandii* require pruning or trimming to stop them becoming too dense.
- 4** Shelter can be multi-purpose. Trees can be managed for timber, bee and stock fodder, amenity values and bird habitat.
- 5** Fencing **MUST** be stock proof and a two to three-metre gap is required between the outside trees and fence line. Fences must be erected and made stock-proof before planting.
- 6** When using evergreen species remember that if the row runs due east-west, there will be a problem with shading on the southern side. A less dense species such as eucalypt teamed with a denser and shorter understorey may solve this problem.

Types of shelter belt

Single row

- May be deciduous or evergreen
- The trees need to be closely spaced (2-3 metres apart) to prevent gaps and draughts underneath.
- A single deciduous row is useful in breaking up westerly winds, and may be used as a secondary internal shelter belt.

Double row

There can be many combinations of species but generally one species provides high shelter with the other giving lower and denser shelter. Often the trees are offset in double rows to provide the understorey, and spacings range from 2-3 metres within and between rows.

Triple row

Three rows of trees, often used in very exposed or coastal situations.



Poplar with flax planted underneath for low shelter, providing habitat and potential timber.



Single row poplar shelter belt.



Double row shelter belt.



Leyland cypress timberline.

Timberline

Shelter trees are clear pruned or clear and alternate fan pruned, providing both timber and shelter. Fan pruning involves removing branches from the back and front of the tree encouraging it to grow sideways.

Coastal situations

Much of Northland is close to the coast and is prone to strong, salt-laden winds. Only certain trees will thrive under these conditions and a list of these follows. Most of these trees will grow in inland situations too.

In Northland the most severe forms of wind erosion are seen on coastal land especially on loose unconsolidated dune sands. Wind can be damaging in other ways. Cold, wet winds lower animal body temperatures and raise feed requirements, while warm westerly winds dry out pastures and crops.

Coastal shelter trees

Tall: 8 metres plus

<i>Cryptomeria japonica</i>	.....	Japanese cedar
<i>Cupressus macrocarpa</i>	.....	Monterey cypress
<i>x Cupressocyparis leylandii</i>	.....	Leyland cypress
<i>Eucalyptus botryoides</i>	.....	southern mahogany
<i>Houheria populinea</i>	.....	lacebark
<i>Kunzeia ericoides</i>	.....	kanuka
<i>Metrosideros excelsa</i>	.....	pohutukawa

Medium: 4-8 metres

<i>Coprosma robusta</i>	.....	karamu
<i>Cordyline australis</i>	.....	cabbage tree
<i>Corynocarpus laevigatus</i>	.....	karaka
<i>Griselinia littoralis</i>	.....	puka
<i>Myoporum laetum</i>	.....	ngaio
<i>Myrsine australis</i>	.....	matipo
<i>Pseudopanax lessonii</i>	.....	houpara
<i>Pittosporum crassifolium</i>	.....	karo
<i>Sophora chathamica</i>	.....	kowhai

Small: under 3 metres

<i>Coprosma repens</i>	.....	taupata
<i>Cortaderia splendens</i>	.....	* toetoe
<i>Dodonaea viscosa</i>	.....	akeake
<i>Olearia spp.</i>	.....	olearia
<i>Phormium tenax</i>	.....	flax

* This is a native species - do not plant pampas grass.

For more specialised information:

Contact land management staff at the Northland Regional Council.

A good reference publication is our 'A planters guide for Northland natives' available free from all Northland Regional Council offices.

Landcare Research internet database, The Green Toolbox. Follow links at www.landcareresearch.co.nz



Good coastal shelter plants include flax, coprosma, pohutukawa and karo.

Shade

In Northland's hot dry summers, animals are often exposed to hours of direct sunlight and high temperatures. These conditions cause heat stress and production declines. Many European stock breeds also suffer from skin cancers and constant exposure to sunlight does not help recovery.

It makes sense (and cents) to use trees to provide valuable shade. Shelter belts and native bush edges can also provide shade for stock.

To reduce moisture loss from pasture and discourage stock from camping in one small area, it is preferable to high prune the trees, allowing the leaf shadow to move around the tree. Pruning will also give the option of future timber production from the tree. Deciduous trees are best on southern slopes to allow sunlight to reach the base of the tree in winter.

For sensitive species such as deer, shade and/or shelter is essential to keep stress to a minimum. However, trees must be protected from animal browsing.

Shade around buildings and yards helps make life more comfortable for both stock and farm workers. Because the leaves of trees are cooled by transpiration they provide cool shade. Shade trees will provide shelter, beautification, soil stability and perhaps timber. Stock will be happier and less stressed.

Shelter trees

The following trees are good for shade, either planted in the open or in groups in paddock corners.

<i>Alectryon excelsus</i>	titoki
<i>Alnus cordata</i>	Italian alder
<i>Catalpa speciosa</i>	catalpa
<i>Corynocarpus laevigata</i>	karaka
<i>Eucalyptus spp.</i>	eucalypts
<i>Fraxinus oxycarpa</i> var 'Raywoodi'	claret ash
<i>Gleditsia triacanthos</i>	honey locust
<i>Grevillea robusta</i>	grevillea
<i>Houheria populinea</i>	lacebark
<i>Liquidambar styraciflua</i>	liquidambar
<i>Liriodendron tulipifera</i>	tulip tree
<i>Magnolia grandiflora</i>	magnolia
<i>Metrosideros excelsa</i>	pohutukawa
<i>Paulownia tomentosa</i>	paulownia
<i>Pittosporum spp.</i>	lemonwood, karo, tenufolium
<i>Platanus spp.</i>	plane trees
<i>Podocarpus totara</i>	totara
<i>Populus spp.</i>	poplars
<i>Quercus spp.</i>	oaks
<i>Salix spp.</i>	willows
<i>Ulmus procera</i> var 'Louis van Houtte'	golden elm
<i>Vitex lucens</i>	puriri

See the Tree Guides on page 30 & 31 for individual site tolerances.



This pukatea tree left for shade is providing habitat for a *Griselinia littoralis*, astelias, two rata vines and a totara growing up alongside.



Trees for stock food

With the increasing risk of summer droughts in Northland, it is useful to plant trees which can be used as stock food. Different parts of trees may be used.

Types of stock food

- Branches can be cut off the tree and left below for stock to eat. The best species to use are poplar and willow. Poplar leaf has the same nutritive value as lucerne hay. Willow leaves can reduce the worm burden in young stock.
- A small fenced block with low growing poplar or willow can be opened up for browsing.
- Trees may be planted in the open or paddock corners to provide fruit or seed pods which drop to the ground. It is a good idea when buying these types of trees to make sure that they have been bred for their fruit/seed production, as some cultivars are better than others.

