

Selecting Sites and Trees for Woodland



Woodlands Information Note No.1

SELECTING SITES AND TREES FOR WOODLAND IN SHETLAND

The choice of trees for growing in Shetland is very much influenced by the intended site. Aspect (the general direction the site faces), exposure, altitude, soil conditions, and the nature of existing flora and fauna should all be taken into account, and consultation with neighbours should also be carried out. **Ground that is permanently waterlogged, or high on a hilltop, should be avoided.** If nothing else grows or grazes on the ground, it is a good indication that trees are unlikely to thrive either (although some species of trees or shrubs may be suitable for industrially polluted or contaminated soils). If the proposed site includes an area rich in flora and/or fauna, **open ground** (up to 20% of new woodland is allowed for open ground in the new Scottish Forestry Grants Scheme - SFGS) may be considered to accommodate it, as an alternative to a complete change of site. The same goes for wetland, rocky outcrops, and archaeological sites.

Most sites in Shetland are likely to be on poorer soils. A soil sample and profile, as well as a pH test, are useful tools to determine whether the ground is suitable for tree planting, what ground preparation may be required, the types of tree, and what nutrition may be needed to establish them.

Deep peat imposes severe limitations, with only Sitka spruce and lodgepole or shore pine being suitable among the conifers. As monotonous blocks of evergreen conifer are frowned upon now, because of their negative ecological value and poor visual impact, such plantings should not be considered even for shelterbelts. “Blanket bog” is also of high conservation value. Less deep peaty soils – “peaty podzols and gleys” with *mor humus*, however, can support alder, birch and willow, and, where there is some drainage, aspen and rowan. Gradually over time their leaf litter will improve the soil (towards *mull humus*), so that trees more suited to fertile land may be planted within their shelter. Many of Shetland’s coastal settlements have these types of soil where arable agriculture has been practiced in the past.

If **drainage** is considered beneficial for tree-planting, run-off into watercourses (including other drains) should be avoided by using buffer zones and silt traps, as recommended in the Forestry Commission’s Forests and Water Guidelines. The possibility of **fertiliser** and **pesticide** run-off should be considered in this respect, as well as on account of their more immediate effect on vegetation and fauna on- and off-site. Nitrogenous fertilisers are usually not required for tree-growing, a handful of slow-release organic phosphate being adequate for the root establishment of each tree.

The shape of a plantation is important. While obviously a mere rectangle is the cheapest option with regard to fencing, such blocks of woodland may easily be viewed rather as blots on the landscape. Some effort to blend into surrounding features and landforms should be made. The Forestry Commission publishes advice on woodland design, and Shetland Amenity Trust will also advise prospective tree-planters. Now that SFGS includes fencing as a standard cost, less regular patterns than rectangles may be considered.

The design of the edge of a plantation is also significant. Mixtures of broadleaves and conifers, trees and shrubs, along with some open space, can produce a “wavy” or scalloped edge that blends better with the environment than a harsh uniform line. Such mixed plantings are also attractive to wildlife.

Shelterbelts need not be “straight up and down” plantings, but can also relate to landforms. Their width may be varied, and there is now no minimum restriction on width. Six or seven metres of shelter with the appropriate species may well fit in with a small croft’s in-by land, providing a hedge effect. This however should relate to other, larger wooded areas. Site visits by woodland advisors are the best means of ascertaining the placing of shelterbelts.

Woodland may also be planted across a hillside, to help intercept run-off of rainwater, which is taken up by tree-roots and evaporated through the leaf canopy (with broadleaves this will only occur in the growing season, although the complex soil structure and texture of woodland will slow down the rate of water-flow in winter). Such plantations are useful in preventing erosion, but the possible effect on valuable wetland or watercourses below should be taken into account.

Riparian woodlands, bordering lochs and burns, can be beneficial to wildlife, but care is required in choice of species and design. Essential advice is contained in the aforementioned Forests and Water guidelines.

Community consultation. As woodlands will substantially alter the landscape, it is important to consult your neighbours and/or the local community about your plans. Letters of support submitted with applications for grant aid will be regarded positively.

