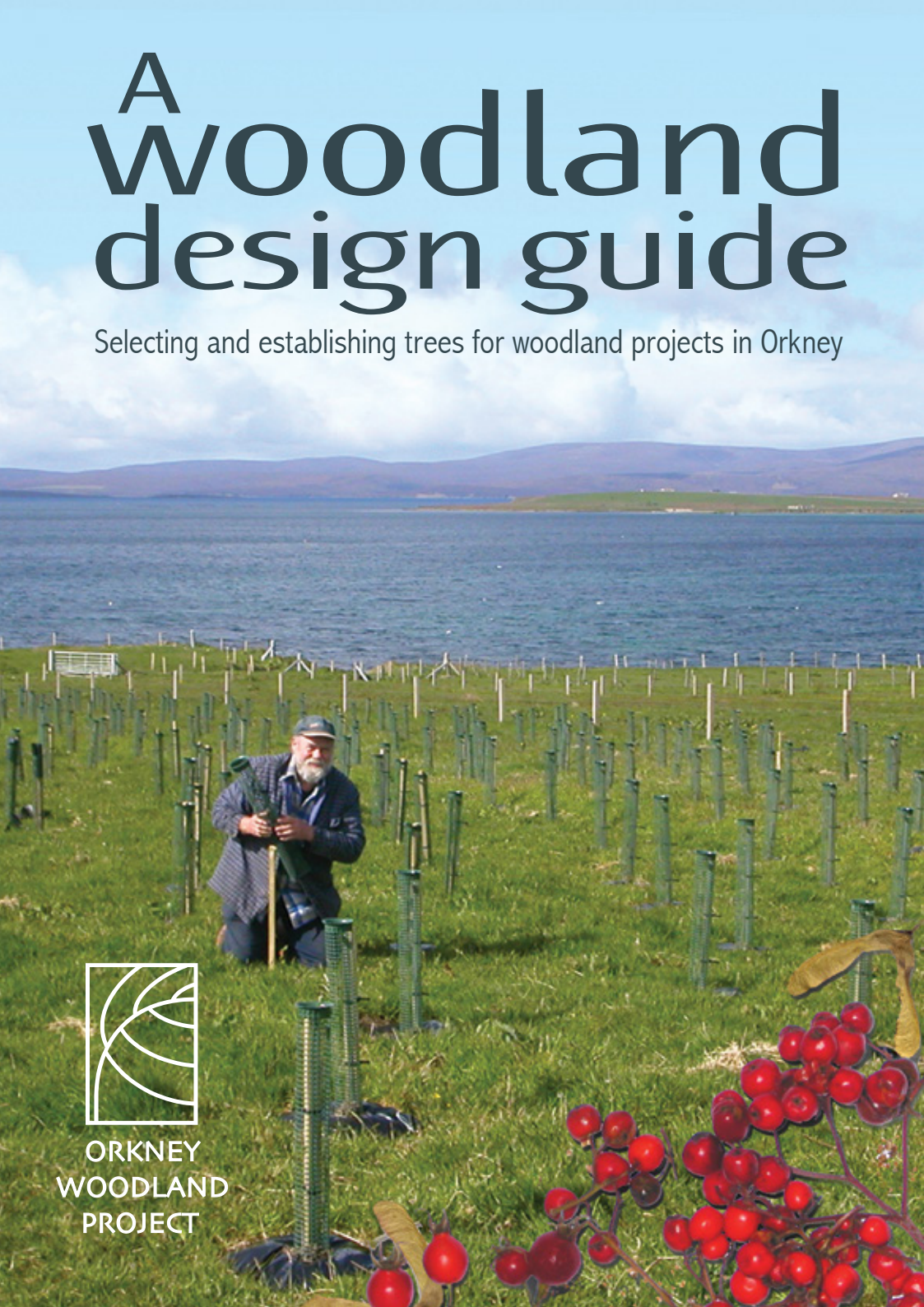
A woodland design guide

Selecting and establishing trees for woodland projects in Orkney



ORKNEY
WOODLAND
PROJECT

Orkney Woodland Project has been in existence since 1998. The OWP gives free advice to individuals, community groups and schools on all aspects of trees, woodland establishment and planting in Orkney including -

- on-site advice on the development of existing or potential woodlands,
- preparing planting and management plans
- preparing proposals for grant applications
- monitoring the development of young woodlands,
- helping schools and community groups to undertake projects in their grounds.