Trees suitable for stock food

<i>Castanea sativa</i>	sweet chestnut – seeds
<i>Chamaecytisus palmensis</i>	tree lucerne – pods and leaf
<i>Gleditsia triacanthos</i>	honey locust – pods
<i>Morus alba</i>	mulberry – fruit
<i>Populus spp.</i>	poplar – leaf
<i>Quercus spp.</i>	oaks – seeds (pigs mainly), leaf (ducks and livestock)
<i>Salix spp.</i>	willows – leaf



Poplars pruned for timber and stock food.

Amenity values

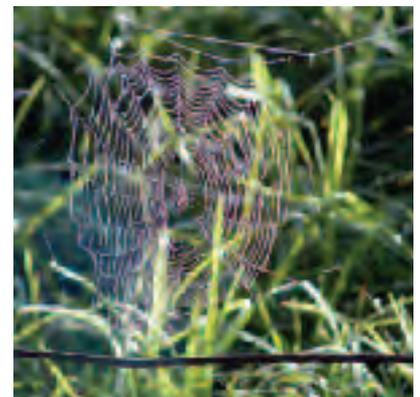
An important reason for planting can be visual effect. Does it look pleasing to the eye? Many amenity trees are deciduous which in subtropical Northland helps differentiate more clearly between the seasons. Newly blossoming trees, fresh spring growth or autumn leaf colours put us more in tune with the seasons. Native trees can provide striking leaf forms and colours, as well as essential food and habitat for native birds. A good place to start is at your local nursery to view the variety of evergreen foliage. You may be able to take advantage of fenced dams or paddock corners to plant trees that look good as well as having added benefits such as stock fodder, flower display, and bee and bird food.

Trees for autumn colour

<i>Fraxinus oxycarpa</i> var 'Raywoodi'	claret ash
<i>Ginkgo biloba</i>	gingko
<i>Gleditsia triacanthos</i>	honey locust
<i>Juglans nigra</i>	black walnut
<i>Liquidambar styraciflua</i>	liquidambar
<i>Metasequoia glyptostroboides</i>	dawn redwood
<i>Nyssa sylvatica</i>	tupelo
<i>Paulownia</i> spp.	paulownia
<i>Platanus</i> spp.	plane trees
<i>Populus</i> spp.	poplars
<i>Quercus coccinea</i>	scarlet oak
<i>Quercus palustris</i>	pin oak
<i>Quercus rubra</i>	red oak
<i>Salix alba</i> var 'vitellina'	golden willow
<i>Taxodium distichum</i>	swamp cypress
<i>Ulmus procera</i> var 'Louis van Houtte'	golden elm



Kowhai flowers providing nectar for tui, leaves are eaten by kukupa.



Trees provide habitat for other life.



Amenity trees for autumn colour.

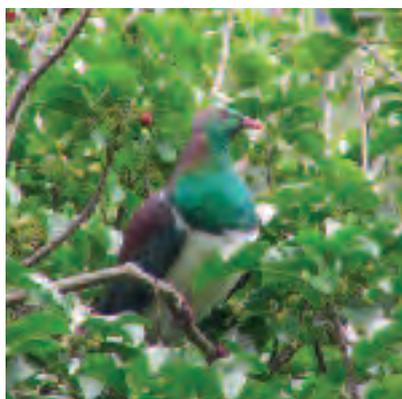


Northern Rata.

Trees for flowers, berries and nectar valuable to native birds

<i>Albizia julibrissin</i>	.....	silk tree
<i>Beilschmedia taraire</i>	.....	taraire (berries)
<i>Coprosma spp.</i>	.....	coprosma (berries)
<i>Cordyline australis</i>	.....	cabbage tree (berries/nectar)
<i>Corynocarpus laevigatus</i>	.....	karaka (berries)
<i>Eucalyptus ficifolia</i>	.....	ficifolia (nectar)
<i>Eucalyptus leucoxydon</i>	.....	var 'rosea' (nectar)
<i>Erythrina crista-galli</i>	.....	coral tree (nectar)
<i>Grevillea robusta</i>	.....	silky oak (nectar)
<i>Hebe stricta</i>	.....	koromiko (nectar)
<i>Hoheria populnea</i>	.....	lacebark/houhere (nectar)
<i>Jacaranda mimosaeifolia</i>	.....	jacaranda (flowers)
<i>Knightia excelsa</i>	.....	rewarewa (nectar)
<i>Liriodendron tulipifera</i>	.....	tulip tree (flowers)
<i>Magnolia grandiflora</i>	.....	magnolia (flowers)
<i>Metrosideros excelsa</i>	.....	pohutukawa (nectar)
<i>Metrosideros robusta</i>	.....	northern rata (nectar)
<i>Morus alba</i>	.....	mulberry (berries)
<i>Paulownia tomentosa</i>	.....	paulownia (flowers)
<i>Phormium tenax</i>	.....	flax, harakeke (nectar)
<i>Pseudopanax arboreus</i>	.....	five finger (nectar/berries)
<i>Sophora microphylla</i>	.....	kowhai (nectar/leaf)
<i>Vitex lucens</i>	.....	puriri (berries/nectar)

For more information on native plants for bird food, see the 'A planters guide for Northland natives' available through the Northland Regional Council.



Kukupu.



Healthy fenced native bush is attractive.

Planting information

1. When to plant?

The best time to plant is from May through August, once the ground is moist. If irrigation is available you can plant throughout the year. Winter is the slowest growth period, especially for deciduous species. Seedlings will be available from your nursery from about May onwards. Check beforehand for availability.

Trees will not survive in dry soil. In dry winters, planting should not take place until enough rain has fallen to make the ground easy to dig. Planting before May and after August is a gamble. In some years and with some species you may get away with it, but the odds are not in your favour.

2. Order a realistic number of trees

How many trees can I expect to plant in a day and look after for the next 18 months? Remember planting is the easy bit – ensuring they survive takes time and effort.

There is, of course, no substitute for experience, but a reasonably fit person planting into spot sprayed pasture using a sharp planting spade on not too steep country should be able to plant 400-450 pines per day. For other species (which will require more cultivation), or if your planting situation is more difficult, reduce this number. It is better to plant all your trees and have some time left over, than to order too many and watch some die before you can get them in the ground. Err on the side of caution until you know your capabilities!