Provenance and origin. Where the trees you intend to plant come from is of great importance. The *provenance* of the seed or cuttings from which a tree is grown is defined as the place where that seed or cutting was collected. The *origin* is a place where trees from which seed or cuttings are collected is deemed to be growing naturally, i.e., not planted by human hand. Most nurseries will at least be able to assure you of the provenance of their trees. Where native trees are concerned it may well be that the provenance and origin are one and the same. Nurseries can also supply certificates of provenance, which provide written evidence of the source of their trees.

Generally speaking, the closer in latitude and similar climate conditions to Shetland a region of provenance is, the better. Native species, such as rowan and alder, originating from the north-west and north highlands of Scotland, will certainly adapt better than those from more southerly regions. Exotic species such as Sitka spruce and shore pine which come from the seaboard of northern British Columbia (e.g., Queen Charlotte Islands) or south east Alaska will again adapt better than more southerly or inland origins. For a species like aspen, which has a vast distribution throughout the northern hemisphere, and yet is indigenous to Shetland, it is vital to choose trees of maritime origin.

Where trees indigenous to Shetland are concerned, it would be the best solution to plant trees of Shetland origin – not only because they are likely to be well adapted, but also because they are likely to possess unique genetic material which has enabled their survival and which may “swamped” by genes of other origins. Unfortunately, sufficient material of Shetland origin for widespread planting is not yet available; until that time, it remains important to be selective, and it is for this reason that **SFGS Locational Premium applicants may be asked to provide nursery confirmation of the provenance of the plants they acquire.**

Provenance regions and zones. The U.K. is divided up into numbered provenance regions and zones, with the western highlands and islands and the northern isles coded 101 to 106. See the map on page 4. Nursery catalogues usually specify the zones in their lists, so that customers can choose the provenance of the species they wish. When ordering trees, certificates of provenance should be requested.

Selecting trees to the site.

Exposure. Wind and salt are perennial problems, and establishing shelter – whether it is for livestock, arable crops, buildings, or for a range of woodland tree species – using effective species and provenances is crucial. A barrier that filters wind and is relatively salt resistant is the optimum. It does not have to be evergreen; the branch structure of many deciduous species can still provide such a filter in winter.

Soil conditions. Permanently saturated soils, where there is no water movement, should be avoided. Roots in this condition will suffer anaerobic decomposition, nor will they find sufficient purchase for the stability of the tree. Where there is some water movement, and oxygen in the soil, some willow and alder species will provide shelter, as will shore pine. Japanese larch requires better drainage. All the aforementioned species however do not require fertile conditions. The table on pages 5 and 6 lists a range of trees and shrubs with their abilities. Interplanting less robust species with these tougher “pioneers” behind shelterbelts may in time yield a woodland of considerable diversity.

Iron pans. These are often found in conjunction with peaty podzols, and will restrict root growth downwards: The water table is high, which means not only that in periods of high rainfall the soil becomes saturated, but also that in periods of drought roots can quickly dry out. The roots of some species such as downy birch can over a length of time penetrate an iron pan: however it may be advantageous to “sub-soil” a site before planting – taking into account the factors mentioned on page 1.

Aspect. The general direction that a woodland site (or part of it) faces is of importance. Not only does it affect the general exposure rating of the site, but even within the small landmass of Shetland, the direction of wind that can be expected to have the greatest effect on a plantation may be significant. For example, on the west side of the mainland, with hills between a site and the North Sea, winds from the eastern sector will tend not to be so salt-laden as westerlies. Other factors need to be considered also. A north facing slope, or a high ridge of hills to the west of a site, may mean a short period of sunlight. An east facing slope may be prone to frost damage.

The map in Figure 1 below illustrates the seed zones identified by the Forestry Commission for Scotland by numbered codes. Certificates of provenance supplied by nurseries growing trees from seed or cuttings will use these codes and also specify actual locations, altitude and the type of location, e.g., seed orchard or stand of trees, indigenous or planted, etc. Please note that Orkney currently shares the same zone, 102, with Caithness and Sutherland. Efforts are being made to alter this anomaly, so that Orkney can be separately identified.

