- *In recent years there has been an increase in the use of common alder as a forest tree in Ireland.*
- *Alder is a native species and is scheduled under the Forest Service afforestation grant-aid scheme.*
- *The species grows well on a range of sites but it is most suited to wet, riverine environments where it will grow to a commercial size.*
- *It is a pioneer, light-demanding species which regenerates easily.*
- *Like other alders, common alder is able to fix nitrogen so it is a suitable species for planting on reclamation sites where soils are often lacking in organic matter and nitrogen.*
- *Apart from Phytophthora, common alders are largely free from major pests and diseases.*
- *Only material from known seed origins should be planted to avoid the introduction of Phytophthora.*

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Common alder *(Alnus glutinosa)* as a forest tree in Ireland

John Fennessy[1]

Introduction

Common or black alder (*Alnus glutinosa*) is of the genus *Alnus*, family *Betulaceae.* It is indigenous to Ireland. It is found throughout Europe, from Ireland in the west to western Siberia in the east, as far south as North Africa and as far north as central Finland (Figure 1).

Common alder is a very hardy species found in all parts of Ireland on a wide range of sites, from sheltered mountain sides to lake shores and river banks to wet sandy soils and gravels. Its occurrence increases in the higher rainfall areas of the west and southwest. Even though flushing occurs early, common alder does not usually suffer from late spring frosts and is hardy to early autumn frosts. It makes a useful shelterbelt tree and is moderately resistant to salt spray (Savill 1991).

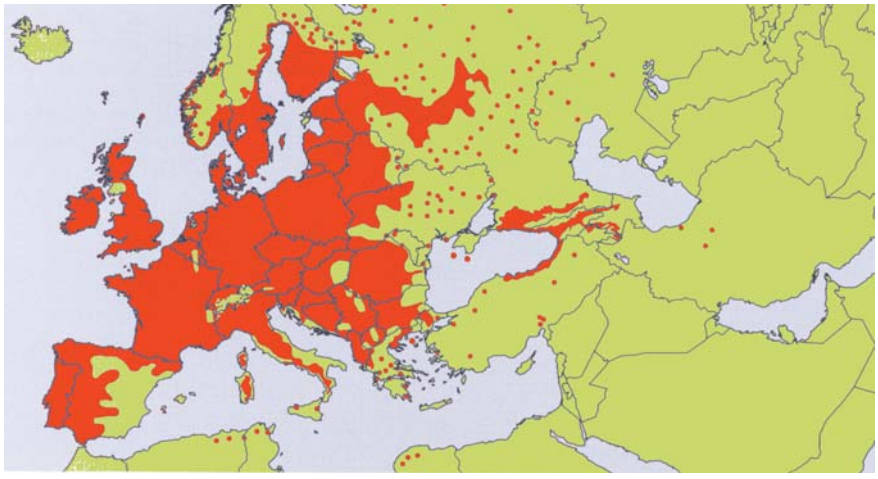

FIGURE 1: Natural distribution of common alder (Kajba and Gracan 2003).

Site requirements

Common alder will grow on a range of soils, although it prefers moist, nutrient rich sites. Infertile and dry sites are tolerated but longevity is greatly reduced in such situations. It is generally an accommodating species capable of growing on all but the most infertile soils largely because of its nitrogen-fixing ability. An

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average water table depth of 10 – 30 cm is optimal for early alder establishment, but subsequent growth is best on drier sites (McVean 1956).

It is a light-demanding pioneer species, which easily regenerates naturally to form small pure stands on areas of freshly exposed soil in wet localities. Nevertheless, good alder regeneration is on the whole sporadic in time and space, partly because of factors such as periodicity of seed production and its viability, and partly because of necessary light intensity, soil moisture, weight of seedling, spring temperature and absence of animal attack rarely coincide (McVean 1956). It frequently occurs in mixtures with ash, hazel and birch and on heavier soils with oak, where it can be a useful nurse.

▲ Alder leaves and cones.

◀ A stand of common alder at the JFK Arboretum, Co Wexford.

Growth

Initial growth of common alder is rapid, height increments of up to a metre per year are typical for the first 15 to 20 years. The species only occasionally attains more than 20 m in height and 40 cm in diameter, though in some sheltered, fertile sites larger trees may be found (Evans 1984). It is generally a short-lived tree usually attaining its full development within 30 – 40 years. Significant height growth usually stops at about 60 years. This pattern of rapid and early maturation makes alder a valuable secondary species in mixtures, provided it is not allowed to grow taller than the main crop. Along with other alders, it is able to fix atmospheric nitrogen and is therefore an important species for planting on reclamation sites where the soils are often low in organic matter and nitrogen (Evans 1984).

Silviculture

Natural stands of common alder generally establish at high densities (10,000 to 100,000 stems per hectare); intense competition causes rapid self-thinning and slow diameter growth. Management to lower initial densities (750 –1,500 stems/ha) can increase diameter growth rates substantially compared to unmanaged stands during the first 10 to 15 years. Continued thinning can maintain diameter growth rates up to 20% higher than unmanaged stands, at least until age 25. Thinning should favour trees with good growth potential – dominant and co-dominant trees less than 15 to 20 years old. It is not worthwhile to thin older stands or to leave suppressed trees because the remaining trees will not have adequate capacity for growth response. Table 1 outlines the suggested silvicultural treatment for alder.