Planting new woodlands in Orkney is a challenge, but, by choosing the right trees for the right site, excellent results can be achieved. This leaflet advises on how to select the most suitable species and successfully establish trees and young woodlands in Orkney.

What are the Native Trees of Orkney and why are they important?

The term 'native' is usually used to describe the species that developed after the last Ice Age (some 10,000 years ago) without the interference of human beings. For Orkney, these species are generally agreed to be **Downy Birch**, **Hazel, Rowan**, **Aspen**, **Willows**, **Rose**s, **Honeysuckle** and **Juniper**.

The use of our native species in new tree planting projects has been strongly encouraged over the past few years. Orkney's native trees have adapted over thousands of years to the local conditions and are therefore excellent species to plant as they are well-suited to the local climate: our strong salt-laden winds, the extremes of day-length and short, cool growing seasons. However, it is inadvisable to plant trees which come from other parts of the UK or Europe, if they are the same species as Orkney natives. For example, a downy birch from central Europe may look the same, but has not evolved and adapted to our very particular conditions and is therefore unlikely to grow so well.

Native tree populations also contain a large amount of genetic variation and this diversity enables each wood to survive everything from extreme climate events to pest and disease attacks. Our native tree species, therefore, fit well with our particular local environmental conditions, the needs of a variety of flora and fauna associated with them and the landscape character of the islands.

In addition to our own native species, there are other British natives which thrive well in Orkney and also some 'aliens' which have adapted well to our climate and conditions (see pages 6 and 7).

What do the terms ‘provenance’ and ‘origin’ mean?

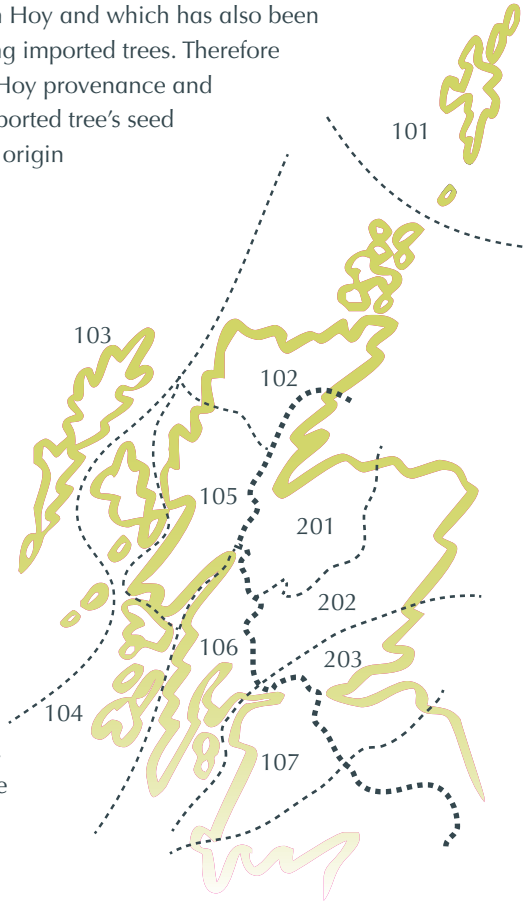
These terms are widely used and can be confusing.

Provenance: Where the seed comes from. For example, if seed is collected from native trees in Berriedale on Hoy and planted, the provenance of the resultant plants is therefore Berriedale (or Hoy). Similarly, if seed is gathered from a tree growing in Cornwall, the resultant trees are of Cornish provenance.

