

OAK BREEDING SEEDLING ORCHARDS 2004 research report

This report summarises progress to date and first year results from eight oak breeding seedling orchards established through BIHIP and Oxford University. The project is now managed and co-ordinated by the Northmoor Trust (NMT). After a short explanation of trial design the report highlights progress and presents a financial report. Estimated costs of a further two years of supporting work are presented.

Summary

The aim of the research is to establish seed orchards of oak (*Quercus robur*, *Q. petraea* and hybrids) in the UK and Ireland from seeds collected from plus trees in the UK, Ireland and northern continental Europe (Figure 1 and Appendix 1). The orchards are situated on eight sites (Table 1) and were planted in spring 2003. Survival was recorded after the first growing season and all sites beaten up.

Table 1. Location details of the eight BSO sites.

Site	County	Grid Ref.	Owner
Sotterley	Suffolk	TM 427861	Mr Miles Barne
Little Wittenham	Oxfordshire	SU 55319363	Northmoor Trust
Shakenhurst	Worcestershire	SO 684734	Mr Michael Severne
Belmont	Kent	TQ 970571	Belmont Park Estate
Newton Rigg	Cumbria	NY 349531	University of Central Lancashire,
Dalkeith	Midlothian	NT 368695	Duke of Buccleuch
Bwlchgwynt	Carmarthenshire	SN 281287	Forest Enterprise
County Cork	Cork	52° 19'N 8° 38'W	COFORD

Each site is approximately 1ha (0.84 -1.22ha) with varying numbers of families per block. Due to limited numbers of trees available, it was not possible to represent families in square blocks all at sites. Some sites therefore have either one or two unplanted gaps at the end of each block. This is undesirable for competition reasons and additional funds have been provided by BIHIP to fulfil this requirement.

Table 2. Trial design (excluding guard rows) and maintenance of each BSO.

Site	Families per site	Blocks per site	Trees per site	Area (ha)	Fencing	Guards	Weed Control
Sotterley	61	50	3,050	1.22	Stock Fence	None	None
Little Wittenham	56	39	2,184	0.88	Deer Fence	0.7m tree shelters	Kerb + 2 applications glyphosate
County Cork	46	48	2,208	0.88	Rabbit fence	None	Glyphosate
Bwlchgwynt	44	52	2,288	0.92	Deer fence	None	Mowing
Newton Rigg	40	63	2,520	1.01	Deer Fence	None	Mowing
Belmont	34	70	2,380	0.95	None	Spirals	Glyphosate
Dalkeith	31	85	2,635	1.05	Deer fence	None	Kerb + 3 application glyphosate
Shakenhurst	21	100	2,100	0.84	Stock fence	0.7m tree shelters	Kerb + 2 applications glyphosate

Update on Progress

The Northmoor Trust measured all sites autumn 2004 for survival, damage and height (Table 2), with the exception of County Cork and Bwlchgwynt.

Table 3. Survival, damage and mean height of the oak BSOs.

Site	Survival (%)	Damage (%)	Mean Height (cm)
Sotterley	79.6	2.3	25.2
Little Wittenham	95.2	13.5	53.5
County Cork	98.4	4.3	33.6
Bwlchgwynt	88.0	0.6	69.9
Newton Rigg	71.0	68.0*	40.7
Belmont	75.5	0.6	42.0
Dalkeith	93.8	0.8	45.3
Shakenhurst	97.0	0.8	100.8
Mean trial data	87.3	3.3	51.4

* 14% are so severely damaged, that they are unlikely to survive.

Sotterley, Suffolk.

The site is protected with a stock fence. There are no guards on the trees and no weed control has been carried out. This was found to be a problem in locating the trees for measurement (average height of trees was 25.2cm). Weed growth was so severe in places as to totally obscure trees, especially a problem under rosette forming weeds. Dieback is severe throughout the site. Although a large number of dead trees were replaced last year, survival is still only 79%. The site has mature oak around the edges which are producing ample acorns, and some natural regeneration is apparent around the outer blocks. Blocks are identified by stakes, and plot markers were provided at the second visit by NMT.

Little Wittenham, Oxon.

The site is deer fenced and the trees protected with spirals. Kerb granules were applied winter 2003 and two applications of glyphosate were administered throughout the growing season. The spirals were found to be detrimental to the growth of the trees in that some cork-screwing of the leader occurred within the spiral, and the leader and side branches were growing

through the holes of the spirals, causing constriction of new growth. All spirals were removed in December 2004 and replaced with 0.75m tree shelters. Survival was good (over 95%) and there were some incidents of cynipid wasp galls. 295 trees showed some damage, mostly due to deer browsing. All deer were culled from the site in December 2004. The families lined out in the demonstration plot are doing well and each family is identified with plastic markers.

