



NATIVE AND NON-NATIVE TREES

Why and how to choose

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BPG NOTE 8

Best Practice Guidance
for Land Regeneration

Introduction

There is, on paper, a very wide range of tree species to choose from when planning the establishment of woodland on brownfield land. But for any particular set of site and soil conditions, some species will be more suitable than others, and some may be totally unsuitable and will die early in their lifespan and/or grow very slowly and uncertainly. Almost all types of tree have a range of site and soil conditions for their optimal growth, a wider range of conditions which they tolerate, and further conditions which they cannot tolerate, as outlined in Figure 1.

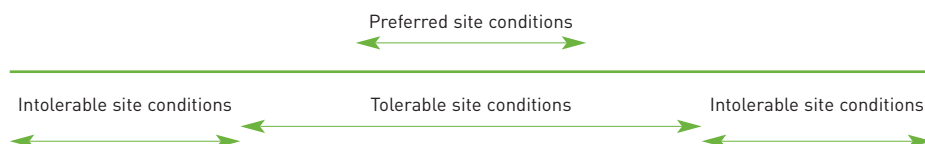


Figure 1 Conceptual model of plant tolerance.

Under so-called natural conditions, it might be expected that an equilibrium is reached between site conditions and the native vegetation, such that individual species and forms of vegetation find appropriate conditions to satisfy their needs. In addition, this native vegetation will be attuned to the other biological components that form the ecosystem of which the vegetation is only one part. For example, woodland formed from oak will support many other invertebrates and bird species in its canopy, and soil macro- and microfauna and flora in the soil between its roots.

Selecting native species or not?

Surely, therefore, it makes sense to look first to native species when planning the revegetation of brownfield land, especially if woodland habitat creation and enhancement of biodiversity is one of the main reasons why woodland has been chosen in the first place. Well, no! By no stretch of the imagination can brownfield land, however well reclaimed, be compared with natural ecosystem conditions. In many cases, soil materials used in reclamation will be of poor quality, infertile and of poor water-holding capacity. Such materials may also suffer from compaction unless high quality soil movements and replacement has been performed. Reclaimed sites are often relatively exposed, and may suffer from winter waterlogging and summer drought. Taken together, these conditions demand that the *most appropriate* tree species are planted, not simply those which have been designated for other purposes, or in other ways, i.e. native species. It is certainly likely that some native species will be classified as suitable for planting on a particular reclaimed site. Extensive research has shown that so-called 'pioneer species' such as birches, willows and poplars tend to do well on reclaimed land, though care must still be exercised in matching species to the particular site conditions (Table 1). Alders, too, can prosper because of their ability to 'fix' nitrogen which they can then donate to adjoining vegetation (Figure 2). Other native species which can tolerate reclaimed land conditions include rowan, whitebeam, field maple and hawthorn. The ROOTS software package for greening brownfield land give further guidance on tree species suitability for a wide range of substrate types; see www.roots-software.co.uk



Figure 2 Italian alder: an example of a species that grows well on reclaimed land.

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Non-native species?

Not all British native species will be suitable for a reclaimed site – for example, soil pH or exposure may limit the choice considerably. It therefore makes sense to look beyond the native list, which many British forest ecologists admit is not an extensive one. A large number of field experiments set down on reclaimed land has shown the value of using a targeted approach to non-native species choice, employing those which have been shown to perform as well if not better than their native equivalents. For example, on substrates as diverse as china clay spoil in Cornwall, opencast coal spoil in South Wales, and sand and gravel wastes in Berkshire, comparative experiments have shown that our only native alder (*Alnus glutinosa*) fares poorly after only a few years, probably due to its inability to find sufficient water in summer months. In contrast, species like red alder (*A. rubra*) and Italian alder (*A. cordata*) grow much better and survive for much longer.

Choosing between native and non-native trees also opens up the debate as to whether conifers are appropriate in land reclamation woodland plantings. Only one native conifer, Scots pine, has been used to any extent. Nevertheless, many other conifers have been used successfully across a range of substrates. Conifers generally tolerate infertility and acidity well, and are low demanding trees (Table 1). Ecologically, conifers have had a natural place in woodland evolution in prehistoric times, and still do on mainland Europe. Conifers can provide useful sheltering qualities in mixed plantations, provide evidence of the 'greening' process throughout the year, and themselves support other components of the evolving ecosystem. It is therefore strongly advised that the individual tolerances of different conifer species are also considered when choosing tree species for brownfield land.

Table 1 Tree species suitability for restored brownfield land.

Species		Heavy soils	Calcareous soils	Acidic soils	Exposure	Air pollution	Comments
Broadleaves	Ash	x	••	x	x	x	More fertile sites only
	Common alder	••	•	•	•	••	Nitrogen-fixing
	Crack willow	••	••	x	x	•	
	Downy birch	•	•	•	••	••	Tolerates low fertility
	English oak	•	•	•	•	•	More fertile sites only
	False acacia	•	•	••	x	••	Nitrogen-fixing. South only
	Field maple	•	••	•	•	•	
	Goat willow	•	•	•	x	••	
	Grey alder	••	•	•	•	•	Nitrogen-fixing
	Grey poplar	••	••	•	••	••	
	Hawthorn	•	•	•	••	•	Tolerates browsing
	Italian alder	•	••	x	x	••	Nitrogen-fixing
	Norway maple	•	••	x	••	•	
	Red alder	••	x	•	••	•	Nitrogen-fixing
	Red oak	•	•	••	•	•	
	Rowan	•	•	•	••	•	
	Silver birch	x	x	••	••	••	Tolerates low fertility
	Swedish whitebeam	••	•	•	•	•	
	Sycamore	•	••	•	••	••	
	Turkey oak	••	•	•	•	•	
	Whitebeam	•	••	••	•	•	
	White poplar	••	x	•	•	••	
Wild cherry	x	•	x	x	•	More fertile sites only	
Conifers	Corsican pine	•	••	••	••	••	Below 250 m O.D.
	European larch	•	x	•	•	x	
	Japanese larch	•	x	•	•	•	
	Scots pine	x	x	••	••	x	

Key: •• tolerant; • moderately tolerant; x intolerant

Further reading

Hodge, S.J. (1995). *Creating and managing woodlands around towns*. Forestry Commission Handbook II. HMSO, London.