3. Five star treatment for seedlings, some dos and don'ts:

Never order more bare rooted seedlings than you can comfortably plant in two days.

Always keep boxes of seedlings out of the sun to protect the plant roots.

Do

- Check for seedling quality before you leave the nursery. Make sure the roots are moist, and that there are plenty of fine fibrous roots for water uptake, with several thicker anchoring roots.
- Trim the roots if they are longer than 10 cm, otherwise they will become misshapen.
- Cover seedlings with a damp sack and put them in the shade and out of the wind.

Don't

- Take the seedling out of the box/pot until immediately before putting it in the ground.
- Expose seedling roots to the air more than necessary before planting.
- Stand the boxes on end or the roots can be crushed. Transport them on their sides.
- Leave the boxes in the sun and/or heat while waiting to plant (trees will sweat and overheat).



Native trees ready for planting.



People of all ages can plant.



Flaxes planted on a damp streamside.

4. Bare rooted or not bare rooted?

Bare rooted trees (i.e. not in pots or containers) are vulnerable to sun, wind and frost. They should be planted within 48 hours of lifting from the nursery. If you leave them any longer than that they will need to be heeled into cultivated ground or kept at low temperatures. Plants in root trainers or pots can be kept until they grow out of their containers, thus planting is more flexible (and beware, it is easier to keep putting off!).

5. Take care of the trees before they go in the ground

To get the most growth from your trees, they need to be well treated before planting, especially the roots and put into the ground with the least amount of stress.

6. Crunch time – planting technique

The best way to learn how to plant trees properly is to see it done and then have a go. All of the local branches of the Farm Forestry Association in Northland have yearly field days to give people this opportunity, usually in April or May. Contact information is on page 23.

When planting

- A good planting spade is essential and there are specialised ones available.
- Bury the spade blade to its 25 cm depth on each cut
- On the last cut make sure to break through any soil pan below

The main objectives when the tree is planted are to make sure the roots

- Point downwards
- Are not bent or crooked
- Have no air pockets around them.

How?

- 1 Trim any roots which are longer than 10 cm.
- 2 Make sure the soil around the tree is well cultivated, to approximately 300x150 mm wide and 250 mm deep.
- 3 The tree must be planted straight (within 20 degrees of vertical).
- 4 When compacting the soil around the tree use the heel of your boot, making sure not to get closer than 50 mm to the stem. The tree needs to be firm enough to resist a steady upward pull.
- 5 A bare rooted seedling can be buried with up to one-third of the greenery in the ground while a container seedling should not be any deeper in the ground than it was in the container. This helps to keep the tree stable and stops socketing (wind blowing the tree around and creating a hole around the stem). In very wet, heavy soils no more than 4-5 cm of the stem should be buried to prevent stem rot.



Prepare ground well before planting.

Making sure trees survive

Given all the things which can go wrong as a tree grows from a seed to a 30 metre monster, it is incredible so many survive. However, survival and healthy growth are not necessarily the same things and there are quite a few actions you can take to stack the odds in the trees' favour. Trees are most vulnerable during the first few seasons, so putting in effort early will pay dividends later on.

Some of the things your trees may need protecting against are:

- Wind
- Frost
- Wild animals, such as possums, hares, rabbits, goats, deer and pigs
- Farmed animals, including sheep, cattle, goats, deer and horses
- Grass and weed competition
- Insect pests and disease.

The best way to avoid many of these problems is to plan ahead.

Before planting

1. Match the right tree to the right site

Look at your site and list the limitations it may have. In areas that are frost-prone, have poor soil, are swampy, dry or have very sandy soil, a tree may survive but be stressed and vulnerable to disease. For example, willows or alders planted close to the coast and constantly in salt spray may live, but not for very long, or very well. Choose varieties resistant to any problems your site may have. This will save you time and money later on.

2. Prepare the area to be planted

The most important actions you can take are:

- Fencing out stock – this is absolutely essential.
- Reducing competition from other plants by:
 - Having the plants close enough to suppress weeds quickly.
 - Spot spraying with herbicide a spot where each tree is to be planted, approximately six weeks before planting. If using a residual herbicide, spray 10-12 weeks beforehand.
 - Grazing the area very hard before spraying (if spraying) and immediately before planting to give the seedlings a head start on competing grasses.
- Controlling pest numbers. To do this you will first need to estimate what pests are already present. This can be done through your own observations, or talking to neighbours and the regional council biosecurity team to gauge the extent of any problem. Once you have an idea of the scope of the problem, the regional council biosecurity officers will be able to help with advice. Be sure to give them at least two months notice before you are intending to plant.
- Planting initial shelter (if needed).
- Ripping the ground to be planted (if needed).



Protect your trees from animal pests.





Spot spraying/mulch.

During planting

- Treat the seedling well.
- If pests are still a problem, treat your seedlings with a spray/dip of egg and acrylic paint to deter them. This will only last a few weeks, then will need a follow-up. This mixture is available through the Farm Forestry Association. Contact details are on page 23. If you wish to make your own mixture the regional council can provide you with the recipe.
- Mulch around the plants, especially if not intending to use other controls on weeds.

After planting

- Exclude all heavy stock for as long as it takes to get the seedlings established, depending on the species and growth rates. In some cases it may be as little as two years (poplar poles) or permanently (for native revegetation). Closely monitor any sheep grazing to prevent damage.
- Keep up the pest control. How much you will have to do will depend on your situation. Don't waste all that early work only to have rabbits, possums or goats kill or damage your young trees.
- Release your trees (clear any competing weeds/grass from around them). This may be either by chemical or mechanical means and generally needs to be done in the first and second years, starting from the October after planting and checking until the trees are well above surrounding weeds.
 - **Chemical:** Special herbicide sprays are available which will not damage young trees if they are used strictly according to directions. *Note:* Young natives are very sensitive to sprays.
 - **Mechanical:** Use a scrub cutter with a nylon attachment, or any other device that will cut potentially smothering weeds. You have to be careful not to damage the stem of the seedling, but the advantage of this method is that the cut weeds can be used as a mulch and help stop any drying out and cracking of the soil over the summer.



A stock proof fence is essential.

Protection from insect pests, diseases and nutritional deficiencies

Nutritional deficiencies, weed competition or water shortages place a tree under stress and can reduce its ability to withstand pests and diseases.

Knowledge of your soil properties will help you to apply the right fertiliser when the trees are young. The reference material listed on page 36 has useful information on disease and deficiency symptoms, but if your trees do not look healthy and you are not sure why, get expert advice from the Ministry of Forestry or a forestry consultant.

