

Forest Perspectives

John F. Kennedy Arboretum a national botanical treasure

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Introduction

Following the death of John Fitzgerald Kennedy, President of the United States of America, on 22nd November 1963, a number of Irish-American societies wished to establish a memorial forest as a living tribute to him in Ireland. The Irish government suggested this take the form of a national arboretum. The Irish-Americans agreed readily and raised \$145,000, which was equivalent to about the value of the arboretum land at that time. The Irish government undertook to develop and maintain the arboretum, which was to be located in Co. Wexford. The JFK Arboretum was opened formally by President de Valera on 29th May 1968.

Arboreta or collections of trees and shrubs were first planted when it was realized that timber from native woods was not inexhaustible. In Ireland the planting of groups of exotics started at the end of the 17th century, with the coming of political security for landlords. These collections grew with the introduction of more exotic species, especially since the beginning of the 19th century. While many of these large plant collections had specimens of great botanical interest, in general they were not comprehensive nor arranged scientifically. This was also a period of economic hardship, so there was uncertainty as to the long-term commitment of owners to the long-term protection of valuable plant collections. A national institution appeared to offer the best safeguard towards this continuity. The National Botanic Gardens, founded in 1790 by the Royal Dublin Society, was limited in its ability to display a comprehensive collection of trees and shrubs, mainly due to its size of 19.5 ha. An area of 80 ha was considered necessary for this purpose and to allow for the future expansion of collections. For these reasons, the need for a national arboretum had long been recognised. One of the main functions of the arboretum has been as a testing ground for newly discovered species, cultivars and hybrids. Where space permits, plots of species with an afforestation potential were established and demonstration provenance trials containing forest tree species of value to Irish forestry were also included. Properly arranged and displayed, the collections should be a source of knowledge for students, gardeners and planners over many generations.

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Figure 1: The long vista – framed by shelter belts, it leads northwards to the visitor centre, with Slievecoiltia in the distance.

A planning committee was established between the Forestry Division and the National Botanic Gardens to plan the content and layout of the Arboretum and the Office of Public Works, which had the responsibility for providing the buildings, roads and services. Initially, committee members visited arboreta and botanic gardens in the U.S., U.K. and continental Europe, to study methods of arranging the collections, recording, etc.

Plant arrangements in Avondale Forest Park were also examined for this reason. Instead of the separate arboretum and pinetum, in John F. Kennedy (JFK) the Plant Collection was planned in two interwoven botanical circuits, one of broadleaves and the other of conifers, which minimised the visual impact of bare-foliaged broadleaves in winter. The Long Vista in JFK (Figure 1), modelled on the Great Ride, is 1 km long and 30 m wide, aligned north-south and bisects the holly (*Ilex aquifolium* L.), horse chestnut (*Aesculus hippocastanum* L.), maple (*Acer* spp.) and members of the rose or Rosaceae family collections.

The plots in Avondale were generally 0.4 ha in area, about 10 times as long as wide, tending towards a single line of trees as the final crop. In JFK, the main forest plots were also 0.4 ha in area, but square, to give a final crop with timber measurements more akin to what might be expected in a real forest situation. “Nurse trees” were not used in JFK and tender species suffered damage from exposure during the early years, but recovered quickly after this. Avondale provided seed for 14 plots in JFK Arboretum. The best examples are Macedonian pine (*Pinus peuce* Griseb.), Serbian spruce (*Picea omorika* (Pancic) Purkyne) and western hemlock (*Tsuga heterophylla* (Raf.) Sarg.), in addition to other unusual species.

The site

The JFK Arboretum is located in the southeast corner of Ireland, 12 km south of New Ross. It covers 252 ha and rises from 36 m at its southern boundary to 271 m at the summit of Slievecoiltia (“Mountain of Woods”), a prominent hill overlooking the Kennedy ancestral home at Dunganstown.

The main part of the Arboretum had been a large working farm of 158 ha, transferred from the Land Commission in 1964. The two monkey puzzles (*Araucaria araucana* (Mol.) K. Koch) at the visitor centre, planted in 1920, were the only exotic trees growing there. A further 28 ha farm, rising to 190 m, plus an 8 ha forestry plantation were acquired in 1965. This site was considered suitable for growing a large range of tree and shrub species. A soil survey, carried out by An Foras Talúntais in 1968, showed the predominant soil to be a deep brown earth over Ordovician slate and shale, with an average pH of 5.7. In 1978, the 58 ha summit of Slievecoiltia was added, to give a total area of 252 ha.