TABLE 1: Silvicultural treatment for common alder.

Top height (m)	Stocking after treatment (trees/ha)	Comment
0.5/0.8	3,300	Planted at 2.0 x 1.5
2.0/3.0	3,000	Formative shaping
4.0/5.0	2,500	2nd formative shaping
7.0/8.0	2,100	Tending, removing wolves
9/11.0	1,000	Heavy crown thinning
12/13	700	Crown thinning of competing dominants
15/16	450	Select 150/200 final crop trees/ha
17/18	200	Further reduction to 100/120 final crop trees

In common with other broadleaves, the strategy for growing alder requires:

- delaying thinning until a branch-free bole of 6–7 m is achieved,
- heavy thinning is carried out when the 6-7 m height is achieved to release potential final crop trees from competition and enhance their crown and diameter growth.

This strategy for the production of quality alder timber requires planting at a sufficiently high density to restrict lateral branch diameter growth and to encourage height growth rather than lateral branch growth. Other considerations are to plant an adequate number of plants to allow for selection of final crop trees. Common alder is normally planted in rows at spacing of 2 m apart and 1.5 m in the row, equivalent to a stocking of 3,300 plants/ha. This should be considered an absolute minimum number and higher initial stocking should be considered if there is a likelihood of substantial losses. A much more desirable number of 4,000 per hectare should be considered planted at 2.0 m apart between rows, at 1.25 m within rows.

Planting stock of common alder used in Ireland is usually two years old and in the height range of 50-80 cm. The seed source should be of known best Irish origin. Imported material of unknown origin should not be used. Due to vigorous early growth, alder should not require vegetation control at establishment.

Pests and disease

Apart from *Phytophthora* disease, European alders are largely free from major pest and disease problems. One particular *Phytophthora* species - known as alder *Phytophthora* - is a recently identified serious disease in alder in several European countries, including Ireland. There is strong evidence that alder from nurseries has played a major role in the introduction of the pathogen to new areas. To avoid introduction of the disease, seed sources of unknown or dubious origin should be avoided.

The key symptom of *Phytophthora* is a necrotic lesion in the inner bark of the stem, often marked externally by the production of a tarry or rusty exudate. In severely affected trees, the foliage is small, sparse and often yellowish. Heavy fruiting commonly occurs. Such trees normally die quite rapidly but some can recover (Gibbs *et al*. 2003).

Timber

Alder is a diffuse porous wood, with a normally pale pinkish-brown colour, which darkens somewhat on exposure to light (Knaggs and Xenopoulou 2003). When freshly felled, alder logs develop a strong orange-brown colour on the end grain, which gradually fades. The timber is fine-grained, with relatively indistinct growth rings and with little lustre.

Physical properties

The density of air-dry Irish-grown alder is around 500 kg/m^3, similar to material grown in Britain. From the limited information available, it can be classed as having medium movement: a change in relative humidity from 60 to 90% results in movement of 2.7% and 1.5% in the tangential and radial directions respectively.

Strength properties

Typical strength values for dry (12% moisture content) defect-free alder are shown in Table 2.

Durability and preservative uptake

Alder is known to be not durable and is susceptible to woodworm attack, although it is not given a rating in EN

TABLE 2: Typical strength values for dry (12% moisture content) defect-free alder.

PROPERTY	VALUE
Irish material (small sample)	
Bending strength (modulus of rupture)	110 N/mm^2
Stiffness	12800 N/mm^2
British-grown material	
Bending strength (modulus of rupture)	80 N/mm^2
Stiffness (modulus of elasticity)	8800 N/mm^2
Shear (parallel to grain)	12 N/mm^2
Compression (parallel to grain)	41 N/mm^2
Hardness (Janka)	2900 N

350-2 (1994). Both sapwood and heartwood are easy to treat with preservatives.

Processing

Conversion: Alder can be readily converted from the log, although poorly shaped stems, or those with growth stresses, may give a woolly surface.

Drying: The timber dries fairly rapidly and well. PRL[1] kiln schedule J is suggested (Table 3).

Machining: Alder can be readily sawn and moulded, but tools should be kept sharp to avoid tearing. It takes nails well.

Finishing: Alder is easily sanded, and is excellent for staining. It also glues easily and takes all finishes.

TABLE 3: PRL[1] Schedule J, recommended for kiln drying of Irish alder.

Timber moisture content %	Dry bulb temperature °C	Wet bulb temperature °C
Green	60	53.5
50	60	50.5
40	60	47.5
30	65	48.5
20	70	52.0

[1] *Princes Risborough Laboratory*

Uses

Irish alder appears to have been little used in the past as a timber, although it occurs occasionally in archaeological excavations such as at Dublin's Wood Quay, where it was found as posts and turned items. Traditional European uses include clogs, turnery and brush backs. It has been widely used for plywood, especially in Eastern Europe and was also favoured for the production of charcoal for making gunpowder. Today one of the best uses of alder wood is for veneer, especially for plywood

Availability

Alder is not readily available in large quantities. Most trees tend to be of small diameter.

Conclusions

Alder is an accommodating species, capable of growing on all but the most infertile soils mainly because of its nitrogen fixing ability. It should be used more frequently, especially as a nurse tree, and as it is one of the few native species it should be planted more extensively in Irish forestry. However, care should be taken to ensure as far as possible that planting stock is free of *Phytophthora*. Native material is preferable to imported stock.

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