

GARDEN SHELTERBELTS – PROTECTING YESTERDAY’S GARDENS TOMORROW

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ABSTRACT

Shelterbelts in gardens, as their name implies, provide crucial protection from strong winds for the less well-adapted species growing behind them. Several of the historic gardens on the west coast of Scotland rely on them in order to cultivate the range of plants that they do. Many of these windbreak plantings were established over 150 years ago and the plants in them are ageing. The National Trust for Scotland held a seminar to discuss this problem and the experiences of a number of gardens, and the lessons learnt are described. New computer-based technology developed by the Forestry Commission is also discussed.

INTRODUCTION

The gardens of the United Kingdom are widely recognized for their horticultural achievement and the breathtaking range of plants they are able to grow. This variety of plant material benefits strongly from the Gulf Stream or North Atlantic Drift, which keeps temperatures a few degrees warmer than they ought to be for the geographical location. However, being an island, the UK is also at the mercy of strong winds (usually from the west or south west). Luckily these are generally benign and bring the moisture levels needed to achieve good plant growth. Now however, with the increasing perils of climate change, the winds are becoming more savage and storm damage more frequent. Nowhere is this more prevalent than on the Atlantic coast which faces the brunt of these gales, and gardens are starting to show evidence of the damage caused.

When many of these ‘classic’ west coast gardens were developed, the owners had the foresight to plant extensive shelterbelts to provide the protection and micro-climates required to grow the flood of plants that were coming in from the ‘new’ countries. These required higher levels of humidity and protection from salt-laden winds and soil erosion, in addition to more specialized cultivation requirements. As Table 1 shows, many of these gardens were created over 200 years ago, and their shelterbelts are now losing their ability to provide protection with the result that they now threaten the collections they have nursed for so long.

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Garden	Created	Location
Abbotsbury	1765	Dorset
Achamore, Gigha	1940s	Argyll & Bute
Ardkinglas	1750	Argyll & Bute
Arduaine	1880s	Argyll & Bute
Benmore	1870s	Argyll & Bute
Bicton	1735	Devon
Bodnant	1790	Gwynedd
Carwinion	1840	Cornwall
Castle Kennedy	1840	Dumfries & Galloway
Dunster Castle	1868	Somerset
Glendurgan	1820	Cornwall
Glenveagh	1870	Donegal
The Lost Gardens of Heligan	1800s	Cornwall
Hergest Croft	1820	Herefordshire
Holehird	1980	Cumbria
Ilnacullin	1900	West Cork
Inverewe	1862	Wester Ross
Jura House	1800	Isle of Jura
Kerracher	1995	Wester Ross
Lanhydrock	1800	Cornwall
Logan	1800	Wigtonshire
Mount Stuart	1717	Bute
Muncaster	1780	Cumbria
Ness	1890	Liverpool
Portmeirion	1850	Gwynedd
Rosemore	1850	Devon
Speke Hall	1850	Devon
Tresco	1834	Isles of Scilly
Torosay	1820	Isle of Mull
Trebah	1831	Cornwall
Trengwainton	1820	Cornwall
Upton Castle	1800	West Wales
Woodfall	1767	Dumfries & Galloway

Table 1. Gardens with large, mature shelterbelts.



Fig. 1 Scots pine windblow in the shelterbelt at Inverewe following the 2005 winter storm. Photo: Kevin Ball.

With this in mind, the National Trust for Scotland (NTS) and Royal Botanic Garden Edinburgh (RBGE) held a seminar in April 2007 to examine the management of senescing shelterbelts. The seminar was held at Inverewe Gardens in the north west of Scotland, an area that has been hit by severe storms over the last few years, causing considerable damage to the plant collections and to the shelterbelts (see Fig. 1). Invitations were issued to staff at gardens with similar issues to those at Inverewe or with an interest in the subject. The final group provided a cross section of scientific, forestry and horticultural representation to provide comment on a range of issues.

EXISTING APPROACHES TO SHELTERBELT MANAGEMENT

Management of shelterbelts takes money, planning, skilled staff and time. Almost all of these, with the possible exception of skilled staff, are in short supply in most gardens, and for this reason shelterbelts have tended to be overlooked. Whilst they are vital to the well-being of the collections they protect, they are of low public interest and are seen as a financial drain by garden managers without the knowledge or understanding necessary to realize their importance.

