PROMOTING SUSTAINABLE HARDWOOD FORESTRY IN THE UK

A unique research centre supporting hardwood forestry is growing in south Oxfordshire. **Gabriel Hemery** and **Jo Clark** explain why research into hardwoods deserves more attention and invite all readers to attend an open day in June.

Britain's broadleaved forests are well known for their landscape, wildlife and amenity benefits but recently the valuable timber produced from well-managed woodland seems to be a forgotten element. Forestry is perhaps the most sustainable industry in the UK but with current policy incentives primarily promoting social and environmental objectives, our broadleaved woodlands are far from sustainable unless economic elements are addressed. In England, 85% of all new planting is broadleaved but there are no measures controlling choice of provenance leading to quality timber production, only those promoting local native origin. Whilst using local native planting stock is highly desirable in terms of genetic conservation and adaptability, it is imperative that quality material be used to maximise returns on the end product. A plantation of best provenance and/or improved stock can be as equally diverse or indeed more so, than newly created woodland containing only native species.

Why improve broadleaved trees?

In 2002, the United Kingdom produced almost nine million cubic metres of wood but imported over 48 million cubic metres at a cost of around £8 billion. Whilst the majority of this was softwood, pulp and paper products, a substantial proportion (2 million cubic metres) was hardwood. With increasing pressure on consumers not to purchase tropical hardwoods, and strict control on their importation, it is important that we provide them with an equally inexpensive, homegrown alternative.

Improvement of conifer species for timber production in Britain began early in the twentieth century but similar programmes for broadleaved species are relatively recent. The Northmoor Trust is actively redressing this imbalance by promoting forestry research for broadleaved species. Forest tree improvement combines tree selection and breeding with best silvicultural

Gabriel Hemery measuring walnut growth.

Table 1. Research trials at Paradise Wood.

Species/Project	Year[1]	Partners[2]	References
ASH (*Fraxinus excelsior*)			
Breeding seedling orchard	1993	BIHIP	Savill et al., 1999; Clark et al., (in press)
Provenance Trial	1995	FR	Cundall et al., 2003
Artificial nitrogen application experiment	2001		
Growing degree days and chilling units/flushing experiment	2001		
International provenance trial – Realising Ash's Potential	2003	FR, EU	
Clonal archive	2003	FR, BIHIP	
BEECH (*Fagus sylvatica*)			
International provenance trial	1999	FR, EU	
CHERRY (*Prunus avium*)			
Clonal Trial	1999	HRI	Russell, 2003
Pruning height experiment	2000		
Wound occlusion experiment	2000		
OAK (*Quercus robur* and *Q. petraea*)			
Clonal archive	2002	BIHIP, HRI	
Breeding seeding orchard	2002	BIHIP	Hubert and Savill, 1999
BLACK WALNUT (*Juglans nigra*)			
Artificial nitrogen application experiment	2001	BIHIP	
Provenance/progeny trial	2003	BIHIP, NF, PU	
COMMON WALNUT (*Juglans regia*)			
Establishment trial	1996		Hemery and Savill, 2001
Pruning experiment	1996		
Provenance/progeny trial	1996		Hemery, 1998; Hemery et al.,(in press)
Nurse mixtures trial	2000 & 2002	BIHIP, NF	Hemery, 2000
Direct seeding experiment	2001		Hemery (in press)
Artificial nitrogen application experiment	2001		Hemery (in press)
Growing degree days and chilling units/flushing experiment	2002		
HYBRID WALNUT (*Juglans* x *intermedia*)			
Hybrid varietal trial	2003	BIHIP	
OTHER RESEARCH			
PINE – Poultry in Natural Environments	2002	UO, FAI, Defra	
Woodland flora development	2002	Ecoscope	
'High Pruning for Profit' leaflet		FR, WH, UO	Hemery et al., 2002
'Formative Pruning' leaflet		FR, WH, UO	Hemery et al., 2003
'The Ash Improvement Programme' leaflet		UCLAN, BIHIP	Clark, 2002

[1]Established/Initiated

[2]Partners

BIHIP	British and Irish Hardwoods Improvement Programme	HRI	Horticulture Research International
EU	European Union	NF	National Forest
COFORD	National Council for Forest Research and Development, Ireland	PU	Purdue University, Indiana USA
		UO	University of Oxford
Defra	Department of Environment, Food and Rural Affairs	UCLAN	University of Central Lancashire, Cumbria Campus, Newton Rigg
Ecoscope	Applied Ecologists		
FAI	Food Animal Initiative	WH	Woodland Heritage
FR	Forest Research, agency of the Forestry Commission		