County Cork

The site was measured by a contractor to Coillte. Survival is excellent (only 35 dead trees, 1.6%) and damage due to hares is low. There is a rabbit fence, but no tree guards. Mean height was low at 33.3cm, relative to the trial mean.

Bwlchgwyant, Wales

This site was measured by the Technical Support Unit of Forest Research, Wales. Survival is slightly better than the average at 88% and damage (due to voles) very low at 0.6%. The orchard is protected with a deer fence and weeds controlled by mowing.

Newton Rigg, Cumbria

The site is protected by a substantial deer fence and the trees were unguarded. Trees are planted in a clover cover crop and vegetation controlled by mowing. Trees had been so severely damaged by voles that only 16 of the 63 blocks were measured. Vole damage was categorised at three levels: 1. moderate damage, 2. heavy damage, 3. damage so severe that the tree is unlikely to survive. The mean damage score was 1.85. Vole guards have now been placed on all trees with the expectation that most trees will survive. Vegetation will be controlled by spraying, and the vole population carefully monitored. Blocks are identified by canes but there are no block markers.

Belmont, Kent

The site is not fenced, but all trees are protected by spirals. Vegetation (grass sward) is sprayed annually. Survival is disappointing (75.5%) as the site looks excellent and there is little evident damage. Mortality occurs in distinct patches, with survival highest in the middle and to the east end of the site. There was no indication of blocks making it very difficult to identify correct trees and the start of each block. Stakes and tags were delivered during the second visit by NMT staff.

Dalkeith, Midlothian

This site is unique within the oak trials, as it is the only orchard planted on a restock site. It is protected by a deer fence and weeds are controlled by glyphosate, 3 applications in 2004. Survival is good and the average height of the orchard is 43.5cm. Damage is negligible, and only a few incidents of cynipid gall wasps. Stakes have been lain out and some erected by the second tree of each block.

Shakenhurst, Worcester

The site is surrounded by a stock fence and each tree protected with spiral tree shelters. Survival is excellent (97%) and mean height is the highest across all sites at 100.8cm. One or two trees suffered in the spirals as at Little Wittenham but, in general, growth was so good that this did not seem to be a problem with the majority of trees being well above the top of the spiral. Damage is minimal. There are a couple of mature oaks around the north side and south corner of the orchard which are producing acorns. Blocks are identified by canes, but there are no block markers.

General Comments.

All sites with the exception of Little Wittenham do not have plot markers. Six out of eight sites have either one or two unplanted gaps at the end of each block. After two growing seasons and one round of beat ups, survival is not sufficient at four sites. It is understood that initial planting stock quality was not high. It is hoped that the sites will be fully beaten up this year. From an experimental perspective, it is necessary to plant up all gaps within each trial, and for each block to be identified with a plot marker. BIHIP have provided funds for plot markers, stakes and the additional trees to fill each block. It is expected that the site owners will provide the trees for beat ups.

Table 4. Summary of costs to provide stakes and missing trees for the oak BSOs.

BSO	Reps per site	Stakes required	Tags	Missing trees per rep	Total trees	stakes @ £0.60	trees @ £0.50	Total (£)
Sotterley	50	0	50	2	100	0.00	50.00	50.00
Northmoor Trust	39	0	39	0	0	23.40	0.00	23.40
County Cork	48	0	48	2	96	0.00	48.00	48.00
Bwlchgwyt	53	0	53	1	53	0.00	26.50	26.50
Newton Rigg	63	63	63	2	126	37.80	63.00	100.80
Belmont	70	70	70	1	70	42.00	35.00	77.00
Dalkeith	85	0	85	1	85	0.00	42.50	42.50
Shakenhurst	100	100	100	0	0	60.00	0.00	60.00
Total								£428.20

Financial Summary

Table 5. Man days incurred measuring the oak BSOs and managing the data.

	Man days
Measuring 6 orchards (2 people)	24
Second visit to 2 orchards	2
Data entry	5
Data management	5
Report	1
Writing Ali tags	1
Total	38

NMT received £3000 from the Forestry Commission to support the work carried out this year. 2004 was the first year that data has been collected on these trials. Handling the data took significantly longer than was expected due to initial establishment hitches. All errors and queries have been highlighted and individual orchard managers are dealing with these on the ground. Two orchards required a rechecking. BIHIP supported NMT with £600 for this second visit and a further £1200 for a second visit to re measure Newton Rigg next year. However, the total labour input during 2004 has been significant (Table 5), the 38 man days equating to £13,300 at consultancy rates. This is time for which no funding has been made available other than those monies donated from the Forestry Commission.