Self help information

If you are considering investing in tree planting, it is important to get advice.

Sources of advice

1. Northland Regional Council

- Advice on land management
- Erosion control
- Flood control and drainage
- Land use capability
- Biodiversity values and funding for protection
- Shelter and shade
- Weed and pest control

2. Farm Forestry Association

A national organisation providing local field days, information (both national and local), and sources of local knowledge.

Contact: PO Box 1122, Wellington. Phone 04 472 0432.

www.nzffa.org.nz

3. Northland Totara Working Group

This is a group of agencies and individuals interested in promoting totara for its timber values.

Contact: Land management staff at the Northland Regional Council.

4. Tanes Tree Trust

Interested in promoting the use of native trees.

Contact: PO Box 12094 Hamilton 3248. Phone 07 858 4404.

www.tanestrees.org.nz

5. Books

Bought or borrowed from public libraries. See the references at the end of this publication for useful books.

6. New Zealand Landcare Trust (an independent charitable organisation)

Staff of the trust are available to help community groups form where necessary to develop their own solutions to land use problems.

Contact: Phone 09 430 0954, Freephone 0800 526 322.

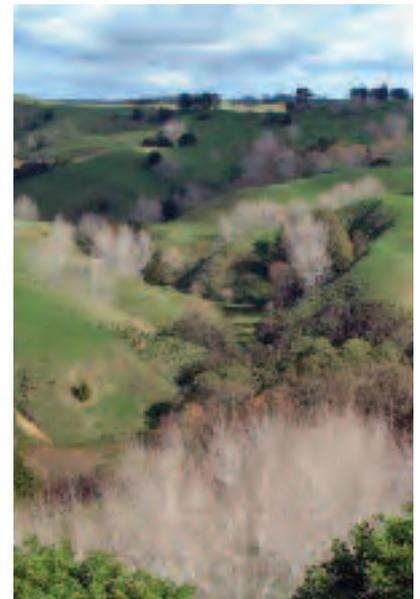
www.landcare.org.nz

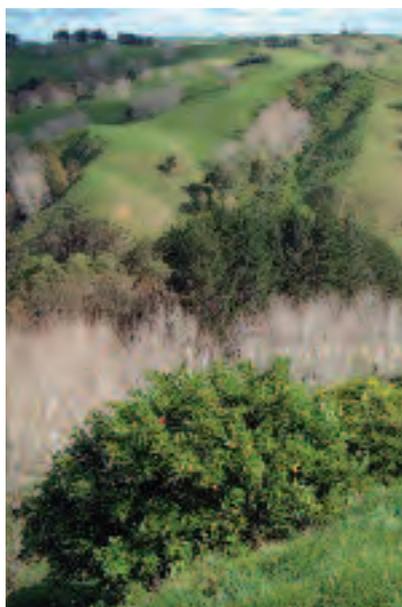
7. QEII National Trust

There are three representatives based in Northland able to help with protecting and covenanting native bush and wetlands.

Contact: PO Box 3341, Wellington. Phone 04 472 6626.

www.nationaltrust.org.nz





Poplars planted and natives left in gullies, forestry on steep dry slopes, native bush protected.

8. Courses

- Correspondence – the Open Polytechnic of New Zealand runs a Farm Forestry course. *Freephone 0508 650 200 for details.*
- NorthTec (Northland Polytechnic). *Freephone 0800 152 100.*

9. Consultants

- Planning
 - Financial: Tax and superannuation
 - Legal: Join venture agreements
 - Planting: Forestry consultants and New Zealand Institute of Foresters Register
- Tree stocks and silviculture
 - Contractors: Yellow Pages or support organisations
 - Planting
 - Thinning
 - Logging

10. Funding for biodiversity protection

- Northland Regional Council Environment Fund. *See back page.*
- Kaipara District Council. www.kdc.govt.nz
- National Biodiversity Condition Fund. www.biodiversity.govt.nz

Other considerations

Consents may be required from:

- Your district council – for changing a land use.
- Northland Regional Council – for activities (including logging) which involve land clearance and/or land and water disturbance. The need for a consent will depend on the scale and location of your operation. Contact the regional council for further information.



Field days are a great way to gain information.

Brief tree descriptions

***Acacia melanoxylon* (Australian/Tasmanian blackwood)**

Important timber species, used for furniture, turning, veneer and panelling. Blackwood is very hardy and will grow in most sites but to produce a good timber tree it requires shelter and tending. Grown in the open it spreads outward and its form is difficult to control, even with extensive pruning.

***Agathis australis* (kauri)**

In a situation that is sheltered and fertile, kauri will grow up to 80cm per year. Kauri has excellent timber and shape with a minimum rotation time of approximately 70 years.

***Albizia julibrissin* (silk tree)**

A deciduous ornamental, this tree bears beautiful flowers during summer but requires some shelter as branches tend to be brittle.

***Alectryon excelsus* (titoki)**

Normally found in coastal and lowland forests, titoki thrives along rivers. Frost tender when young, it needs shelter and prefers a heavy soil. Beautiful, graceful foliage.

***Alnus cordata* (Italian alder), *A. glutinosa* (black alder), *A. rubra* (red alder)**

Alders are a versatile species with these three having commercially useful timber. They will grow in very disturbed and infertile sites. They improve soil conditions by fixing nitrogen and their leaf drop builds up soil structure. Their timbers are ground durable and good for furniture and firewood. *A. glutinosa* should not be planted alongside waterways as it can spread and become weedy. All alders are shade tolerant and will spread if planted in shady areas.

***Araucaria heterophylla* (Norfolk pine)**

Very resistant to salt winds, this tree grows best in sandy soils. Young trees are frost tender. Useful as coastal shelter.

***Casuarina glauca* (swamp she oak)**

Casuarina has beautiful timber, useful for cabinet making, turning and furniture. This tree tolerates strong and salty winds and will survive both damp and dry conditions. Excellent coastal shelter.

***Chamaecytisus palmensis* (tree lucerne)**

A nitrogen-fixing shrub, tree lucerne is adapted to drought-prone sites provided drainage is good. It withstands salt winds but has a limited life of 3-5 years. As it is a soil improver, it can be used on a dry site to give early shelter to slower-growing natives.