The climate of the arboretum is typical of the south-eastern coastal region. Temperatures range from a mean January minimum temperature of 2.7°C (absolute minimum -8.4°C in January 1979) to a mean July maximum temperature of 19.4°C (absolute maximum 29.4°C), for the period 1968 – 1998. The mean annual rainfall received is about 1004 mm. Rosslare Strand in this region, receives about 1,600 hours of sunshine per year, more than the rest of Ireland. The main limiting factor for establishment was exposure, and shelterbelts were planted initially, to protect young specimens. The species planted for shelter were Japanese larch (*Larix kaempferi* (Lamb.) Carr.), giant fir (*Abies grandis* (Dougl. ex D. Don) Lindl.), Lawson cypress (*Chamaecyparis lawsoniana* (A. Murr.) Parl.), western hemlock, common beech (*Fagus sylvatica* L.) and red oak (*Quercus rubra* L.), to give extra autumn colour.

The JFK Arboretum has five main objectives, as follow:

- Demonstration – To display a comprehensive collection of trees and shrubs and a series of forest plots, properly arranged and labelled.
- Education – To be a source of knowledge of trees and shrubs for students, planners and the general public and to give guided tours.
- Research – To record the performance of a wide range of trees and shrubs in open and forest conditions. To cooperate with other organisations in conducting studies of mutual interest.
- Conservation – To make provision for the inclusion of endangered species and cultivars in the collections and to establish pools of genetic material of these.
- Recreation – To provide a setting in which to enjoy leisure activities and stimulate an interest in woody plants.

The plant collection

The plant collection covers 125 ha and occupies the parkland of the lower southern slopes of Slievecoiltia to an elevation of 85 m. Initially, it had been planned to establish a horticultural college on 20 ha in the south west corner of the site, but this idea was abandoned in favour of Kildalton in Co. Kilkenny. This corner became the

Extension Area and contains part of the cypress family (Cupressaceae) with provenance display plots and an elm (*Ulmus* spp.) “adaptability” trial.

Approximately 4,500 species and cultivars of trees and shrubs are represented. In planning a comprehensive collection capable of growing in the Arboretum's climate, a final content of between 5,000 and 6,000 species was envisaged. The families are arranged by taxonomic classification, based on the system of Engler and Prantl¹.

There are some modifications, the main one being the planning of the conifers in a separate circuit, but interwoven at times with the broadleaves to improve the overall appearance of the collection.

Other modifications included the planting of certain genera to take advantage of a sheltered position, or moving collections to reduce the risk of disease, such as planting the *Ribes* collection downwind of the “five-needle pines” (*Pinus* spp.) to reduce the likelihood of an outbreak of the white pine blister rust (*Cronartium ribicola* J.C. Fisch.). Priority was given to species and natural varieties of wild origin, with interesting cultivars represented where space permits. Up to three specimens of each type were planted at a spacing sufficient to allow for full development of the crown, free from competition. Each plant is labelled and a record is kept of its growth over time. Growth assessments have been carried out periodically.

As the area is exposed to the prevailing south-west winds, any existing woodland is retained to perform the dual function of giving shelter and providing a setting for sylvan walks. Shelter belts of two rows of trees were established 40 m apart initially to protect young specimens. These are being removed as they become superfluous. Several vistas extend through the plant families and provide glimpses of the surrounding countryside.

For ease of plotting and indexing, a system of numbered grid-points was put in place, the markers consisting of sunken blocks of concrete set to the cardinal compass points, 61 m apart, and numbered consecutively. A set of large scale maps, at a scale of 1:240, is used in conjunction with this grid, and provides for the accurate planning of specimen positions.

The ericaceous garden (Figure 2) is part of the botanical circuit but deserves special mention. It was designed by the National Botanic Gardens in Dublin and covers nearly 5 ha. There are more than a 1,000 different species and varieties of this family growing there. The main species are rhododendrons and azaleas (*Rhododendron* spp.), and heathers (*Calluna* and *Erica* spp.), with many other genera included. Initial mulching with peat provided the acid soil condition required by these species. Specimen trees have been planted throughout, to give some vertical scale, and provide a more natural setting, with protection from the wind. There is colour all year round, although the best time to view is late April, May and early June when the plants are in flower.

1 Engler and Prantl's (1887–1915) *Die Natürlichen Pflanzenfamilien* was one of the few detailed works to attempt the classification of the plant world since Linnaeus.