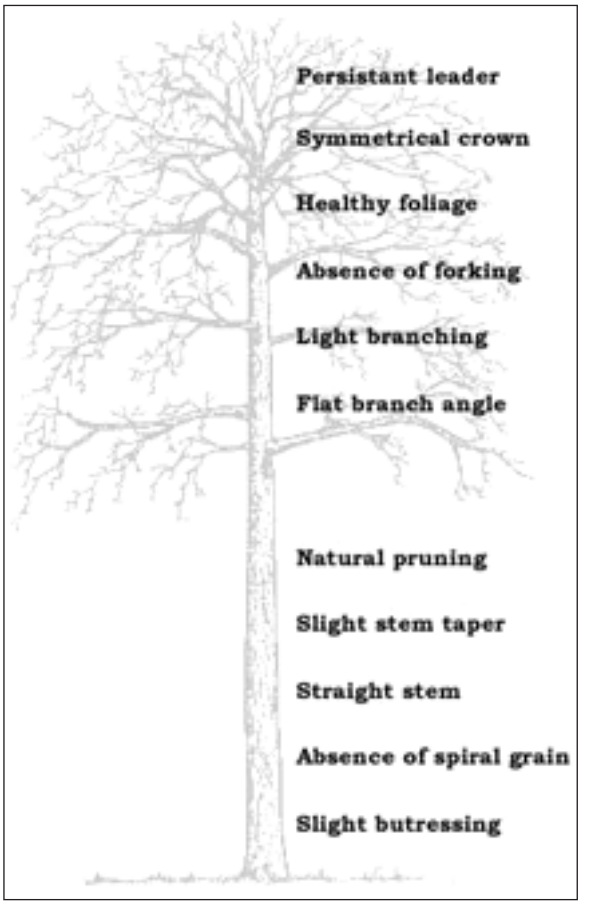
practise. The advantages of promoting quality timber production are that it:

- aids commercial viability while maintaining amenity and conservation values;
- encourages better silviculture;
- marketability is improved;
- a more diverse range of timber products is produced;
- confidence in planting stock encourages further tree planting.

Paradise Wood

Established by the Northmoor Trust in 1992, the Forestry Research Centre at Paradise Wood concentrates on tree improvement in conjunction with silvicultural and ecological research. It adopted the name 'Paradise' from a medieval field name at the centre of the site. The site is a level ex-floodplain and classed as Grade 2 arable, the deep soils being mostly sandy-clay loam overlying river gravel, with pH ranging from 6.2 to 7.7. Rainfall averages 570mm per annum.

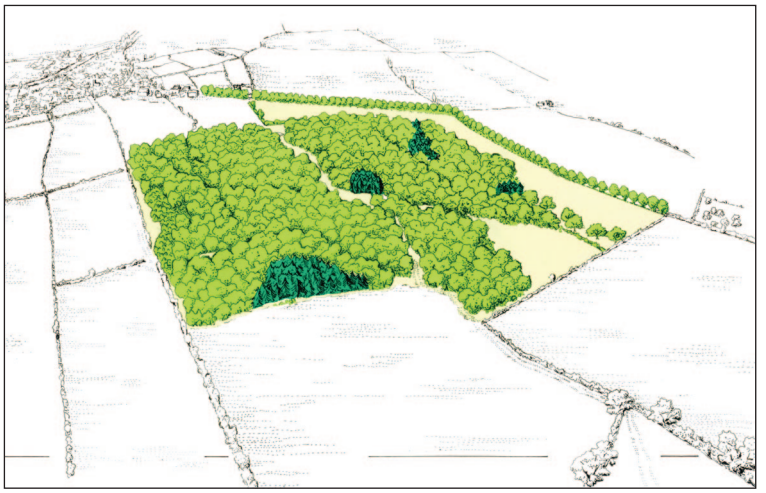
Paradise Wood has primarily been created for timber production and research but will also provide long-term benefits to wildlife and enhance the local landscape. Drawing upon the Northmoor Trust's expertise in applied environmental research, the Trust is uniquely placed to demonstrate the multi-purpose benefits of sustainable woodland management. To date 50,000 trees have been planted across 25ha, receiving grant aid under current schemes (Woodland Grant Scheme and Farm Woodland Premium Scheme). Unplanted areas on the site continue under a commercial arable-cropping regime until selected for tree planting. The completed woodland will eventually cover 45 to 50 ha and will be composed of 75% broadleaves, 10% conifers, 5% coppice and 10% open ground.



The ideal tree from a tree breeder's point of view. Promoting the planting and management of quality trees in a forest creates the ability to generate income from growing timber whilst not compromising social and environmental benefits from maintaining woodland habitat.