Origin: The original ancestry of the tree. For example, if seed from a Japanese Larch which is growing in the UK is planted, the resultant trees will be of UK provenance but will still have Japanese origin. However the plants grown from the seed collected from Berriedale would be of both Hoy provenance and origin, as they are descended from a long line of local native trees.

This is particularly relevant in Orkney for several species, like Rowan, which is a true Orkney native found growing on Hoy and which has also been widely planted on Mainland Orkney using imported trees. Therefore rowans grown from the Hoy trees are of Hoy provenance and origin, whereas those grown from the imported tree’s seed are of Orkney provenance, but unknown origin (i.e. they are not true Orkney natives)

The Forestry Commission has divided Scotland into a number of seed zones which are frequently listed in nursery catalogues to show the provenance/origin of stock. Unfortunately, Orkney is currently included in the Caithness and Sutherland zone (102) which includes many areas quite unlike the islands. For instance, much of the northern Highlands are non-maritime and thus not prone to salty winds, but are more prone to heavy snowfall and frost. Hopefully, this will be changed in the future and Orkney will either be allocated its own zone or included with Shetland. In the meantime, please ignore these zones and source true Orkney natives as described above. Other Scottish natives should come from the nearest possible seed zone and preferably be of coastal origin.



Forestry Commission Seed Zones

What species should be planted in different situations?

Is the land in, or immediately adjacent to any land designated for its natural history and conservation interests, an RSPB or other reserve, adjacent to moorland, or in a wild or natural part of the countryside?

If so, then use only Orkney native trees and shrubs grown from native Orkney seed and cuttings. (See Table 1). On some sites you could also plant Common Alder (from Caithness or Sutherland) as this may once have been native in Orkney, although we have none today.

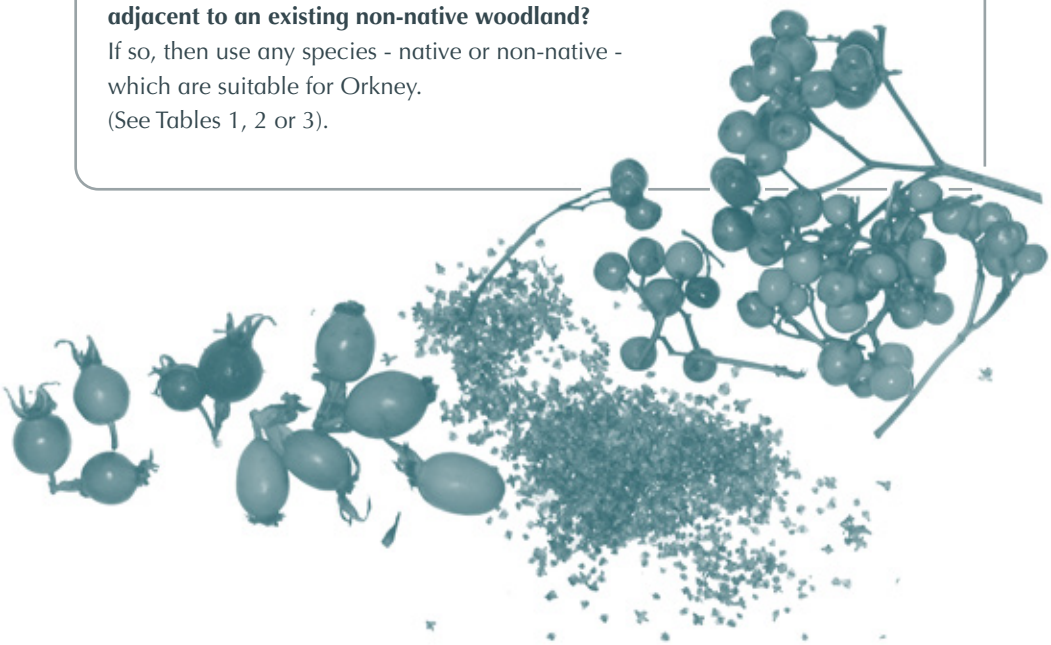
N.B. If the site contains interesting flora, fauna or archaeology, or if it lies adjacent to an important wader nesting site, it may be best not to plant it at all - seek advice. If the site lies within an SSSI, you may need to apply for consent from NatureScot.