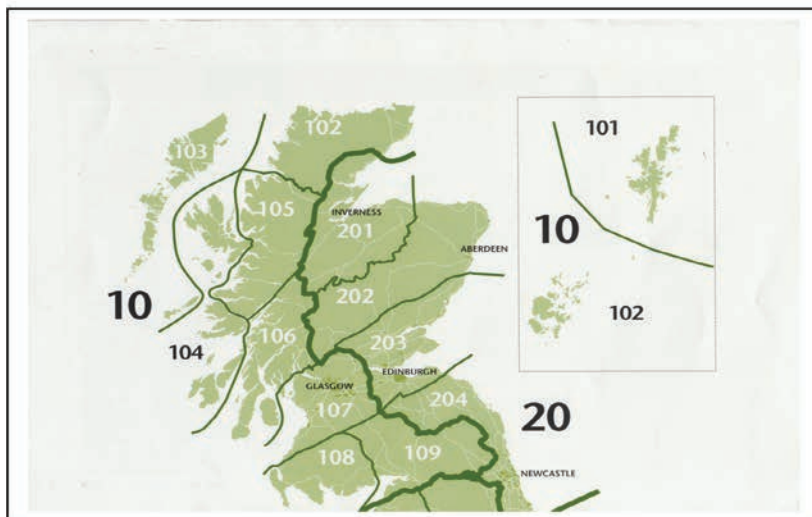


Fig. 1: Provenance regions (10, 20), and seed zones (101 etc.) in Scotland

A nursery that has grown trees from seed or cuttings should be able to supply a certificate of provenance, which will provide more details of the location of seed/cutting collection, including the name of the location, altitude, and whether the material is indigenous or of a different origin.

The table overleaf (pages 5 & 6) lists a selection of trees and shrubs that can be expected to grow well in Shetland according to soil conditions, exposure and provenance. The colour coding is as follows:

Green – native to Shetland

Orange – native to U.K.

Black – exotic (not native to U.K)

Red – indicates the seed/cutting origin

Blue – indicates the seed/cutting provenance

For some species, provenances have not been sufficiently tested to determine exact zones, for example, sycamore and elder. In general it is better to ensure that such species are grown in Scottish nurseries – purchases from further south may result in premature bud-burst. Some provenances refer to seed orchards, or even to nurseries where stocks are held.

Tree Species (English name)	Scientific name	Soil tolerance	Exposure rating	Salt resistance	Preferred available provenance or origin	Notes
BROADLEAVES						
Alder, common or black	<i>Alnus glutinosa</i>	Wet, poor	Medium	Medium	101,102	1.
Alder, grey	<i>A. incana</i>	Wet, poor	Poor	Poor		2.
Alder, red	<i>A. rubra</i>	Wet, poor	Medium	Medium	S.E. Alaska	3.
Alder, Sitka	<i>A. sinuata</i>	Wet, poor	Excellent	Very good	S.E. Alaska, 101	4.
Ash, common	<i>Fraxinus excelsior</i>	Fertile, heavy	Medium	Medium	105	5
Aspen	<i>Populus tremula</i>	Poor, well-drained	Good	Medium	101, 102, 201	6
Beech	<i>Fagus sylvatica</i>	Well-drained	Good	Poor	202 (Cawdor)	7
Birch, downy	<i>Betula pubescens</i> ssp. <i>tortuosa</i>	Wet, poor	Good	Medium	101, 102(incl. Orkney)	8
Elder	<i>Sambucus nigra</i>	Well-drained	Good	Medium	Scotland	9.
Elm, wych	<i>Ulmus glabra</i>	Fertile, heavy	Good	Medium	201	10.
Hazel	<i>Corylus avellana</i>	Well-drained	Good	Medium	101,102,103,105	11
Hawthorn	<i>Crataegus monogyna</i>	Well-drained	Good	Medium	Scotland	
Rowan	<i>Sorbus aucuparia</i>	Poor, well-drained	Good	Medium	101,102,105	12.
Sycamore	<i>Acer pseudoplatanus</i>	Fertile, heavy	Good	Medium	Scotland	13
Whitebeam, Swedish	<i>Sorbus intermedia</i>	Well-drained	Good	Good	Scotland	
Willow, Alaskan felt-leaf	<i>Salix alaxensis</i>	Wet	Excellent	Excellent	S.E. Alaska, 101	14
Willow, almond	<i>Salix triandra</i>	Wet	Medium	Medium	Scotland	15.
Willow, bay	<i>Salix pentandra</i>	Wet	Medium	Medium	Scotland	
Willow, goat	<i>Salix caprea</i>	Wet	Good	Medium	Scotland	15.
Willow, Hooker's	<i>Salix hookeriana</i>	Wet	Excellent	Excellent	S.E. Alaska, 101	16.