***Coprosma repens* (taupata), *C. robusta* (karamu)**

Taupata will withstand extreme coastal winds and dry conditions. It will hedge well and provide a good understorey, to about 1.5 metres. Karamu will not tolerate salt winds well, but makes an attractive understorey tolerating most soil conditions. They have prolific crops of orange berries enjoyed by tui and other birds.

***Cordyline australis* (cabbage tree/ti kouka)**

The cabbage tree has a multi-branched head and perfumed flowers in August. Very hardy, it will grow in both wet and dry conditions.

***Corynocarpus laevigatus* (karaka)**

The karaka is a hardy tree surviving salt winds and dry coastal situations. Good for shade and amenity with its orange berries appearing in summer. The berries are poisonous to humans but loved by the native wood pigeon.

***Cryptomeria japonica* (Japanese cedar)**

Grown mainly for shelter, the cryptomeria has excellent timber although it is slow growing. It is relatively tolerant of salt winds and will grow in dry clays but has no tolerance of poor drainage.

***Cupressus lusitanica* (Mexican cypress), *C. macrocarpa* (Monterey cypress)**

Both have excellent timber which is used in place of kauri for boat building, furniture making and turning. *C. macrocarpa* will withstand dry conditions, salt winds and exposed sites. Excellent shelter when tended. *C. lusitanica* requires more sheltered and fertile sites and will not withstand salt winds. Of the two, *C. lusitanica* is not so susceptible to cypress canker and fluting of the stem which both occur in humid conditions.

***X Cupressocyparis leylandii* (Leyland cypress)**

This sterile cross between *C. macrocarpa* and *C. chamaecyparis nootkatensis* is an excellent shelter and timber tree. It is very hardy, and will withstand salt winds and dry conditions but will not tolerate poor drainage. Because all trees are grown from cuttings they make a very even shelter belt.

***Dacrycarpus dacrydioides* (kahikatea)**

Kahikatea is a beautiful, tall, straight tree growing to 60 metres. It prefers swampy, poorly drained land but is hardy and will tolerate most sites. The timber is straight and easily worked and the female trees bear a prolific berry crop, edible to humans, birds and possums.

Brief tree descriptions

Dodonaea viscosa (akeake)

A small tree growing to 6m, akeake is hardy, withstands salt winds and will cope with clay and dry soils. It is excellent as an understorey shelter species in dry and/or coastal situations. Frost tender when young, it dislikes poorly drained soils. Two varieties are available, with either a green or purple leaf.

Erythrina crista-galli (coral tree)

This amenity tree has a beautiful red flower in summer and loses its leaves in winter, providing an interesting silhouette. It will not tolerate poor drainage.

Eucalyptus

The eucalypts have several varieties that are well suited in Northland for timber production, soil conservation, shelter and amenity. They are prone to insect pests so ask around before planting.

Eastern bluegums

This group grows well in Northland although there are some problems with milling and seasoning which can be overcome with suitable technology.

E. botryoides (Southern mahogany)

Very hardy, this tree will withstand salt winds, dry and wet conditions and exposed areas. Useful for coastal shelter and/or very wet or dry areas. The timber from this tree is useful but not as good as its close relative *E. saligna*.

E. saligna (Sydney bluegum)

Good furniture, veneer and building timber if milled properly. It requires better sites than *E. botryoides* but will tolerate clay soils and provides shelter.

Stringybarks

These are noted for the durability of their timber in the ground and for fewer problems when milling.

E. globoidea (white stringy bark)

Strong, tough, durable timber which mills well. It prefers a well-drained site that is not too dry and is without heavy frosts.

E. microcorys (tallow wood)

Timber is dense, hard and durable and has been used for electric fence standards. It is tolerant of shade and prefers better soils, being intolerant of drought and palatable to possums. It is frost tender when young.

E. muellerana (yellow stringy bark)

Hard, strong, durable timber which is excellent for farm and exterior uses. This tree does not tolerate poor drainage or hard frosts but will withstand clay or sandy soils.

E. pilularis (black butt)

Very durable timber, hard and strong. This tree will withstand poor clay soils and drought conditions. However, it is frost tender and palatable to possums when young.

Fraxinus oxycarpa var '*Raywoodii*' (claret ash)

This tree is noted for its claret coloured foliage and it grows well in dry clay soils and tolerates wind. It is an attractive shade tree. The timber is little used in New Zealand but valued in Europe and America.

Ginkgo biloba (ginkgo)

The main feature of this slow growing tree is its brilliant gold autumn colouring. A well-shaped tree, it will grow close to salt water, in most soils, and tolerates wind. Seeds are poisonous and smell horrible so plant away from buildings.

Gleditsia triacanthos (honey locust)

Honey locust fixes nitrogen and is hardy, withstanding droughts and drained swamp conditions. The leaves turn brilliant yellow in autumn, and fall leaving pods which are good stock food. Pod bearing varies between cultivars. The timber is ground durable and useful for furniture. Spring pollen provides good bee food.

Grevillea robusta (Australian silky oak)

This graceful tree has a good display of orange flowers in January. The timber is valuable and easily worked. Branches tend to be brittle and shelter is required for good shape and timber production.

Griselinia littoralis (broadleaf, kapuka)

These attractive small trees grow to 12 metres, are hardy and will withstand coastal winds. They will hedge well. The wood is durable, dense and strong.

Griselinia lucida (puka)

Attractive small tree that grows to 8 metres with bright green, thick, shiny leaves. Similar in appearance to broadleaf. In the wild it usually starts life as an epiphyte and then its roots make their way down to the soil.

***Hebe stricta* (koromiko)**

Because koromiko prefers dry, coastal areas and tolerates clays, it is an excellent low coastal shelter. Self-seeding, it will also revegetate bare areas, over time. Attractive white or purple flowers are present for 3-4 months of the year.

***Hoheria populnea* (lacebark, houhere)**

An attractive tree bearing white flowers in late summer. It is hardy, and will grow in most situations. When pruned it grows to a medium height for a windbreak.

***Jacaranda mimosaeifolia* (jacaranda)**

Planted in a hot sheltered sunny position, jacaranda provides a spectacular display of purple flowers in summer. It prefers a dry sandy soil.

***Knightia excelsa* (rewarewa)**

Preferring plenty of light, the rewarewa is a striking, narrow tree growing to over 30 metres. The timber is attractive, strong and used for interior decorative work. Hardy, it will grow in most free-draining soils. Good bee and bird food.

***Kunzea ericoides* (kanuka/red manuka)**

Pioneer species, flowers gracefully in January on the end of branches. Good revegetation species.

