

An analysis of the species composition of Brechfa Forest Garden

Introduction

The Forest Garden at Brechfa was established alongside others such as Kilmun and Bedgebury to evaluate the comparative performance of potential plantation species. Planting was focussed on species that were likely to be suited to high rainfall regions of Wales. Although the primary objective of the plots as a testing ground is no longer a high priority, there remains an extensive collection of trees that serve as a living database of species that has potential value for a range of audiences including scientists, arboriculturists, foresters, horticulturists, pharmaceutical researchers, and tree enthusiasts. Other roles include education and interpretation, public display of trees in aesthetically pleasing ways, and engaging and involving the public in support through activities like Friends organisations. Collections like Brechfa also have an important role to play for global conservation of threatened tree species. Some of the species that were tested as plantation species, are now considered to be rare or threatened in the wild, and plots containing several hundred individuals of particular seed origins may be a significant *ex situ* conservation resource. Also in the context of conservation, the importance of botanical collections in education and interpretation of global conservation issues is well recognised and specified as Target 14 of the Global Strategy for Plant Conservation which was adopted by the Conference of the Parties to the Convention on Biological Diversity, at its sixth meeting in 2002.

The objective of this report is to present a numerical analysis of the collection at Brechfa in terms of its species composition and conservation value.

Assessment

The scientific value of a collection can be measured in terms of its composition, rarity in Britain and globally, accuracy of identification, physical condition, quality and accessibility of information on each accession.

Composition

There are a total of 87 species growing in the plots at Brechfa; two-thirds (54 species) are conifers, and the remaining third (33 species) are broadleaves.

Table 1 shows the numbers of species of the all the north temperate genera of conifers growing at Brechfa. The potential number of conifer species that might be grown successfully in Britain is large, and I've estimated the maximum number of possible species for each genus using species listed in comprehensive tree guides (Mitchell, 1978; Rushforth, 1999). Six genera are unrepresented at Brechfa (*Cunninghamia*, *Ginkgo*, *Juniperus*, *Sciadopitys*, *Taxodium*, and *Taxus*); the remaining 16 genera are represented by at least one species. Species from the three largest genera: true firs (*Abies*), spruces, (*Picea*), and pines (*Pinus*) are reasonably well represented with about 40% of potential fir and spruce species, and about 30% of pines present in the garden. A traditional arboretum containing individual specimens of these species would be a significant collection, but having them present as plots of many individuals makes this a near unique collection.

Genera of broadleaves with more than one species represented at Brechfa include *Acer*, *Betula*,

Eucalyptus, *Nothofagus*, *Populus*, and *Quercus*.

Rarity in Britain

The latest version of Champion Trees of Britain and Ireland (Johnson 2003) categorises the frequency of occurrence of each species in the British Isles based on the numbers of records held in the Tree Registry of the British Isles (TROBI) database. Of the 54 conifer species at Brechfa, 23 (43%) are listed as being Rare or Very Rare in Britain; this high proportion of rare species adds significantly to the scientific value of the collection. In several instances, less than 50 or 100 specimens of certain species are recorded as growing throughout Britain by TROBI. Clearly, representation of some of these very rare species in plots or groups at Brechfa adds appreciably to the total numbers of specimens in Britain.

Of the broadleaves, species considered rare in Britain are *Acer pensylvanicum*, *Betula lenta* and *B. maximowicziana*, *Quercus canariensis*, and *Q. faginea* (syn. *Q. lusitanica*).

Conservation value

Globally, conifers are one of the most threatened groups of plants. Of the 800 species, subspecies and varieties of conifers in the world, 355 are listed as being of conservation concern, with 200 (25%) threatened with extinction (Farjon and Page 1999). Of the 54 conifer species at Brechfa, 12 (22%) are Red Listed as being threatened in the wild (Table 1); this makes Brechfa an important potential resource for *ex situ* conservation of these species. More research is needed to determine which of the Red Listed species are derived from wild collected seed, and are present in sufficient numbers to make them valuable for *ex situ* conservation. Species present in fewer numbers, or derived from other seed sources, also have a valuable conservation role in publicising conservation messages. Further investigation of the conservation value of Brechfa should be given high priority.

Only one of the broadleaved species growing at Brechfa is Red Listed: *Nothofagus alpina* (syn. *N. procera*, *N. nervosa*).

Identification

The identity of all species needs to be verified systematically because the current names seem to be based on trusting the original ones supplied with the planting stock, which is not always reliable!