Is the land on other countryside or farmland?

If so, use native species as above, plus some other appropriate Scottish/British native species. (See Table 2). You could also use some tough non-native species to provide initial shelter for the other trees, or simply plant very densely around the exposed edges.

Is the land a garden, or in an urban area, or immediately adjacent to an existing non-native woodland?

If so, then use any species - native or non-native - which are suitable for Orkney.
(See Tables 1, 2 or 3).



Can seed and cuttings be collected from 'wild' trees?

It is very important to obtain permission from the landowner before you collect seed or cuttings from any trees. In addition, if trees lie within any land designated for natural history interests, eg SSSIs, SPAs, or SACs, then the landowner must check with NatureScot to see whether a formal consent is required before any seed collection. Always leave plenty of seed for natural regeneration and berries for the birds. When taking cuttings, make clean cuts and take only a few from each plant so that you leave the shape and form of the plant intact. Collect material from as many different plants as possible, so as to maintain a wide range of genetic diversity in the resulting plants.

The tables on the following pages show the majority of trees that grow well in Orkney. Of course, there may be other species that are thriving in sheltered gardens and so the list is not exhaustive. It does, however, include all the most useful and reliable species for using in woodland planting projects.

1 Orkney native species

	Common name	Latin name	Preferred provenance	Notes
	DOWNY BIRCH	Betula pubescens	Use only Orkney native stock	A hardy tree found growing in native woodland in Hoy. Will tolerate slightly peaty ground, but also enjoys good rich soil. NB Silver birch does not do well in Orkney
	HAZEL	Corylus avellana	Orkney (if planting in Hoy), seed zone 102 for elsewhere	Only 3 'wild' hazels remain. Except in Hoy use Caithness/ Sutherland stock. Likes good soil and grows well as understorey in open woodland.
	ASPEN	Populus tremula	Use only Orkney native stock	Approx. 13 different clones in Orkney, found in Berriedale and on exposed cliffs. One plant can sucker to produce an extensive stand. Prefers good soil, but very salt tolerant and hardy.
	ROWAN	Sorbus aucuparia	Use only Orkney native stock	Hardy, berrying tree found growing in Hoy.
	WILLOWS	NB. All willows are very hardy and tolerate wet ground. Grow well from cuttings. A number of hybrids exist.		
	Eared Willow	Salix aurita	Use only Orkney native stock	Hardy willow, tolerates peaty soil.
	Grey Willow	Salix cinerea	Use only Orkney native stock	Taller vigorous hardy willow
	Tea-leaved Willow	Salix phylicifolia	Use only Orkney native stock	Shiny leaves and stems, vigorous and hardy.
	Creeping Willow	Salix repens	Use only Orkney native stock	Prostrate willow, therefore of limited use.
	ROSES	Hardy wild roses which grow in Hoy and Mainland produce abundant single white or pink flowers, and hips.		
	Glandular Dog Rose	Rosa squarrosa	Use only Orkney native stock	
	Glaucous Dog Rose	Rosa vosagiaca	Use only Orkney native stock	
	Soft Downy Rose	Rosa mollis	Use only Orkney native stock	
	Downy Rose	Rosa sheradii	Use only Orkney native stock	

