

# Oak Management at Westonbirt Arboretum

by Hugh C. Angus, Curator  
South & West England  
Westonbirt Arboretum  
Tetbury, Gloucestershire

**W**estonbirt Arboretum was founded in 1829 by Robert Holford. Today it extends to 600 acres and has in excess of 18,000 numbered trees and shrubs, many dating back to this period. The collection was centered around the current site due to the occurrence of two pockets of acid soil. These are situated in Savill Glade and the Sand Earth area of Silk Wood. These pockets of acid soil can support a much greater diversity of trees and shrubs. When Robert Holford was planning the Arboretum his main aim was to create the biggest collection of trees in the United Kingdom. Subsequent generations of the Holford family have continued to plant trees with the same passion and commitment. In 1956 the collection passed to the Forestry Commission who have been managing it ever since.

The area just north of the visitor center is where the Arboretum was started and all the ground north and east of this area was open fields in the 1820's, with only a few hedgerow trees which still remain today. The next area, developed in the 1850's, was that around 'The Pool' and then in the 1870's, Jackson Avenue.

In 1875 Robert Holford was joined by his son Sir George Holford and his first job was to start on the development of Silk Wood. Silk Wood was all semi-natural woodland at this time and has a history dating many centuries. The main crop is *Quercus robur* with an understorey of *Corylus avellana*. The first job Sir George undertook was to cut through this woodland and create Willesley, Broad and Waste Drives. Sir George was also responsible for the original maple plantings both in this area and in the Old Arboretum. Many of the trees still growing in this area date back to this period.

In 1956 the estate passed to the Forestry Commission and we carry on the Holford's work, albeit from a much more scientific viewpoint. Our main objectives today are conservation, education and recreation. All



these objectives are of equal importance and the skill of management today lies in getting the correct balance between them.

The conservation side of our work is the collection of trees themselves and the information that we collect about our 18,000 numbered individuals. We are basically plotting the life history of every tree from the time that it arrives in the Arboretum until its death. This means that we record anything of significance that happens to each one. All records are kept on a computer database and the information is recorded in the International Transfer Format. This will allow us, at some time in the future, to communicate more effectively with other collections around the world. Today the greater percentage of species added to the collection are of documented wild origin. We currently list some 63 species that are regarded as rare and endangered in the wild.

To look after our educational responsibilities we employ a full time Education Officer who is supported by a number of part time staff. We offer a wide range of activities ranging from half-hour introductory talks to a full-day programs, depending on the needs of the particular group. We have concentrated our activities towards the younger age groups and 95% of our work today is with 5- to 11-year olds. During most years around 12,000 children visit and use our facilities. We are also developing a number of Botanical Workshops

through our events program. These involve a number of activities such as Fungal Forays, Identification of Conifers, Tree Gazing and Propagation.

The Arboretum has been open to the public since 1956 but it is only in the last few years that visitor numbers have reached about 250,000. Of these, up to half come to see our

displays of autumn color during the month of October. However it is the variety of fungi, birds, flowers and insects, as well as the trees and shrubs, that makes Westonbirt such a special place to so many



©Guy & Edith Sternberg

*Former director John White examining a declining English oak (Quercus robur L.) at Westonbirt dated by White to the year 1665.*

people. Visitors now provide us with enough income to cover all our expenditures.

This has enabled us to start looking at expanding the collection. A project team is currently involved in looking at this and hopes to draw up some objectives and plans within the next few months. Some of our current thinking revolves around strengthening our maple and native species collections. We shall also look at our current management of the semi-natural woodland, although this will involve more active management.

The greater part of our work at Westonbirt involves the active management of trees and we have several hundred oaks that we look

contd. on pg. 44



## Oak Management . . .

contd. from pg. 43

after for different reasons. These are spilt into five different management types.

1. Oaks used in the shelter matrix.
2. Veteran oaks - trees greater than 200 years old.
3. Oak standards with hazel coppice.
4. Oak collection.
5. Expansion plans.

Westonbirt Arboretum is 400 ft. above sea level. It has no natural shelter and is open to all elements so it was essential to establish some shelter before starting to plant the collection. This was recognized by Robert Holford and his first job was to plant a matrix of trees on the open ground. The main species that he planted were *Quercus robur*, *Quercus ilex*, *Taxus baccata* and *Pinus sylvestris*. Once these trees became established, he then began to cut out pockets and plant them with the new plants that were coming into the country at that time.