***Leptospermum scoparium* (manuka)**

Growing in almost any soil and climatic condition, manuka is a primary native coloniser. The wood makes excellent firewood and the tree flowers during late spring-summer. Various coloured pink/red forms are available for amenity planting.

***Liquidambar styraciflua* (liquidambar)**

This tree is deciduous, with excellent autumn colour. It is hardy and will tolerate both wet and dry soils and wind. Colours range from orange through to red and are especially effective next to water.

***Liriodendron tulipifera* (tulip tree)**

The tulip tree requires good soils and a sheltered site. It is a graceful tree with beautiful flowers and foliage. It does not flower for 10-20 years, but the leaves are a buttery yellow autumn colour.

***Magnolia grandiflora* (evergreen magnolia)**

Tolerant of wind and dry clays, the magnolia is hardy and makes a good shade or specimen tree. White, fragrant flowers are profuse and spectacular from early summer until autumn. Timber is useful for furniture and does not warp.

***Melia azedarach* (bead tree)**

With yellow autumn foliage and purple flowers succeeded by yellow berries, the melia is very attractive. Hardy, it will grow in most soils. However, all parts of the plant are poisonous and this may restrict where the tree is planted.

***Melicytus ramiflorus* (mahoe)**

A small tree growing to about eight metres. Mahoe will withstand most soil conditions but does not grow well in very exposed sites. It is useful as an understorey shelter tree. The leaves are very palatable to stock.

***Metrosideros excelsa* (pohutukawa)**

A Northland icon, pohutukawa withstands salt winds and dry coastal conditions. Dramatic prolific red flowers appear in early summer and are an important food source for tui. Pohutukawa make excellent shade and shelter in coastal areas, but are very palatable to possums and frost tender when young. The nectar from the flowers is an important source of food for a number of species of birds and insects.

***Metrosideros robusta* (northern rata)**

Devastated by possums, few mature rata remain in Northland's forests. It will tolerate a wide range of conditions but needs protection from possums. The northern rata has a stunning display of red flowers in early summer and is an important source of high quality nectar for tui, bellbird and other nectar-loving birds.

***Morus alba*, *M.nigra* (mulberry white/black)**

The mulberry bears fruit which is suitable for both birds and humans. They are small hardy trees, tolerating most soil conditions. They are useful for shade and attracting wild fowl around dams.

***Nyssa sylvatica* (black tupelo)**

Tolerating wet and poorly drained conditions the tupelo, although slow growing, has brilliant red autumn colours. Grows better with shelter from wind.

***Olearia traversii* (olearia)**

This plant tolerates dry, windy, coastal conditions. It is excellent for hedging, grows fast and bears profuse numbers of small, white flowers in spring.

***Paulownia tomentosa* (paulownia)**

A quick growing, attractive tree bearing large purple flowers in spring. The timber is light and very soft. However, the tree requires deep, moist soils over summer and its large leaf is not tolerant of wind.

Brief tree descriptions

Phormium tenax (flax, harakeke)

Flax is tough, hardy and will tolerate very wet, very dry and coastal conditions. Excellent for revegetation, gully planting and low shelter. Tui are attracted to the flower stalks which emerge in late spring.

Pinus radiata (radiata pine)

New Zealand's most important commercial timber tree. Radiata will tolerate a very wide range of soils and climatic conditions. Timber is soft, easily worked, and though not durable, takes treatment very well. Tolerates coastal situations and windbreak trimming.

Pittosporum crassifolium Sp., (karo), *P. eugenioides*, (lemonwood/tarata), *P. tenuifolium* (kohuhu)

All of these trees are fast growing and hardy (withstanding trimming) and are good for hedging. Karo makes excellent coastal shelter and will tolerate dry conditions. Lemonwood has attractive foliage and is a good understorey shelter away from the coast. Kohuhu will tolerate shady conditions.

Platanus acerifolia (London plane)

A large, spreading tree, good for shade and timber, which often grows to 30 metres or more. The timber is tough and valuable. Leaves are shed in autumn and have an orange/brown colour.

Podocarpus totara (totara)

Very hardy, the totara will withstand wet, dry, clay and windy conditions. The timber is ground durable, easily worked, and used outside and in decorative work. Totara has potential to be farm grown for high quality timber.

Populus (poplars)

Poplars grow quickly and are effective for soil conservation, stock shelter, shade, fodder and as ornamental trees. In Northland most poplars will tolerate clay soils and wind. They are an excellent timber resource, providing a light, strong and non-resinous white timber. Poplars are easily propagated from cuttings, poles or wands.

New poplar clones are being developed and are replacing older strains which are less tolerant of a range of climatic conditions, faster or slower growing depending on the application and more resistant to rusts disease and possums. Older strains no longer favoured for propagation are Eridano, Yeogi, Flevo, Cromarty and Androscoggin.

The following is a selection of poplar clones currently recommended for use in Northland.

P. deltoides x yunnanensis (Kawa)

Excellent for agroforestry and soil conservation; highly rust and possum resistant. Two years to produce poles.

P. x euramericana x yunnanensis (Toa)

Similar to kawa, a narrower border tree. Three years to produce poles.

P. deltoides x nigra (Veronese)

Imported black poplar. Good drought wind and tolerance; prone to rust.

P. x euramericana x nigra (Crownsnest)

Suited to shelterbelt applications. An excellent soil conservation tree; reasonably drought tolerant.

P. Yunnanensis (Yunnanensis)

Slower growing than both kawa and toa, holds foliage well into winter. Susceptible to black spot disease. Three years to produce poles.

P. deltoides x nigra (Margarita)

Suited to eastern and northern warmer parts of the country. Has a narrow crown and reasonable rust tolerance.

P. deltoides x nigra (Fraser)

A narrow tree with a light, open canopy, similar to Veronese and Crownsnest. Lighter stems are prone to breakage.

Northland Regional Council is establishing a poplar and willow nursery to support soil conservation work. Poles will be available from winter 2015.

Quercus (oaks)

Oaks are renowned for their timber, and the following varieties will grow well, giving autumn leaf colour.

Q. coccinea (scarlet oak)

Prefers dry, sandy soils, good autumn colour.

Q. palustris (pin oak)

Prefers wet, poorly drained areas, good colour (red/orange).

Q. robur (English oak)

Excellent timber, yellow/orange autumn colour.

***Robinia pseudoacacia* (black locust)**

Common throughout the USA and Europe, robinia is a fast growing, and highly regarded timber. It is a very good erosion control species and will tolerate dry conditions and infertile soils. The timber is ground durable and used for furniture, insulators and architectural work.