Figure 2: *A view across a bed of evergreen hybrid azaleas in the ericaceous garden. Note the anemometer sited in the bed.*

Other collections

- Climbing plants – A selection of climbing plants is growing on four stone and timber shelters.
- Hedges – Different hedges in the picnic area, serve the dual purpose of demonstration and the provision of shelter. A planted maze of 24 m diameter is nearby.
- Slow-growing conifers – A landscaped area contains a collection of 300 species and cultivars of slow-growing conifers (See Figure 3).
- Ground-cover – A collection of plants suitable for ground-cover is growing near the main woodland block.
- Waterside plants – There are examples of these plant types found by stream and pond sides for use in similar situations.
- Street trees – There are demonstrations of trees commonly used as street trees in an urban setting, including many poplar (*Populus* spp.) clones, both old and new.

Plant supply

Twenty-two countries, with which Ireland had diplomatic relations, each sent gifts of trees and shrubs representative of their country to the Arboretum. The main source of plants used in the Arboretum has been from reputable nurseries that could authenticate the source of their material. Plants, cuttings and seed are also received as gifts or by exchange from other arboreta or botanic gardens. The Arboretum has a



Figure 3: The view southeast over beds of dwarf spruce and other slow-growing conifers to the wooden shelter. Part of the cherry (*Prunus spp.*) collection appears in the gap to the left.

nursery, with propagation house, covering about 1 ha. In addition to propagation, plants are held here prior to planting out in the plant collection or forest plots.

Forest plots

The forest plots extend up the slope of Slievecoiltia to 190 m above sea level. They occupy 61 ha and in contrast to the Plant Collection, are arranged geographically. The vigorous tree species from Western North America protect the windward flank of this area. Those from eastern North America, South America, Australasia, and Asia stretch across the slope, while the hardier species from Europe are at the higher elevations. The area is divided into 0.4 ha squares, with rides of 2 m or 4 m between each plot. Plot sizes range from 0.4 to 0.1 ha; the exact size apportioned depended on planting stock availability and perceived hardiness of the species (i.e. smaller plots of lesser-known species were planted to determine how they might perform and eventually justify further planting in the arboretum). Where these squares are divided into smaller plots, it is important that there is sufficient area and number of trees to permit accurate estimation of tree growth responses at the stand level (e.g. volume), including the impact of thinning. Both evergreen and deciduous species were planted to give variety to the overall appearance, although where provenances of the more important species are included, they are kept together.

Material from the following locations is included in the collection:

- Western North America – 50 plots. These include three clones of *×Cupressocyparis leylandii* (Dallim. and Jacks.) Dallim. The *×Cupressocyparis leylandii* (Dallim. and Jacks.) Dallim. “Castlewellan” plot was used to demonstrate “line thinning” in 2003. There are five provenances of *Picea*

sitchensis (Bong.) Carr and five of *Pinus contorta* Dougl. ex Loud., three of coastal (ssp. *contorta*) origin. The most vigorous plots here are *Abies grandis* (Dougl. ex D. Don) Lindl. and *Cupressus macrocarpa* Gord. *Alnus rubra* Bong., initially the most promising species, soon declined although it has rallied somewhat in later years.

- Eastern North America – 36 plots. The best plots contain *Pinus strobus* L. and *Quercus rubra* L.
- South America – six plots. There are three provenances of *Nothofagus procera* (Poepp. Endl.) Oerst. which were vigorous with good form. Currently there are only a handful of trees remaining in these plots. The *N. obliqua* (Mirbel) Blume trees had been in decline for a number of years and all have died in more recent years.
- Australia, New Zealand – 44 plots. These are mainly *Eucalyptus* species, the outstanding one being *E. nitens* Maiden. A plot of this species at over 200 m elevation on the eastern flank of Slievecoiltia, succumbed during the recent cold winters.
- Asia – 51 plots. The most vigorous plots here are *Cryptomeria japonica* (L.f.) D. Don, *Larix kaempferi* (Lamb.) Carr. and *Picea likiangensis* (Franch.) Pritz.
- Europe – 85 plots. This area includes five plots of mixtures of two species to reflect a recent trend in the national planting programme. The first plots were planted in 2001 to replace *Pinus nigra* ssp *nigra* J.F. Arnold, which was destroyed in the 1997 storm. The species used were *Pinus sylvestris* L. and *Quercus petraea* (Mattuschka) Lieblein. The best plots contain *Abies alba* Mill., *Alnus cordata* (Loisel) Desf., *Larix × marschlinsii* Coaz, *Picea abies* (L.) Karsten and *Pinus peuce* Griseb.

Table 1: Synopsis of main forest tree plots.