Inverewe, for instance, has a shelterbelt that is now over-mature. With recent changes at management level in the garden the shelterbelt issue has been overlooked and is now reaching a critical stage. A number of options have been discussed, but the finances required for implementing these have been diverted to other projects, culminating in the current situation. The main method of management has tended to be reactive rather than proactive. After storms, the shelterbelt is assessed and the most dangerous trees removed. There has not been a continuous programme of



Fig. 2 New growth on the yew trees following hard pruning to the shelter at Westonbirt Arboretum. Photo: Simon Toomer.

replanting. The absence of such a programme accompanied by low rates of natural seed recruitment caused by poor, thin soils and lack of staff to weed and water new plantings in the establishing years has led to a decline in the health of the shelterbelt. Whilst this example is not typical of all gardens with shelterbelts, it is thought to be common.

Other gardens faced with similar problems reviewed the challenges by drawing up simple and effective management plans. Often, procrastination is the easiest approach, but this stores up problems for the future! At Westonbirt Arboretum, for example, there was a problem with ageing yew trees taking up space and light and preventing the younger trees from developing properly. A drastic approach to this problem was required which involved cutting back the trees hard to allow in light thereby generating new growth (see Fig. 2). In the past their shelterbelt plan used to be a separate document from the garden management plan but is now fully integrated to ensure that the two work in harmony. The shelterbelt is now considered to be part of the garden's aesthetic appeal and has become an area of discovery for children where they can climb and play in the trees. In doing so, a subtle interpretation message has been established where connections with the garden can be made. The planning of this work was made in accordance with the Forest Design Plan (FDP). This is a standard Forestry Commission (FC) tool. Such plans are not normally employed in a garden, and it is interesting to note that it is standard FC practice – perhaps this is an area where horticulturists can learn from foresters. By taking a bold decision and further working on reducing the number of tall trees from 18,000 down to a manageable 1,400 trees that are healthy and viable, this will also assist in the long-term wind management programme for the collection. The abiding focus of the plan was that the principles are more important than absolutes.

RBGE aim to develop an understanding of the site in order to implement management plans for their gardens. For example, drainage may be a vital element to the success of a good shelterbelt planting. Knowledge of the drainage at a site should inform the species selection but aspect and ecology also need to be considered. In the west coast gardens of Logan Botanic Garden and Benmore Botanic Garden, much of the shelter planting might have been in a similar position to that of Inverewe had careful management over several years not been implemented. However, decisions had been made over the years to thin and remove trees and open areas up. The new plantings also used species that were part of the overall plant collection and this has added to the botanical value of the collection and seamlessly combines both functions.

Abbotsbury Gardens in Dorset has been owned and managed by the same family since its establishment in 1765. The garden was badly hit by storms in 1990, leading to a review of their shelterbelt. Developments within the land surrounding the gardens allowed an opportunity to plant a new area of protection on a deflection hill created from the spoil. In addition, many of the holm oaks surrounding the gardens were pollarded in 1992 (see Fig. 3). This extended their lifespan, and they are now due for pollarding again fairly soon. The existing shelter has been used to create a longer growing season, provide a rain shadow and create areas to harden plants off over the winter. Recently, a large part of the shelterbelt has been removed to open up the views in the garden and while this has not had a detrimental effect so far, it remains to be seen what the long-term effect might be.

It is interesting to note that the approach taken by the Forestry Commission is far more technical and scientific. With years of research behind them and a technical



Fig. 3 Holm oaks prove an effective shelter to the tender plant collection at Abbotsbury sub-tropical garden. Photo: Steve Griffith.

department, Forestry Research, they have the tools and experience to take decisions in given situations. The purpose of the majority of their research in this area is for the benefit of the agricultural world, to provide solutions for shelter and protection for both animals and crops. Utilizing the years of knowledge and experience they have generated along with specifically designed software, the FC can produce a planting design suited to each site. These are assessed using a farm audit that defines the needs of the site itself, the activities in each field and impacting factors, such as snow and frost. With the information entered, the audit determines the type of woodland required – windbreak or shelterbelt. The woodland plan is then created, taking into account all the relevant factors. A management plan is also produced, indicating when to thin out, replant or remove. A further software package, ‘Ecological Site Supply’, produces a species mix that fits the profile of the chosen site.

SEMINAR RESULTS

A number of key themes emerged from the presentations and subsequent discussions. The main one was the need for effective planning and proper resourcing. Most of the established shelterbelts protecting plant collections in the UK are over-mature and little remedial work has been undertaken at the correct time. When producing a garden