Salix (willows)

There are numerous varieties of willows, all of which can be easily propagated from cuttings. They are divided into two broad groups: **tree willows** (up to 20 metres in height single trunk) and **osier willows** (also known as basket willows, medium sized shrubs slender branches and long narrow leaves).

Willows tolerate a wide range of conditions including very wet, poorly drained sites which makes them ideal for erosion control in wet areas on hill sides and gullies.

In New Zealand and parts of Northland willows are a troublesome species which choke waterways exacerbating flooding and causing a range of issues. The worst is usually crack willow (*Salix fragilis*) and it is not recommended that it is propagated or used for amenity planting.

Tree willows

The following is a selection of recommended clones for use presently in Northland.

***Matsudana* and *S. alba x matsudana* (Matsudana)**

Widely planted since the 1960s for soil conservation, shelter and as an ornamental.

***S. alba* 'vitellina' (Golden willow)**

Has bright yellow branchlets. Semi weeping habit grows up to 15 metres. Not affected by leaf gall sawfly.

***S. matsudana* (Tangoio)**

Developed specifically for farm and horticultural shelter planting, this is the best drought tolerate willow clone.

***S. matsudana* (Moutere)**

Blue-green foliage, best suited to moist gullies, can cope with exposed sites.

Osier willows

***S. schwerinii* (Kinuyanagi)**

Commonly known as Japanese fodder willow, this grows as a large shrub or small spreading tree up to six metres tall. Kinuyanagi is a fast grower and does well in most fertile soils. Kinuyanagi is a male clone which is highly resistant to willow saw fly and is a valuable fodder crop. As a soil conservation plant it is excellent for stabilising stream banks and gullies.

***Sequoia sempervirens* (Californian redwood)**

Timber from the redwood is durable, easy to work and resists insects. It grows best on more fertile areas, where the soil is deeper.

***Sophora tetraptera*, *S. microphylla* (kowhai)**

A beautiful, deciduous tree flowering in spring and having delicate foliage. Tui feast on its nectar and native pigeons eat the new leaf growth. It grows well along river margins and close to the coast and will tolerate most soils. It is susceptible to hormone sprays. Timber is tough, hard and durable with beautiful colour and grain.

***Taxodium distichum* (swamp cypress)**

One of the few deciduous conifers, swamp cypress thrives in damp soils and the best shape is achieved in sheltered areas. Rich orange foliage in autumn is followed by delicate green new growth in spring.

***Ulmus procera* 'Louis van Houtte' (golden elm)**

Tolerant of wind, golden elm has yellow foliage throughout the summer, turning golden in autumn as its leaves drop. It is an excellent shade tree, which will tolerate most soil conditions and provide hard, tough, heavy wood.

***Vitex lucens* (puriri)**

Beautiful spreading evergreen tree. In a fertile site they will grow quickly and provide shade and food for native birds. Puriri will also tolerate clay soils and wind, but are vulnerable to possums and frost (when young). Puriri heart wood is ground durable although the puriri moth, which attacks older trees, makes it difficult to get sound timber.

A guide to planting native tree species in Northland

BOTANICAL NAME	COMMON NAME	TOLERANCES						USES						AMENITY			
		Clay	Wind	Damp	Dry	Frost	Possums	Timber	Shade	Berries	Shelter belts	Soil stability	Flowers	Foliage	Growth rate	Height	
<i>Agathis australis</i>	Kauri						1							Aug-Oct	Evergreen	Med	50m
<i>Alectryon excelsus</i>	Titoki					Tender	2							Oct-Dec	Evergreen	Med	12m
<i>Aristotelia serrata</i>	Wine berry						2					Revegetation		Sep-Dec	Deciduous	Fast	8m
<i>Avicennia marina</i>	Mangrove			Salt		Tender	1							Feb-Apr	Evergreen	Slow	15m
<i>Beilschmiedia tarairi</i>	Tarairi					Tender	1							Sep-Dec	Evergreen	Med	22m
<i>Beilschmiedia tawa</i>	Tawa						2							December	Evergreen	Med	20m
<i>Brachyglottis rapanda</i>	Rangiora		Salt				1					Revegetation		September	Evergreen	Med	7m
<i>Cadcluvia roseaefolia</i>	Makamaka						2							Oct-Nov	Evergreen	Med	10m
<i>Carpodetus serratus</i>	Putaputaweta						2					Revegetation		Oct-Dec	Evergreen	Med	8m
<i>Coprosma repens</i>	Taupata		Salt				2				Coastal			Sep-Oct	Evergreen	Med	6m
<i>Coprosma robusta</i>	Karamu						2				Low			Sep-Oct	Evergreen	Med	5m
<i>Cordyline australis</i>	Cabbage tree/ti kouka						1					Revegetation		November	Evergreen	Med	10m
<i>Corokia buddlioides/Cotoneaster</i>	Korokio						2				Coastal			Aug-Mar	Evergreen	Med	6m
<i>Cortaderia toetoe</i>	Toetoe						1				Low	Coastal		Dec-Feb	Evergreen	Fast	2m
<i>Corynocarpus laevigatus</i>	Karaka		Salt			Tender	1				Coastal			Aug-Nov	Evergreen	Med	15m
<i>Dacrycarpus dactyloides</i>	Kahikatea						2							Sep-Oct	Evergreen	Slow	50m
<i>Dacrydium cupressinum</i>	Rimu						1							Nov-Jan	Evergreen	Slow	40m
<i>Dodonaea viscosa</i>	Akeake		Salt				1				Low	Revegetation		October	Evergreen	Fast	7m
<i>Dysoxylum spectabile</i>	Kohekohe		Salt				3	Durable				Revegetation		August	Evergreen	Med	10m
<i>Elaeocarpus dentatus</i>	Hinau						1							Oct-Dec	Evergreen	Slow	18m
<i>Elaeocarpus hookerianus</i>	Pokaka						1					Revegetation		Oct-Jan	Evergreen	Med	15m
<i>Entelea arborescens</i>	Whau		Salt			Tender	1	Light				Revegetation		October	Evergreen	Fast	6m
<i>Fuchsia excorticata</i>	Kotukutuku					Tender	3							Oct-Dec	Evergreen	Med	10m
<i>Griselinia littoralis</i>	Broadleaf—kapuka		Salt				2				Low	Coastal		Nov-Jan	Evergreen	Med	15m
<i>Griselinia lucida</i>	Puka		Salt			Tender	2				Coastal			Nov-Jan	Evergreen	Fast	10m
<i>Hebe stricta</i>	Koromiko		Salt				2				Low	Sand dune		January	Evergreen	Med	3m
<i>Hedycarya arborea</i>	Pigeonwood/Porokaiwhiri						1					Revegetation		Oct-Dec	Evergreen	Med	12m
<i>Hoheria populnea</i>	Lacebark/houhere						2					Gully		January	Evergreen	Med	10m
<i>Knightia excelsa</i>	Rewarewa						1					Revegetation		October	Evergreen	Med	30m
<i>Laurelia novae-zelandiae</i>	Pukatea						1					Gully		Oct-Dec	Evergreen	Slow	35m