2 British native species

	Common name	Latin name	Preferred provenance	Notes
	COMMON ALDER	Alnus glutinosa	Seed zone 102 (coastal)	Very hardy, quick growing tree which tolerates wet ground. Native in far north of mainland Scotland. Its roots are nitrogen fixing.
	COMMON ASH	Fraxinus excelsior	Seed zone 105 (coastal)	Sadly not currently to be planted due to Ash Dieback Disease
	HOLLY	Ilex aquifolium	Seed zone 102 (coastal)	Suitable only for sheltered locations. Will tolerate shade. Grows wild in far north of mainland Scotland. Not salt tolerant.
	BIRD CHERRY	Prunus padus	Seed zone 102 (coastal)	Hardy flowering/berrying tree which is native to north of Scotland and seems to be doing well in Orkney. Use in preference to Gean/Wild Cherry (Prunus avium).
	SESSILE OAK	Quercus petraea	North of Scotland (coastal)	The most northerly native oak. Suitable only for sheltered locations. English Oak (Quercus robur) is native further south.
	WYCH ELM	Ulmus glabra	North of Scotland (coastal)	Dutch Elm disease is now in north of Scotland and killing U.glabra, so best to avoid.
	WILLOWS Goat Willow	Salix caprea	North of Scotland (coastal)	Hardy willows native to other parts of Scotland which do well in Orkney.
	Bay Willow	Salix pentandra		
	HAWTHORN	Crataegus monogyna	Scotland (coastal)	Prickly, hardy small tree/hedging plant.
	COMMON BEECH	Fagus sylvatica	Scotland (coastal)	Suitable only for sheltered locations. Does not like acid or wet ground.
	WHITEBEAM	Sorbus aria	Scotland (coastal)	Grows well, perhaps less hardy and salt tolerant than Swedish Whitebeam.

3 Non-native species

	Common name	Latin name	Preferred provenance	Notes
	SYCAMORE	Acer pseudoplatanus	Scotland (coastal)	Very hardy tree which grows to good size in shelter of towns.
	ALDERS		Scotland (coastal)	Alders are generally hardy. quick growing trees which tolerate wet ground. These are probably slightly less hardy than the native Common Alder although Sitka Alder seems vigorous. Other Alders could be tried.
	Grey Alder	Alnus incana		
	Italian Alder	Alnus cordata		
	Red Alder	Alnus rubra		
	Sitka Alder	Alnus sinuata	Alaskan origin	
	HORSE CHESTNUT	Aesculus hippocastanum	Scotland (coastal)	Only suitable for sheltered locations. Trees in Balfour woods produce conkers.
	BALSAM POPLAR	Populus candicans	Scotland (coastal)	Grows well from cuttings. Hardy but prone to canker. Other Poplars could be tried.
	SWEDISH WHITEBEAM	Sorbus x intermedia	Scotland (coastal)	Hardy, salt tolerant, berrying tree which has been commonly planted in Orkney.
	WILLOWS	Salix sp.	Scotland (coastal)	A huge range of Willows do well in Orkney and are salt tolerant.
	HYBRID LARCH	Larix x eurolepis	Scotland (coastal)	Deciduous conifer. The Hybrid Larch seems to do better than the European/Common Larch.
	LODGEPOLE PINE	Pinus contorta	Alaskan origin	Conifer which will tolerate peaty soil. NB, Scots Pine does not do well in Orkney.
	SITKA SPRUCE	Picea sitchensis	Alaskan origin	Conifer which will tolerate peaty soil. Norway Spruce generally not so hardy.

What is the best site for tree planting?

An ideal site would be one with deep, rich soil, with good shelter from strong and salty winds and with ground that remains moist, but not boggy, all year round. Not everyone has the perfect site, but if there are none of the above conditions, then the results may be disappointing. Every potential site is different and the choice of species used and the way they are planted needs to reflect each individual site's characteristics.

Peaty ground will limit which species you can use (see tables). Rich fertile soil, by contrast, gives any plant a good start and enables the root system to develop quickly; thus a tree is more resilient to attack by gales, pests or diseases. Species should be selected from the tables according to the site location and ground conditions.

An extremely exposed or constantly waterlogged site may fail completely. It's a good idea to assess the potential of a site by looking at the vegetation cover already in the area. Are there any other existing trees and shrubs? Are they thriving, or are they failing to grow any higher than a sheltering dyke? Is there long, lush grass on the site, or is all the vegetation dwarfed by strong salt winds?

Members of the Orkney Field Club planting trees in Durkadale

How can a woodland be designed to look good and to thrive?