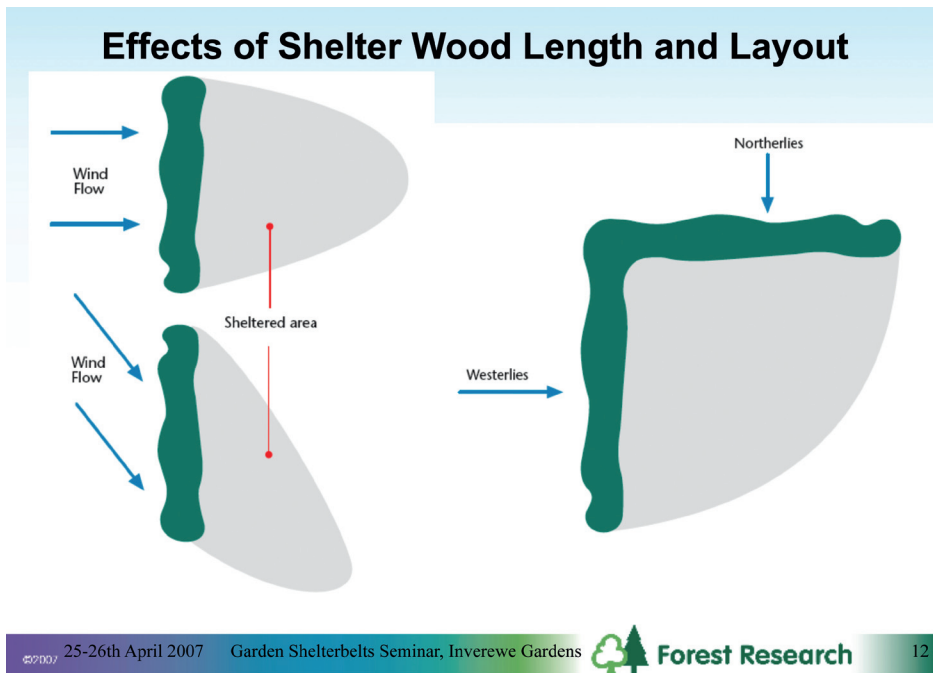


Fig. 4 The graph indicates the effects wind has on shelterbelt design, demonstrated here through the length of the shelter and the effect of gaps within it. Photo: Barry Gardiner.

management plan, the shelterbelt needs to be included as a major part of any forward thinking. Interestingly it emerged that the biggest enemy facing current shelterbelts is procrastination! Bold decisions need to be taken for the medium- to long-term health of the trees and shelterbelt as a whole. As has been successfully demonstrated at Westonbirt, the shelterbelt can become a feature of the garden, in this case an area where the public can interact with it, children are able to play in the lower branches, and visitors are kept up to date through interpretation and information in the visitor centre.

The Forestry Commission at its Forest Research Centres has developed a number of computer software programs such as 'Forest Gales' (see Fig. 4) for wind speed calculations and the effect on trees and density of planting, the 'Farm Audit' and 'Ecological Site Supply'. All or part of these can play a part in the development and management of shelterbelts. There is also a wealth of information available on shelter design, indicating the best format for a range of sites, heights, widths and lengths of planting as well as the shape of the shelter.

Finally, awareness of the local environment is vital for a better understanding of the work a shelterbelt has to do. Factors such as wind, saltiness, drainage and temperature ranges must be included. Development of the shelterbelt to incorporate biodiversity issues, and the ornamental role it can play as part of a collection or as a possible extension to existing collections, must also be considered.

THE NEXT STEPS

It is clear that a lot of information regarding shelter types has been produced but is not necessarily readily available. In order for it to become more readily available, a bibliography of the literature should be produced and made available via the web. A further publication or database with a listing of suitable species and their requirements or benefits also needs to be developed. Working with colleagues at Forestry Research should enable this to happen.

Funding for shelterbelt improvements is going to be vital to many of the gardens concerned. Tree work is expensive and time consuming and usually has little financial gain. An exploration of possible funding sources needs to be established and made available to the gardening community.

All of these processes need to be co-ordinated and developed for a wider audience. It is proposed to form an Atlantic Gardens Forum, to bring together properties 'gardening on the edge' and make the information available. A forum of this type would create a focus in which to share knowledge, explore opportunities to work together and raise the profile of a wide range of gardens with a common theme. A survey will be sent out to selected gardens in the region, including east coast United States, Caribbean and Atlantic-facing European gardens, to seek interest in such a forum.

CONCLUSIONS

The seminar was felt to be long overdue and deserved a larger audience so that it could have had a more far-reaching impact. However, those attending found it very useful and the seeds of partnership were formed. It is clear that the horticultural community will have to work closely with foresters in order to make use of the extensive knowledge of tree mechanics they have. In turn, foresters will have to be sensitive to the needs of horticulturists and the amenity function that a shelterbelt can provide. Various groups and organizations that provide a network exist but there is nothing specifically aimed at this topic. Many of the gardens found in the Atlantic zone have long histories and have acted as centres for horticultural development in the wider world. The protection of these historic and dynamic collections through properly planned shelter is vital for the future to protect our past.