Tree Species (English name)	Scientific name	Soil tolerance	Exposure rating	Salt resistance	Preferred available provenance or origin	Notes
Willow, Japanese	<i>Salix kinuyanagi</i>	Wet	Good	Good	101, Scotland	17.
Willow, Japanese	<i>Salix udensis</i>	Wet	Good	Good	101, Scotland	18.
Willow, osier	<i>Salix viminalis</i>	Wet	Medium	Medium	Scotland	15.
Willow, purple	<i>Salix purpurea</i>	Wet	Medium	Medium	Scotland	15.
SHRUBS						
Blackthorn	<i>Prunus spinosa</i>	Well-drained	Medium	Medium	Scotland	19.
Cotoneaster	<i>Cotoneaster bullatus</i>	Well-drained	Good	Medium	Scotland	20.
Currant, flowering	<i>Ribes sanguineum</i>	Well-drained	Good	Good	Scotland	
Fuchsia	<i>Fuchsia magellanica</i>	Well-drained	Good	Medium	Scotland	
Honeysuckle, shrubby	<i>Lonicera ledebourii</i> or <i>involutrata</i>	Well-drained	Good	Good	Scotland, N. England	21.
Rose, dog	<i>Rosa canina</i>	Well-drained	Good	Medium	101,102	22.
Rose , Ramanas	<i>Rosa rugosa</i>	Most soils	Good	Good	Scotland	23.
Spiraea (Bridewort)	<i>Spiraea salicifolia</i>	Wet	Good	Good	101, Scotland	24.
Willow, eared	<i>Salix aurita</i>	Wet	Good	Good	101	25.
Willow, grey	<i>Salix cinerea</i>	Wet	Good	Good	101	
Willow, (Iceland)	<i>Salix</i> 'Brekkuvidur'	Wet or dry	Good	Good	Iceland, 101	26.
Willow, tea-leaved	<i>Salix phylicifolia</i>	Wet	Good	Good	Iceland, Faroe, 102	
CONIFERS						
Fir, noble	<i>Abies procera</i>	Well-drained, poor	Good	Medium	N.W. America, Scotland	27.
Larch, Japanese	<i>Larix kaempferi</i> or <i>leptolepis</i>	Well-drained, poor	Good	Good	Japan, China	28.
Pine, shore or lodgepole	<i>Pinus contorta</i> var. <i>contorta</i>	Peat, wet	Good	Good	S.E. Alaska	29.
Spruce, Sitka	<i>Picea sitchensis</i>	Peat, not too wet	Good	Good	S.E. Alaska, Q.C.I	30.

NOTES.

1. Trials of common alder with a seed origin of the North coast of Sutherland (Crossburn, Skerryay), indicate an increased tolerance to exposure and sea winds, but only small quantities of this provenance are yet available in Shetland. Common alder is considered “native” to Shetland, as remains of its wood have been found in peat, but there are no relicts known to be growing in the wild.
2. Grey alder is very vigorous even on flushed peat, provided there is existing shelter, and makes a fine tree.
3. Red alder is faster growing and a taller tree than Sitka alder, but does not tolerate exposure so well. Seedlings from Shetland grown trees will be available in two or three years.
4. Sitka alder is now available from Shetland outlets, with a seed origin of south-east Alaska. Undoubtedly well suited for initial shelter on even the poorest soils. Like all alders it has the ability to take up atmospheric nitrogen via bacterial nodules on the roots. It is noteworthy that its stems have been used for smoking salmon in Alaska.
5. Ash originating from near Bergen, Norway, is available in small quantities this year. The seed zone 105 usually refers to Britain’s most northerly natural ash woodland, Rassal, in Wester Ross, and is usually available.
6. Aspen is native to Shetland and Orkney and was recently available commercially of Shetland (101) origin. On no account should material of mid-European provenance be used, as it just won’t survive here. Speyside (201) origins have done well in shelter.
7. Beech from Cawdor has been available recently from Scottish nurseries, and is establishing well in shade at Kergord. Its natural distribution in Britain, however does not reach as far as Scotland.
8. Downy birch is a Shetland native, but this provenance has yet to be brought into cultivation. Orkney seed trees will be available in 2 – 3 years, and trees from Southern Iceland and the West coast of Norway are being tested. The subspecies term *tortuosa* is broadly synonymous with *carpatica* and *odorata*. Provenances of North West Scotland are generally available, and thrive better than those from the more “continental” and low-lying valleys of the Grampian region (*Betula pubescens* ssp. *pubescens*).
9. Elders have long been grown in Shetland: sometimes their remains can be seen “hanging on” nearby abandoned croft houses. Their bark and leaves are unpalatable to sheep and rabbits. Not a big tree, in fact more often a shrub, but valuable for shelter – and for elderflower products. It rarely fruits in Shetland.
10. Wych elm is similar in its requirements to ash and sycamore – indeed it is just as tough as the latter and there are several fine examples of large trees in Shetland. Generally available with a provenance of 201 or 202.