Orkney has a very beautiful, open landscape within which any feature can be seen for many miles and within which woods are not a common occurrence. It is therefore very important that any new woodland fits appropriately into the landscape. A wood does not need to have straight sides, or to totally fill the square field it may be in. It can be curving and sinuous and can follow natural features eg burns and hollows.

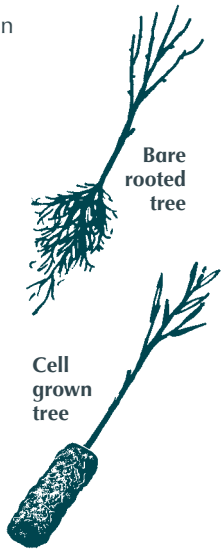
In an ideal world, woods would be created slowly, over many years. Step one would be to plant a good belt of tough, hardy, sheltering woody shrubs around the exposed edges of the site to be planted. Then, as this grew up, the hardier trees could be added in and, later still, the more tender species amidst the developing shelter of the other trees. Unfortunately, grants systems (and understandable human impatience) mean that woods are often planted over only one or two years.

However, the principle of planting a dense, shrubby edge to the wood remains a good one. (Shelter fencing is expensive for anything other than a small area.) The more exposed the site, the more closely the trees may need to be planted, as their development and growth will be speeded up by the mutual sheltering effects of close planting. Trees should be planted no more than two metres apart, but closer on exposed edges or on exposed sites i.e. a normal planting density of between 3000 and 4000 trees per hectare (2.4 acres).

Leaving paths and open spaces and avoiding straight lines will help create an informal feel to the wood and the glades created will, in the future, provide good habitats for a range of flora and fauna. They also, of course, provide access for people to enjoy the woodland environment.

What size and type of plants should be used?

There is no advantage to buying a large plant. In fact, experiments have shown that a smaller plant will overtake a larger one in a fairly short space of time. Particularly in our windswept conditions, large plants may suffer from die-back, may end up shooting from the base instead and take longer to establish themselves. Smaller plants are more sheltered near the ground and can develop good root-systems before putting on height.



- Nurseries may supply plants as -
bare-rooted or field-grown : these are grown in the ground and dug up by the nursery to sell. These plants should only be bought and planted in the dormant season i.e. when the leaves are off the trees (between about November and April).

- cell grown : these are grown in trays divided into cells and therefore come with their own individual plug of earth which encloses the roots. This means they can be planted at any time, although it is still best to avoid midsummer planting (even in Orkney there can be dry spells). Some species eg birch are almost always grown in this way as they don't like root disturbance.

Where can these plants be purchased?

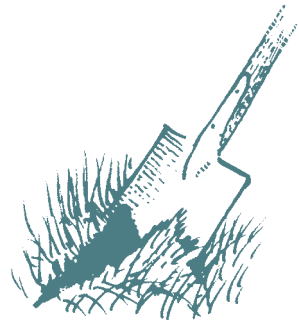
Contact the Orkney Woodland Project for a list of suppliers, particularly of native stock. Small, local growers are supplying plants to various projects and local native seed is also sent south to a large nursery to grow plants on. OWP may occasionally have small quantities of seed available for anyone who wants to grow their own plants.

How should the plants be cared for on delivery?

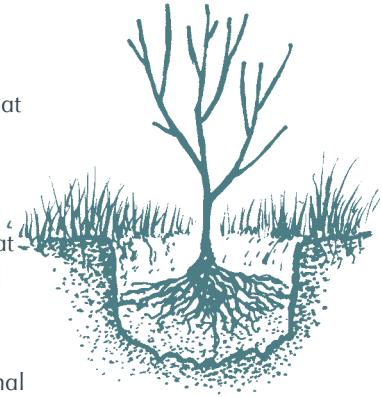
Firstly check that all plants have been delivered as ordered and in good condition. Bare-rooted plants should be delivered with their roots covered and kept moist, usually within plastic bags. If plants seem a bit dry at the roots, whether they are bare-rooted or cell grown, then give them a good water. If you have bare-rooted plants delivered and cannot plant them straightaway, then keep their roots damp inside dark plastic bags in a cool place for a few days or, if it's for a longer period, then 'heel' them into a spare bit of ground, making sure all the roots are covered with soil. Unplanted young trees should never be left with their roots exposed to the air, even for a short time. Some species can be killed very quickly, so they are best kept in plastic bags until they are to be planted.

