Scientific work relating to valuable broadleaves in the United Kingdom

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Background – forest areas

The UK has 2,817,000 ha of forest and woodland (11.6% of its land area, up from 4.7% in 1905) (Forestry Commission 2004). This represents similar percentages to Denmark (10.7%), Ireland (9.6%) and the Netherlands (11.1%), but it is small in comparison to most other EU countries where 30% or more is common. Of the total forest area, 1.17 million ha (41%) is broadleaved, with almost two thirds of this growing on the better soils and in the more favourable lowland climate of England, rather than Scotland, Wales or Northern Ireland.

Of the 1.17 m ha of broadleaved forest, about 27% consists of oak, beech, and other 'non-COST' species. The most common COST species are birch (mostly *Betula pendula*) – 160,000 ha, ash (*Fraxinus excelsior*) – 129,000 ha, sycamore (*Acer pseudoplatanus*) – 67,000 ha, and sweet chestnut (*Castanea sativa*) – 12,000 ha.

Features of broadleaved forestry in Britain

Particular features of broadleaved woodlands and forestry in the UK are:

1. Most of the emphasis in the last 100 years has been upon establishing and growing conifers on ground that was previously bare of trees. A culture change has been (in fact still is) needed to grow broadleaves well.
2. Historically, the most important forest management objective has been the production of timber, though this is now tending to change with environmental and social issues gaining more prominence.
3. In about one third of British broadleaved woodlands, the trees are unmanaged. These are mostly small woods on farms which are valued as features in the landscape, for maintaining biodiversity, or for sport such as pheasant shooting.
4. More than 90% of the British broadleaved area is in private ownership, indicating that there is, and always has been, considerable scope for variation in approaches to growing broadleaves. There is much less standardisation than in the predominantly state- and large company-managed conifer forests.
5. In terms of current (2004) planting, the proportions reflect traditional levels well. Most (72%) new planting and restocking in England is with broadleaves, 35% in Scotland and 39% in Wales and 38% in Northern Ireland, with an overall figure of 47% for the UK as a whole.
6. The total recorded annual production of hardwoods is approximately 620,000 m^3 (Forestry Commission 2004). This is only about 15% of the increment each year, which for 1.17 million ha, must be close to 4 million m^3.
7. The technical and economic constraints on production of hardwood timber in Britain are:
   - Poor quality of the existing resource
   - On average, lower timber revenues than conifers, due to poor quality
   - Higher cost of suitable land than that used for conifers
   - Costly management during establishment, especially weeding and protection
   - Lack of expertise and training in broadleaved management
   - Marketing difficulties including lack of consistency in supply, and
   - Lack of developed home markets.

Scientific work on broadleaves

It has long been accepted that the quality of a tree is a consequence of its genes and the silvicultural treatment to which it has been subjected over its life. In producing quality, the need for good silviculture and a good genetic make up are totally inseparable.

1. Genetic improvement

Savill *et al.* (2005) have recently summarised work on broadleaved tree improvement in the UK. They concluded that the long-term nature of any genetic improvement programme for broadleaved trees has led to a reluctance to start projects. Much of what was funded in the mid 1900s has since been lost through spending cuts and 'rationalizations'. Most expenditure on genetic improvement has been, and still is devoted to conifers, particularly Sitka spruce (*Picea sitchensis*). While broadleaved planting has increased enormously since the 1980s, attitudes towards growing high quality broadleaved trees for timber have hardly changed. Conservation, landscape and amenity values are placed far higher than quality. Nevertheless some progress with genetic improvement has been made from the 1990s with seven species through the British and Irish Hardwoods Improvement Programme – an informal, but apparently effective, voluntary association of landowners, nursery managers, research institutions, universities and professional foresters. The species include ash, sycamore, birch, cherry, walnut, sweet chestnut and oak. Work on the genetic improvement of broadleaves has suffered from inadequate investment and generally weak management of projects. This, unfortunately, potentially undermines all aspects of sustainable forestry and hampers the delivery of forestry policies; most notably, it limits the potential for the production of high quality hardwood timber.

2 Silvicultural research

The main themes of silvicultural research on COST species are:

Continuous cover forestry, see Mason *et al.* (1999) and Kerr (2002)

Natural regeneration, see Harmer (1994a; 1994b; 1995)

Reducing use of pesticides, see Willoughby *et al.* (2004a)

Direct sowing of tree seed, see Willoughby *et al.* (2004b)

Seed science, see Gosling (2002)

Silviculture of *Fraxinus excelsior*, see Kerr and Boswell (2001); Kerr (2003); Kerr (2004); Kerr and Cahalan (2004).

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