11. Hazel is native to Shetland and Orkney and efforts are currently being made to bring these relicts into cultivation. Usually available with a provenance of 104/105.
12. Rowan is also a Shetland and Orkney native, but does not often fruit in the wild here, so indigenous stocks are going to be slow to build up. 102 and 105 material is commonly available.
13. Sycamore is an old Shetland favourite, but really only does well on richer soils, and suffers dieback in extreme coastal exposure.
14. Some strains of Alaskan felt-leaf willow are amazingly salt resistant, if their origin is of coastal South-east Alaska. Several clones are being tested and are available locally, some of which are also very fast growing yet stable, unlike the osiers. Highly recommended for primary shelter, in a mixture with Sitka alder. Please note that although tolerant of wet ground, willows like most other trees need oxygen round their roots, so do not plant in permanently saturated ground.
15. The British native willows offer a variety of colour in stem, leaf, and catkin. Usually when planting, it is wise to prune them quite hard back, otherwise they get 'top-heavy' and are prone to collapse. There are several other willow species and hybrids, e.g., *Salix* x *smithiana*, which are available and viable in Shetland.
16. Hooker's willow is fractionally less salt-resistant than the Alaskan felt-leaf, but is just as vigorous, and attractive. Again, highly recommended for primary shelter.
17. *Salix kinuyanagi* is related to the osier, but is perhaps slightly more wind-resistant, and less liable to wind-throw. Its bright green foliage and flowers are attractive.
18. *Salix udensis* is usually available in the cultivar form 'Sekka', which grows in curiously flattened (fasciated) and curling stems. It tends to grow wider than tall, but is very tough. Its (male) flowers in spring are most attractive, lighting up edges of woodland where nothing is yet in leaf.
19. The blackthorn or sloe is a worthy addition to the range of trees and shrubs usable in Shetland. Although slow to reach maturity and flowering stage, its white blossom in early spring is breath-taking. Given time and some shelter, it can grow to a small tree and is a good alternative or neighbour to hawthorn.
20. *Cotoneaster bullatus* is a fine, tall deciduous shrub from the Himalayas, certainly wind-resistant, and is covered with large red berries in autumn – a great attraction to birds.