What is the best way to plant trees?

Large numbers of trees can be planted fairly quickly by means of 'notch'planting. A 'T' shaped slot can be cut with a spade, as deep as needed to take the roots. The top of the 'T' can then be levered open with the spade and the the roots slotted down into the slit until the plant is at the correct depth. The ground should then be trodden firmly back round the roots.



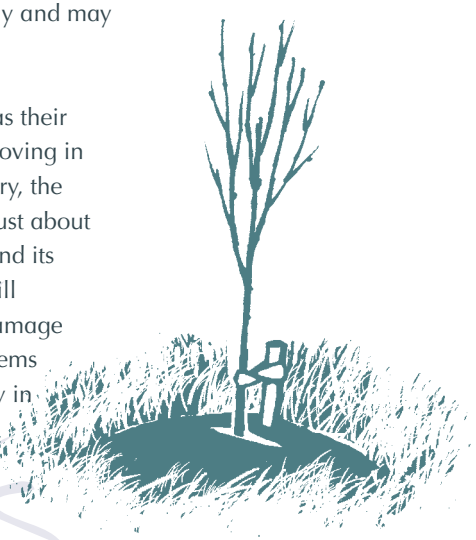
Small numbers of trees can be planted by digging an individual hole deep and wide enough to take the whole spread of the roots, breaking up the soil removed and placing it back carefully round the tree roots, ensuring that no air pockets are left and firming down so that the roots are in good contact with the soil.



Whichever method is used, each tree should be planted at the same depth as it was growing in the nursery - the soil mark on the stem should be visible.

There is generally no need to apply fertiliser on any normal soil; however, if the ground consists of poor, acid soils, then a phosphate based fertiliser should be applied at planting. This will help the roots to get established quickly and may need to be repeated after three years or so.

It is not usually necessary to stake small trees, as their roots develop best as a response to the stems moving in the wind. However, if staking becomes necessary, the best method is to use very low stakes rising to just about 15 cm above ground. These will hold the tree and its roots in place, but, unlike a taller stake, they will allow the stem to move. A common cause of damage to young trees is the rubbing of their delicate stems against a tall stake and this is particularly likely in the windy climate of Orkney. Trees should be fastened to stakes with a soft material tied in a figure of eight and not cable ties or other harsh materials.



Low stake only if necessary

How can competition from weeds be prevented?

Grass and other weeds compete with young trees for light, nutrients and water. Weed control is, therefore, absolutely essential for the fast and successful establishment of trees and can be achieved by either organic or chemical means. In either case, the aim is to keep a weed-free area, of approximately 60 cm diameter, around each tree. Once the trees have established their roots and their branches extend well above the surrounding vegetation, weed control becomes less important; this usually takes 3-5 years or more.

The mulch mat system of weed control has been used very successfully in Orkney. Mulch mats can be bought ready-made, but these are often too small and can be expensive when planting larger quantities of trees. Reasonably priced and effective ones can be made by cutting squares of recycled silage covering or re-using feed bags if available. Other materials that can be used include old carpet, preferably hessian-backed and wool, that contain less chemicals than those made from synthetic materials. Alternatively, cardboard weighed down with grass cuttings, stones or seaweed may also be used.

In the centre of each mat, the smallest possible slit should be made, so that the mat can be threaded carefully over the tree. This leaves the smallest space possible for weeds to grow through and will therefore save time in maintenance in the long-term. The edges of a plastic mat need to be forced down into the ground with a spade to hold it firm. If mulch mats have been fitted well, there should be little ongoing weed control needed.