A guide to planting exotic tree species in Northland

BOTANICAL NAME	COMMON NAME	TOLERANCES					USES					AMENITY					
		Clay	Wind	Damp	Dry	Frost	Possums	Timber	Shade	Berries	Shelter belts	Soil stability	Flowers	Foliage	Autumn colour	Growth rate	Height
<i>Acacia melanoxylon</i> *	Tasmanian blackwood						2							Evergreen		Fast	30m
<i>Albizia julibrissin</i>	Silk tree		No			Tender	2		Pods		N	January	Deciduous		Med	8m	
<i>Alnus cordata</i> *	Italian alder						1						Deciduous		Fast	25m	
<i>Alnus glutinosa</i> *	Black alder						1				N tap root		Deciduous		Fast	25m	
<i>Alnus rubra</i>	Red alder						1				N tap root		Deciduous		Fast	25m	
<i>Araucaria heterophylla</i> *	Norfolk pine		Salt			Tender	1			Coastal			Evergreen		Slow	40m	
<i>Casuarina glauca</i> *	Swamp she oak			Salty		Tender	2						Evergreen		Med	20m	
<i>Catalpa speciosa</i>	Indian bead tree					Tender	1					January	Deciduous		Fast	15m	
<i>Chamaecytisus palmensis</i>	Tree lucerne		Salt			Tender	3		Very good	Low	N	June	Evergreen		Fast	7m	
X <i>Cupressocyparis leylandii</i>	Leyland cypress		Salt	No			1						Evergreen		Fast	30m	
<i>Cupressus lusitanica</i>	Mexican cypress						1						Evergreen		Med	30m	
<i>Cupressus macrocarpa</i>	Monterey cypress		Salt				1						Evergreen		Med	30m	
<i>Erythrina crista-galli</i>	Coral tree		Salt			Tender	1				Hard sites	January	Deciduous		Med	15m	
<i>Eucalyptus botryoides</i>	Southern mahogany		Salt				1						Evergreen		Fast	30m	
<i>Eucalyptus muellerana</i>	Yellow stringy bark					Tender	2						Evergreen		Fast	30m	
<i>Eucalyptus pilularis</i>	Black butt					Tender	2						Evergreen		Fast	30m	
<i>Eucalyptus saligna</i>	Sydney blue gum						2						Evergreen		Fast	30m	
<i>Fraxinus oxycarpa</i> Raywoodii	Claret ash						2						Deciduous		Med	30m	
<i>Ginkgo biloba</i>	Ginkgo						1						Deciduous		Slow	30m	
<i>Gleditsia triacanthos</i>	Honey locust						2		Pods		N hard sites	November	Deciduous		Fast	20m	
<i>Grevillea robusta</i>	Silky oak					Tender	1					January	Evergreen		Med	20m	
<i>Juglans nigra</i>	Black walnut						2						Deciduous		Med	30m	
<i>Liquidambar styraciflua</i>	Sweet gum						2						Deciduous		Med	30m	

Land information notes

Property description:
..... Annual rainfall (mm):

Area One:ha.

Soil type:

Drainage: Frost / Flooding:

pH: Slope / Steepness:

Fertility:

Annual pests:

Prevailing wind:

Trees: e.g. species planted, year, source, number, spacing, pruning etc.
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Area Two:ha.

Soil type:

Drainage: Frost / Flooding:

pH: Slope / Steepness:

Fertility:

Annual pests:

Prevailing wind:

Trees: e.g. species planted, year, source, number, spacing, pruning etc.
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References and reading list

- 1. Trees for the New Zealand Countryside**
John and Bunny Mortimer.
- 2. Growing Poplar and Willow Trees on Farms.**
National Poplar and Willow Users Group.
- 3. Gardening with New Zealand Plants, Shrubs, and Trees**
Muriel Fisher.
- 4. NZ Indigenous Tree Bulletins – Ensis**
No. 1 Totara – Establishment, Growth & Management.
No. 2 Kauri – Ecology, Establishment, Growth & Management.
No. 3 Native Trees – Planting and early management for wood production.
No. 4 Pohutukawa – Ecology, Establishment, Growth & Management.
No. 5 Farming with Native Trees – A guide for farmers from Northland to Waikato.
- 5. Native Trees of New Zealand**
J.T. Salmon.
- 6. New Zealand Timbers**
N.C. Clifton.
- 7. Radiata Pine Growers Manual**
J.P. Maclaren.
- 8. A planters handbook for Northland natives**
Northland Regional Council – www.nrc.govt.nz
- 9. The Green Toolbox database (species/site selection tool)**
Follow links from www.landcareresearch.co.nz
- 10. The Quickfire Guide to Growing Native Plants**
Andrew Crowe.
- 11. Restoring the Balance**
A self help kit available through the Northland Regional Council and Department of Conservation – www.nrc.govt.nz
- 12. Clean Streams – a guide to riparian management in Northland**
Northland Regional Council – www.nrc.govt.nz
- 13. Looking after your wetland**
Northland Regional Council – www.nrc.govt.nz

NORTHLAND REGIONAL COUNCIL

In consultation and co-operation with the people of the region, the Northland Regional Council is involved in or responsible for:

- Controlling pollution of Northland's waters, land, sea and air.
- Cleaning up oil spills.
- Fairly allocating water resources.
- Maintaining harbour buoys and beacons.
- Planning for regional land transport.
- Co-ordinating Civil Defence/Emergency Management.
- Controlling the use and safe disposal of hazardous substances.
- Preparing regional plans for the sustainable management of
- Northland's air, water, coastal and land resources.
- Preventing and controlling erosion.
- Advising on flood control and drainage.
- Advising land users on control of problem plants and weeds.
- Controlling and advising landowners on control of possums and other animal pests.

The Northland Regional Council also supports business development and tourism promotion in the region.





Putting Northland first

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