*Quercus robur* forms 70 percent of these shelter plantings and is by far the most important of the overstory species. The characteristics of *Quercus robur* that interest us most in this situation are that : it makes a large tree; it is long lived; it has a good rooting system and is relatively wind firm. Growing into a large tree is very important as many of the specimen trees needing shelter also have the potential to grow very big. Therefore the trees put in to provide shelter also need to be large.

It is also advantageous if these trees are long lived, since this avoids re-planting and gives a greater continuity of shelter. This in itself is of great importance. Using *Quercus robur* will hopefully mean that we have the right tree in

the right place for at least 200 to 300 years. Being on an exposed site means that we are buffeted by a number of strong winds every year. It is inevitable that we will lose some trees, but having a tree that is wind firm within the shelter system means that the losses are much reduced.

The importance of continuity in a shelter system has been mentioned already. This can not be over stressed and can only be achieved by the active management of those trees used to provide shelter, in conjunction with good



©Guy & Edith Sternberg

A healthy English oak (*Quercus robur* L.) planted at Westonbirt in 1829.



choice of species. This means that we can not wait until the trees die of old age, as this means that a large percentage of a particular species is liable to die within a relatively short period of time. The consequences of this can only be imagined but would, without doubt, have a catastrophic effect upon a collection like Westonbirt. To minimize this we have established an active policy of removing relatively young trees and planting new ones. Over the next hundred years or so the age structure of the shelter plantings will be much more continuous, resulting in the whole collection being less prone to wind damage.

I mentioned the removal of trees at a relatively young age. By this we are not talking about plants less than 100 years old. It is also important to stress that with a continuous age structure there will be room for 500-year-old trees alongside the one- and two-year olds. The aim is to achieve this continuous age structure throughout the whole collection.

Careful management of our older trees is essential, especially with the large number of visitors present in our grounds. Accidents caused by falling trees and branches must be avoided. First, it is essential that we know where all the older trees are. This is achieved by having every one of our trees mapped. An active mapping program is essential to ensure that maps are kept up to date.

Once these trees are identified they go onto our "trees for regular inspection" list and they are looked at once during every six month period. During this inspection we determine if the tree looks healthy, and also if there are any potential problems from a public safety viewpoint. All details from these inspections are recorded on our database. The location of the tree will also determine what type of action we take. For instance if the tree is in an area of high public access then we would remove any deadwood as a matter of routine. However if it is well away from the public areas we may not take any immediate action.

If we decide that a tree is inherently unsafe, then we must consider the type of action most appropriate. In the case of a large old oak in the vicinity of our Visitor Center we decided that something had to be done before it became a real hazard. The tree was around 300 years old and had some very big scars from previous tree surgery work. In addition, at least one very large limb was overhanging a main path. Our first thoughts were that the tree would need to be removed. This was a difficult decision, but we felt that we had no choice because of its position. At this point we came up with the alternative idea of pollarding the tree. This involved removing all the large diameter limbs about four meters from the ground. This addressed the public safety concerns while retaining the genetic material. Concerns about the appearance and life expectancy of the tree after the work had been done were unfounded, part of the success being due to our highly skilled tree team. Five years later I am pleased to say that the tree appears to have recovered well and has a very satisfactory appearance.

If the only thing to do is to remove a tree, then we ask if that particular tree has any genetic value to the collection? If the answer is "yes," then the tree will immediately go to a category one status on our "trees for propagation" list. This basically means that we shall propagate from the tree before it is removed. Having done this means that we retain the genetic material, albeit in the form of a 10-cm plant rather than a 30-m tree.

Our next management category is our "oak standards and hazel coppice." These areas at one time covered the whole of Silk Wood. This area of woodland has a history of being sold to the peasants dating back to the twelfth century and was actively worked up until 60 years ago. However we are now trying to bring all the remaining areas back into rotation. To

contd. on pg. 46



## **Oak Management . . .**

contd. from pg. 45

date we have re-cut some 25 percent of the 30 hectares remaining. It is important with any areas like this to be sure of the objectives before starting any work. I would also stress the importance of recording this information for future reference. Our main objectives with these areas are to:

1. Increase visitor enjoyment by seeing active hazel coppicing in action.
2. Increase the ecological value of the area.
3. Create a sustainable market for the hazel coppice.
4. Enhance the educational value of the area.
5. Re-cut all the areas of hazel coppice.