21. The shrubby honeysuckle originates from north-west North America, and is a very valuable shelter species, well able to cope with the toughest of conditions, except for waterlogging. Unfortunately it is limited in supply as a cheap, field grown hedging plant, and its production as a potted ornamental makes it prohibitively expensive for forestry purposes. It seems to be difficult to root from cuttings.
22. The dog rose is often found on remote banks on the Shetland coastline and in gulleys safe from sheep. Its flowers vary from pink to white. Dog roses imported from mainland Scotland have not performed well, and are not recommended.
23. The Ramanas rose is a Japanese species, growing in the wild on sandy seashores, but can tolerate most soil conditions, including bogs. Its only drawback is its propensity to sucker, perhaps less of a problem in woodland than in a garden. It flowers, pink or white, are large, as are its bright, round red hips in autumn, when its foliage also provides seasonal colour. A very useful shelter shrub, and inexpensive.
24. This spiraea, known as “Bridewort”, is a also rather rampant spreader, but makes dense cover, and although not growing higher than a metre, can give good edge shelter. Its flowers are held in pink panicles above the stems.
25. The native Shetland willow species have only recently been brought into cultivation, and their habit “out of the wild” – where they are for the most part stunted scrub – is currently being evaluated. They would be valuable in a riparian (loch or burn) setting, and will soon be available in Shetland in small quantities. The Scottish grey willow does tolerably well, but is not as vigorous or large as the osiers.
26. This shrubby hybrid willow from Iceland is available in Shetland. Its glossy leaves which resist desiccation render it valuable for shelter and ornament.
27. The noble fir lives up to its name, although it is slow to establish, and can – like the other conifers – lose its leader (apical stem) in severe weather (dry salt-laden gales in spring or summer being particularly harmful). Its homeland is the mountainsides of western North America, where it has to cope with desiccating winds. The foliage when bruised has a pleasant scent of orange peel. Widely available from the nursery trade.
28. The deciduous Japanese larch is another mountainside tree, this time from the slopes of Mount Fuji. It does extremely well on well-drained but poor soils; it does, however, tend to grow in a contorted manner, perhaps because its shoots keep extending late in the summer, and do not stiffen as do the evergreen conifers, which have a much more rapid and shorter growing period. European larch (*Larix decidua*) just does not like the Shetland climate, and the hybrid between these two species, *L. x eurolepis* (the Dunkeld larch) has not been sufficiently tested here. Provenances of Japanese larch are often Hokkaido in northern Japan (where it is not strictly native) or China, and both are acceptable. Its colours in spring, autumn and winter make it very attractive, and it is an excellent choice for edge planting with broadleaves.

29. The lodgepole pine is, strictly speaking, the more continental, inland variety *latifolia*, of *Pinus contorta*, whereas the coastal variety is what is required in Shetland. Most nurseries, however, sell it as lodgepole. It is important to try for Alaskan provenance or origin; more southerly latitudes produce larger but much more “branchy” trees susceptible to basal sweep (where the stem runs along the ground before rising). The shore pine is more tolerant of permanently wet soils than the other conifers suited to Shetland.
30. Sitka spruce has long been successfully planted in Shetland, and certainly tolerates maritime exposure well, if its provenance is of a northerly latitude, such as Queen Charlotte Islands (QCI) or Alaska. It is prone to defoliation by the green spruce aphid *Elatobium abietinum*, but as new shoots are not attacked, it can recover. Heather can severely check the growth of Sitka spruce. Blanket planting of this species is now discouraged, because of its negative ecological – and visual – impact, but as a shelter component of mixed woodland it has great merit. Trees from a seed orchard in Western Norway, of Alaskan origin, are now being trialled in Shetland.

Some further notes concerning the purchase of trees.

Field-grown, or **bare-rooted**, trees are best planted in Shetland in spring, but before their leaves or new shoots unfold. **It is absolutely essential that their roots do not dry out**, even when they are dormant; for this reason nurseries and other suppliers should “heel” them in soil or keep them in some kind of damp compost. The same goes for the buyer, if a period of time longer than 24 hours occurs between purchase and planting. Standing roots in buckets of water overnight is okay – after this amount of time there is a risk of stagnation and root death.

Some nursery catalogues specify the age of their field-grown trees as follows:

1u1 = 2 years old (in the same seedbed, but the roots undercut, i.e., pruned to make them more bushy, after 1 year).

1u1u1 = 3 years old as above, but undercut after years 1 and 2.

1+1 = 2 years old, 1 year in the seedbed, then transplanted for year 2.

2+1 = 3 years old, 2 years in the seedbed, then transplanted for year 3.

2+2 = 4 years old, as above but 2 years in the transplant bed.

Other combinations of these numbers can easily be worked out to give the age of the tree. The height – and price - usually correspond to the age. What is required – and specified in British Standards for “forest transplants” - is a tree with a good, sturdy basal girth, and a good root to stem ratio.

Cell-grown (CG or CGP) trees are grown under glass and then hardened off outside, so that they are available for planting within 1 or 2 years of being sown. Most are grown in “roottrainers” which prevent roots from spiralling. They are more expensive than field grown trees of similar age and size, but they have a big advantage for the tree-planter. They can be purchased all year round, and, provided they are not allowed to dry out, can be planted at any time in the growing season.

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