

Walnut: Testing commercial viability in the UK

Northmoor Trust, National Forest Company, Forestry Commission



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Introduction

The research

This research forms part of a national research programme to test the suitability of growing walnut as a commercial tree species in the UK. Four research trials have been established at Lount Wood, Leicestershire covering approximately 4.95ha. Three of these are black walnut provenance and progeny trials, investigating which provenances are best suited to growing in the UK. The fourth trial is examining the silvicultural effects of using nurse species with different varieties of walnut, including management techniques to improve the physical form of trees. The research was started in 2001 and is on-going.



Why do it?

Walnut is a valuable timber species and with predicted increases in temperature resulting from climate change, it could provide an alternative commercial forestry option in lowland areas of the UK. However, walnut trees have a larger than average crown diameter than any European forestry species and historically have been grown at wide spacing. As a consequence large, low branches are formed which can reduce the commercial value of the trees. There have also been issues of poor genetic quality of trees and unsuitable silvicultural management techniques. The Lount Wood trials have been designed to address these issues and to provide practical advice on the most appropriate provenance of trees and management techniques.

Aims & objectives

- To investigate planting mixtures that promote the growth of walnut species and hybrids in terms of stem quality and vigour, resulting in reduced rotation time (walnut silviculture trial).
- To evaluate planting mixtures which create additional financial and environmental incentives for landowners (walnut silviculture trial).
- To test a wide-range of black walnut material from across its natural range for suitability to produce timber in the UK (progeny and provenance trials).

The Project

Description

The research trials are based upon similar work being undertaken in Europe. They have been designed to undertake long-term monitoring to test provenance, vigour, silvicultural practices and the growth and early form of trees, when planted with, or without a nurse species. The research plots include three black walnut progeny and provenance trials, which were planted between 2003 - 2005. There is also a silvicultural trial, planted in two identical blocks. This is testing the suitability of two species (black and common walnut) and two hybrids (MJ209 and NG23) for planting in the UK. Seedlings were secured from Europe (including: Italy, France, Slovakia, Serbia and Montenegro), the UK and the USA. The trees are planted at a regular spacing (2.5 x 2 m) in a set pattern in two blocks, each comprising 17 different plot treatments for each of the four walnut species. For comparability, this design has been replicated at three other sites in Oxfordshire (owned by the Northmoor Trust), Devon and Sussex.

Approach

The silviculture trial plots are set out with walnut species planted in intimate mixtures, with a selection of tree and shrub nurse species. Nurse species include: trees – Italian alder, silver birch, Japanese larch and wild cherry; and shrubs – hazel, autumn olive and elder. Italian alder and autumn olive are included as nitrogen fixing species. Six walnut trees were selected per trial block to record survival (in year one), height and increment growth (years two and five).

Tree form is being assessed by calculating the branch to stem ratio, based upon measurements of the diameter of the highest branch in three height zones (0 - 50cm, 51 - 100cm and 101 - 150cm) and the branch immediately below. This will provide data to assess how tree form will affect the potential commercial value of the trees.

Silvicultural works include pruning, recording time of bud-burst and an experiment into 'stumping'. Cutting back some poorer formed walnuts to the base has been undertaken to assess whether they produce better form from the subsequent re-growth.

Data collection, monitoring of success rates and data analysis is undertaken annually.

Timescales

2001 – 2005:	Project establishment, planting and initial monitoring.
2005 – 2015:	Detailed research assessment.
2015:	Project review, when all plantings will have reached 10 years old.

Budget

2003 – 2008:	Around £23,800
2009 – 2012:	£8,400.

Plus National Forest Company and Forestry Commission in-kind staff time related to project planning, management and promotion.

Results

Outcomes

Findings so far include:

Genetics trial

- By 2009 overall survival of the walnuts was 99%. 20% 'beating up' of losses was required for phase II of the planting, but only minor losses were recorded for phases I and III
- Heights of over three metres were recorded by year seven for some of the mixtures, with growth rates at Lount Wood almost twice those of the Oxfordshire site.
- Both site and tree provenance have proved to be highly significant factors for height growth.

Provenance and genetic diversity

- There are high levels of genetic diversity in the black walnut stock from Europe and the USA.

Silviculture trial

- There were no negative results from planting with any of the nurse species; but there were significant benefits from establishment with a shrub nurse. A tree nurse offered no benefit after year six.
- A general benefit from nurse species was shelter and protection from late spring frosts.
- The autumn olive was particularly beneficial as a nurse species as it helped to promote increased height growth; helped to reduce branch sizes relative to stem diameter; guarded against multiple stems forming at the base of the walnuts; and improved nitrogen nutrition for the trees.
- The lack of a nurse species was found to be detrimental to all of the desired benefits listed above.

Stumping back

- Stumping back helped to promote rapid height increment and strength and form of shoots, through the early frost sensitive phase of growth. This is an important corrective measure for trees showing poor form; by pruning, a single leading shoot can be selected.
- Stumping back should take place during the winter and singling of multiple shoots should take place in the second year during the summer period. This is more successful in producing a stronger tree.
- It is not beneficial to undertake stumping in the summer, as although trees sprouted in the same summer, the new shoots suffered more damage from frost and deer browsing before the next growing season.
- Survival of trees after stumping is high (91%).

Applications

- Helping to improve the quality of walnut as a commercial forestry tree in the UK, with the view that walnut is more likely to benefit, in the short term, from a warmer climate.
- Providing practical tree planting advice to landowners.
- Contributing to a Europe-wide research programme to further knowledge and understanding about the commercial viability of Walnut.

Further information

Dissemination

- Site visits to the research trials by forestry stakeholders.
- Annual reports produced by the Northmoor Trust.
- Scientific publications on tree provenance trials.
- NFC research review seminar 2010.
- NFC website www.nationalforest.org

Links to published work

Walnut trials at Lount Wood, National Forest (2005 to 2008/9). Forestry Research reports. Northmoor Trust.

Growing walnuts in mixtures – early results (2009). Clark, J.R. and Hemery, G.E. Woodland Heritage Journal.

The future of black walnut in Britain (2005). Clark, J.R., Hemery, G.E., Russell, K and Williams, H. Quarterly Journal of Forestry, 99 (3).

The use of autumn olive in British Forestry (2006). Clark, J.R. and Hemery, G.E. Quarterly Journal of Forestry, 100 (4).

Early growth and form of common walnut in mixture with tree and shrub nurse species in Southern England (2008). Clark, J.R., Hemery, G.E. and Savill, P.S. Forestry, 81 (5).

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