Oak trees are a key element in these areas. The main consideration is the number of trees to grow on any particular area. Generally speaking the more oaks there are, the less hazel. It is necessary to know what sort of market you have for the hazel, since this dictates how long to leave the hazel between cuts. The better the market for hazel, the fewer oaks will be needed on a given area.

It is important to remember that good management of this woodland type dictates the removal of trees as an essential part of the process. If the oaks are left to grow indefinitely, eventually they will shade out the hazel coppice. This means that every time the hazel is cut it is essential to evaluate the crop of oaks and make an assessment on the number to be left. Any trees that are deemed surplus can then be removed. At the same time it is essential to plant and maintain new trees. Traditionally any type of oak planting stock was

used in an arboretum of this nature. However, it is a lost opportunity not to plant something of greater genetic value. It may be possible to plant the progeny from an old tree that had to be removed from somewhere else in the collection. When no local stock is available it is possible to use stock from other areas. Whatever the decision, good record keeping is a key element of this work.

When trees have been felled we are always looking for an innovative use for the timber. Most tend to be sold into the timber trade and are probably sawn up into planks. However at Westonbirt we hold an annual large tree carving event which makes good use of some of the trees. This is a week-long event and finishes with the completed pieces being auctioned and a percentage of the money raised going to 'Tree Aid'. This is a charity committed to planting trees throughout Central Africa.

The oak collection at Westonbirt is centered around the northern end of Broad Drive. It incorporates both the old and new collection. The old collection was started by the Holfords, but the lack of species would suggest that they had no real enthusiasm for this particular genus. The current collection has 105 taxa divided into 68 species, 24 cultivars and 13 others. Out of our 108 trees that are the biggest in the British Isles, only three are oaks. This again indicates the lack of interest shown by the Holfords for this genera.

The area of scrub woodland, adjacent to this collection will be used once we start to expand the collection. For this reason the time has come to re-assess our reasons for having an oak collection. We need to set objectives whether we are re-evaluating an old collection or starting a new one. Then it is important to



decide why to have a collection of oaks. There may be a variety of reasons including:

1. Timber production.
2. Scientific research.
3. Conservation.
4. Aesthetic/Landscape.
5. Educational.

Once the objectives are decided upon, the next step is to decide which oaks will best meet them. First, since *Quercus* is such a large genus, it is unlikely that any one site could accommodate all the species. As an example, if conservation is the main objective, then we would probably want to collect the rare and endangered species from around the world. It would also be essential to ensure that the soils and climate are suitable for the type of oaks that we want to grow. As an example, most of the Mexican oaks are not going to survive in Northern England and Scotland, so it would be a waste of resources to consider plants from this area.

Obviously it is not possible for us to grow all oak species at Westonbirt. However, it is important that we assess our current strengths and build on them, including our current maple collection. It therefore seems likely that we shall not be concentrating particularly on oak species. However *Quercus robur* will always be an important tree to the Westonbirt collection, particularly from a wind protection viewpoint. This means that, without doubt, we shall be planting good numbers of oaks throughout our expansion area. If we are going to do this anyway then it makes sense to use plants that have a genetic value. This means that we shall have to consider some sort of propagation program. Planting oaks from this type of material would mean that we would meet a conservation objective as well as providing good wind protection.

To summarize I would like to recap the five different management approaches for oaks at Westonbirt.

1. *Quercus robur* is one of the essential species in protecting other plants from strong winds. Continuity of shelter is an important element in any plantings and an active management regime of felling and planting is necessary to achieve this. This helps to create a continuous age structure of wind firm trees for long periods of time.

2. Ecologically old oaks are very desirable, but can be a problem from a public safety viewpoint. Hazardous trees must be identified, problems addressed and solutions found. This does not always lead to felling the tree in question and should certainly not lead to any loss of genetic material.

3. Continuity of a good crop of different aged oaks is only achieved by a good felling and planting program. We also look for good ways to use any felled trees. More oaks means less hazel. You need to know your markets and grow the crop that meets that demand.

4. It is essential to define objectives for starting any collection of plants and to state these in a written document ensuring they are revisited at regular intervals. If this is not done, then plants tend to be collected in a very random fashion.

5. Oaks are an essential element to any expansion plans at Westonbirt and it is difficult to imagine Westonbirt without them.