An organic and completely natural option, is to dig and upturn a small square of soil, make a t-slot in the top and plant the tree in the mound, 'heeling in' firmly around the base.

Whatever method of weed control you use, please remember to remove all non-biodegradable materials once the trees are established and to re-use, recycle or dispose of them responsibly.

Great care should be taken if using any herbicides and the manufacturer's instructions should be read and followed very carefully. Inappropriate use of herbicides can harm wildflowers, insects and other wildlife and can also damage, or even kill, young trees. They should not be used close to watercourses. However, if used correctly, they have their place in weed control, especially in the spot treatment of weeds before planting. Prior training on their use is advised.

A keen eye needs to be kept on the young woodland and ongoing maintenance carried out to remove any competing growth until the young trees become established.

Tree planting can be hard work!

Do trees need protection?

It may be necessary to erect stock fencing to prevent cattle or sheep from damaging the young trees. Areas can also be rabbit-fenced. This is not always foolproof as rabbits can find their way in or, indeed, may find themselves fenced inside the area. The bottom of the rabbit-fencing should be buried beneath the ground or bent back to prevent rabbits burrowing through.

Tree guards serve several purposes: they can protect trees from wind and rabbits and voles, they can enable small trees to be found amidst a field of long grass and they can prevent young trees being smothered when long grass collapses over them in late summer. Mesh or net guards are serving this purpose very well on many sites. Solid guards are probably best avoided as they encourage fast, spindly growth in their artificial microclimate and this growth may be severely set back when the 'real world' is encountered. Research has shown that trees put on girth in response to moving in the wind and the mesh guards allow this to happen.

Once trees are growing out of the tops of the guards and appear vigorous and sturdy, the tree guards can be removed. The only disadvantage with mesh guards is that branches sometimes grow out through the mesh (especially from young alder and birch) and it may sometimes be necessary to cut the guards off. It may be easiest to remove them in spring just befor the trees leaf up. Any guards which can be removed reasonably intact can of course be reused.

And is that all there is to it?

Unfortunately no. Until young trees become firmly established - for up to five, or even more years - they will need ongoing monitoring and maintenance.

Young trees will need -

- ongoing weed control to give them the best chance of growing well;
- regular checks, particularly after strong winds or hard frosts, to ensure all the plants are still firmly in the ground and that guards, mulch mats, stakes and ties are all secure.
- regular checks for damage by rabbits, hares or voles .
- occasional replanting of trees which have died to maintain the mutual sheltering effects.

Tree planting in Orkney is a challenge and, to be successful, requires the highest quality of plants and workmanship and some real commitment. In recent years many new young woodlands have been created by individuals and groups (many of whom had no previous experience of planting trees) and these are now developing well. They are the living proof that creating new woodlands in Orkney can be an immensely rewarding experience.

Other useful information -

Trees and Shrubs in Orkney
a booklet by Alan H.Bremner and Elaine R.Bullard

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For further advice on all aspects of tree planting and woodland management and information on available grants, please contact:

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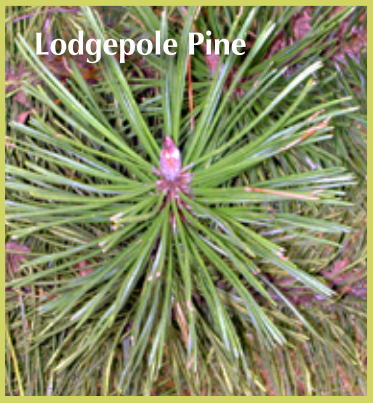
See OWP website:
www.orkneycommunities.co.uk/WOODLAND


Grey Willow


Hawthorn


Hazel


Larch


Lodgepole Pine


Sessile Oak


Poplar


Rowan


Sycamore


Tea-leaved Willow


Whitebeam


Wild Rose

front cover: Nick Morrison, busy tree planting in Orphir.

back cover: Ann Chapman, justifiably proud of her wonderful young woodland on Rousay.

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