Physical condition

The overall condition of the garden is good, and shows clear signs of being under active management. The condition of each plot has recently been thoroughly surveyed and appropriate management plans prepared. Some plots have also been recently replanted. However, there needs to be an accessions policy drawn up that will inform future planting of replacement and new plots.

Records and labels

The information on the origins, past management, and growth of accessions in a collection is as important scientifically as the trees themselves. Modern collections are supported by computer databases that hold the accession information in a readily searchable format, and provide the vital

link between recorded information and the trees on the ground via GIS. Systems like the one used at Westonbirt also play a central role in the management and maintenance of an arboretum. All available past records have been collected together and collated electronically and it should be relatively straightforward to migrate these records into an appropriate collections database. The collection needs to be mapped onto GIS using GPS.

Labels are also a key part of the information system and are the principle source of information about a species for the casual visitor, and it is pleasing to see that new labels are being installed.

Public display and interpretation

The site's relative remoteness inevitably limits potential visitor numbers. However, the layout of most plots on a steep slope creates some magnificent views and opportunities to look down onto the canopies of species.

At present, Brechfa offers little in the way of interpretation about the trees in the collection either to the general visitor or to the tree enthusiast. There are many opportunities for interpreting the collection by improved labelling, guide books, and the development of thematic trails. Many of the species have stories waiting to be told about the relationship between trees and man. For example, useful products derived from species represented at Brechfa include Benecol for lowering cholesterol, Douglas-fir sugar, antiscorbutics for the navy, Coca-Cola, etc; conservation stories: Brechfa has species like Serbian and Koyama's spruce with only a few hundred individuals left in the wild; and bizarre stories like the explosive gasoline tree (Jeffery pine).

In a wider context, Brechfa is not well-known as a significant tree collection. Targeted publicity and a web presence will help raise its profile and status.

Future species planting

Brechfa is one of the four major collections of trees on the FC estate. In particular it compliments the other major Forest Gardens at Bedgebury and Kilmun, but also fits well with the specimen collections at Westonbirt Arboretum and Bedgebury Pinetum. Suggested options for future planting at Brechfa include:

- Extending the range of conifers to include species from missing northern genera, and also species from the southern hemisphere.
- Either specialise in developing a collection of one or two particular broadleaved genera that should be suited to the mild wet climate, such as *Nothofagus* species.
- Or plant a range of broadleaves from areas of temperate rainforest.
- Participate in a wider programme of *ex situ* conservation of endangered species along the lines of the collaborative project between Bedgebury and the International Conifer Conservation Programme, who are based at the Royal Botanic Gardens Edinburgh.

References

Farjon, A. and Page, C. 1999. Conifers. Status Survey and Conservation Action Plan. IUCN.

Johnson, O. 2003. Champion Trees of Britain and Ireland. Whittet Books Ltd.

Mitchell, A. 1978. Trees of Britain and Northern Europe. HarpeCollins.

Rushforth, K. 1999. Trees of Britain and Europe. HarperCollins.

Table 1. An analysis of the composition of conifer species at Brechfa Forest Garden

Genus	Potential number of species ¹	Number of species at Brechfa	Number of species that are rare in Britain ²	Number of species that are Red Listed ³
Abies	36	14	7	4
Cedrus	4	1	0	0
Chamaecyparis	5	1	0	1
Cryptomeria	2	1	0	0
Cunninghamia	1	0	-	-
X Cupressocyparis	1	1	0	0
Cupressus	6	1	0	0
Gingko	1	0	-	-
Juniperus	6	0	-	-
Larix	8	2	1	0
Metasequoia	1	0	-	-
Picea	24	10	6	2
Pinus	59	17	8	2
Pseudotsuga	2	1	0	0
Sciadopitys	1	0	-	-
Sequoia	1	1	0	1
Sequoiadendron	1	1	0	1
Taxodium	2	0	-	-
Taxus	3	0	-	-
Thuja	5	1	0	0
Thujopsis	1	0	-	-
Tsuga	8	2	1	1
TOTAL	178	54	23	12

Notes.

1. Figures are estimates of numbers of species and major varieties per genus that have been planted and survived in Britain. Sources include Mitchell (1978), Rushforth (1999), and Johnson (2003).

2. 'Rare' is defined as absent from many counties and found in only a few parks and gardens in others (Johnson 2003). In several species fewer than 100 individual have been recorded elsewhere in Britain.

3. Numbers of species in the following IUCN Red List Categories: Lower Risk – Conservation Dependent; Lower Risk – Potentially Threatened; Vulnerable; Endangered; Critically Endangered; Extinct in the Wild; and Extinct. Source: Farjon and Page (1999).