Research Activities

The Forestry Research Centre hosts the UK's greatest collection of experimental broadleaved forestry trials. In collaboration with British and Irish Hardwood Improvement Programme (BIHIP) partners, the Northmoor Trust hosts more than 20 projects including provenance and progeny trials, breeding seedling orchards, clonal tests and archives, and silvicultural trials in ash, beech, cherry, oak and walnut species (Table 1). An innovative silvo-poultry research project, PINE (Poultry In Natural Environments), was established in 2002 containing free-range table chicken in newly planted woodland (see below). The Northmoor Trust works closely with a large number of partners in developing and facilitating forestry research. Field trials and genetic collections are hosted for Forest Research (FR), the research agency of the Forestry Commission, Horticulture



Artist's impression of the maturing Paradise Wood in 2050 A.D. covering some 50 hectares.

Research International (HRI), and with many leading universities and research institutes. Some key projects are highlighted below.

Common Walnut

The Northmoor Trust is leading an internationally important tree improvement programme for the common walnut, having amassed a collection of 25 provenances from across the species' natural and current ranges, including 375 genotypes new to Britain. Field trials aimed at developing improved silvicultural methods for walnut have been established by the Trust at Paradise Wood and across five other sites in southern Britain. The trust is a lead consultant to a high-profile research project underway with the National Forest Company in Leicestershire, testing new walnut genotypes and silvicultural methods, funded by Jaguars Cars.

Walnut is particularly desirable from a commercial perspective in that it is the only hardwood that can be grown in Britain that produces an attractive dark wood. The only alternative is yew, which is extremely slow growing. With prices fetching in excess of £1000 per cubic metre, combined with a relatively short rotation time in the region of 55 years, walnut is a sound financial investment.

Oak (pedunculate and sessile)

In partnership with BIHIP and the University of Oxford (OFI), a series of eight breeding seedling orchards (BSO) was established across Britain and Ireland during 2002 with progenies from 100 plus trees selected across the UK, the Republic of Ireland, France and the Netherlands. Two hundred trees were originally selected. However, work at OFI identified a link between large spring vessel sizes in the wood, with the presence of shake. All trees selected were therefore microscopically assessed, and of these, 100 trees were rejected as having large vessels. Sixty five of the remaining 100 superior mother trees bore sufficient numbers of acorns for collection over three years and these are now represented in the BSOs. In addition to a BSO hosted by the Trust, seven representatives from each family have been planted in a demonstration plot and archival clones of the mother trees have been planted for conservation purposes.

Ash

Three different ash trials are hosted at Paradise Wood. The oldest of these is a BSO, planted in 1993 by BIHIP and already yielding useful results (Table 1). A provenance trial established by Forest Research is addressing the best ash across 15 European provenances for planting in the UK. Most recently an international provenance trial was planted this year under the RAP project (Realising Ash's Potential), with EU funding.

PINE (Poultry in Natural Environments)

This is a new and exciting high profile research project for the Northmoor Trust. Working with several partners including Oxford University and the Food Animal Initiative, the Trust is developing and testing innovative and sustainable poultry production that promotes animal health and welfare while encouraging the establishment of new woodland.

All poultry originate from Asian jungle fowl whose natural habitat is under tree and shrub cover. However, even in existing 'free range' systems, birds are reluctant to range due to the threat of predators and lack of shade. Evidence suggests that the birds still prefer woodland or scrub than the open pasture usually provided on poultry farms. Newly planted woodland is slow to generate a financial return, so additional income from the land would be an advantage. The three main benefits arising from this project are:

- natural environment improves animal welfare and ranging;
- there is an early economic return (from production of chickens) on the otherwise long term investment of timber production;
- phyical inputs into tree production are reduced, these being herbicides for weed control and fertiliser, due to chicken manure.

The ultimate aim of the project is a commercially viable farming system that promotes biodiversity whilst delivering food which meets consumers' demands for quality and safety in food production.

Field Day Invitation

The Northmoor Trust regularly delivers talks to interested organisations and welcomes many visitors to Paradise Wood each year. Royal Forestry Society groups, farming and forestry interest groups, students and researchers from many universities and research institutes have all benefited from our unique facilities. Several forestry conferences have been hosted in recent years and we have welcomed executives and policy makers from the Forestry Commission and Defra.

The Northmoor Trust is hosting a field day in conjunction with the 'Better Trees, Better Profits' Conference held on 4th March 2004 by the Royal Agricultural Society of England and the Royal Forestry Society. Join us in the field,

A recent aerial view of Paradise Wood. The woodland has been sensitively designed to blend in with the surrounding landscape although internally it contains over 20 trials laid out in experimental grids. The poultry arks are visible in the middle distance (left).

Thursday June 10th 2004 from 10am to 3pm, with many of the researchers responsible for these projects and foresee the future for our trees and forests. Visit www.NorthmoorTrust.co.uk or www.BIHIP.com for booking information or contact the Northmoor Trust on 01865 407792.

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The Northmoor Trust is a charitable trust aiming to reconnect people to the landscape through its activities, which include sustainable farming, environmental monitoring, archaeology, forestry research and education.

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