Genus	Species	Common name	Provenance	Planting year	Productivity (m ³ ha ⁻¹)
Western North America					
<i>Abies</i>	<i>grandis</i>	Grand fir	West Cascades, Washington	1969	26.1
<i>Abies</i>	<i>procera</i>	Noble fir	Randle, Washington	1966	19.3
× <i>Cupresso</i>	<i>cyparissylelandii</i>	Leyland cypress	Haggerston No. 2	1967	20.3
<i>Cupressus</i>	<i>macrocarpa</i>	Monterey cypress	Ballintombay, Rathdrum	1967	26.3
<i>Picea</i>	<i>sitchensis</i>	Sitka spruce	Alberni, V. Is.	1966	21.8
<i>Pinus</i>	<i>contorta</i> var <i>contorta</i>	Beach pine	Long Beach, Washington	1966	17.9
<i>Sequoia</i>	<i>sempervirens</i>	Coastal redwood	California	1972	17.0
<i>Thuja</i>	<i>plicata</i>	Western red cedar	Masset, Q.C. Is.	1967	20.0
<i>Tsuga</i>	<i>heterophylla</i>	Western hemlock	Avondale Forest	1966	20.6

Table 1 (*continued*)

Genus	Species	Common name	Provenance	Planting year	Productivity (m³ ha⁻¹)
Eastern North America					
<i>Pinus strobus</i>		Eastern white pine	State of Michigan	1969	14.5
<i>Quercus rubra</i>		Northern red oak	Campine, Near Antwerp	1966	5.7
South America					
<i>Nothofagus obliqua</i>		Roble beech	B.F.C., England & Wales	1977	7.4
<i>Nothofagus procera</i>		Rauli beech	Malleco, Chile	1977	14.7
Australia and New Zealand					
<i>Acacia dealbata</i>		Silver wattle	Judds Ck, Tas.	1984	18.3
<i>Eucalyptus nitens</i>		Shining gum	Anembo S.F., N.S.W.	1982	31.0
Asia					
<i>Cryptomeria japonica</i>		Japanese cedar	(Eichenberg)	1972	18.7
<i>Fagus orientalis</i>		Oriental beech	North Caucasus	1967	10.6
<i>Larix kaempferi</i>		Japanese larch	Nagano, Japan	1967	13.2
<i>Picea likiangensis</i>		Likiang spruce	Avondale Forest	1967	12.9
Europe					
<i>Abies alba</i>		European silver fir	South Europe	1967	20.4
<i>Alnus cordata</i>		Italian alder	Salerno, Italy	1967	16.4
<i>Larix marschlinsii</i>		Hybrid larch	State Seed Orchard, Denmark	1971	18.0
<i>Picea abies</i>		Norway spruce	Paneveglio, Italy	1967	16.9
<i>Pinus peuce</i>		Macedonian pine	Avondale Forest	1967	18.6

Slievecoiltilia

The summit of Slievecoiltilia covers 66 ha. The 8 ha forestry plantation covers the south east slopes of the mountain. Planted in 1961, it had been part of New Ross Forest. There is a demonstration of native woodland here. This is balanced by similar planting to the north west. Native woodland species have been planted to the north, while the natural hilltop vegetation is being left undisturbed. There is a road to the summit and a viewing point. On most days there are panoramic views over parts of six nearby counties, from Galtymore Mountain (920 m) 80 km to the west in Tipperary, to Croaghanmoira Mountain (665 m) 74 km to the north east in Wicklow.

Management

Planning meetings were held at regular intervals from 1964, either in Dublin or on site. After the Arboretum opened on 29th May 1968, the committee was restructured.

Meetings were attended by four or five representatives of the Forest Service, (headed by the Chief Inspector, in the seventies and Asst. Chief Inspector or Senior Inspector, in the 80s) and two representatives of the Dept. of Agriculture (Senior Inspector and Director, National Botanic Gardens). An advisory committee comprised mainly of university professors, was invited from time to time, to present their views on Arboretum development.

The last committee meeting was held in May 1987. The Arboretum remained within the Forest Service until 1989, when it was handed over to Coillte Teoranta for four years, before joining The Office of Public Works in 1993 under Historic Properties. Following the years with Dúchas, from 1997 until 2003, it returned to the OPW and has remained there until the present (2013).

Description of current situation in JFK arboretum

Demonstration

- Signage – The current range of arboretum signage includes public road, main gate, parking and buildings signs as well as title signs for each prominent collection along the internal road and Long Vista. It includes five maps at intervals around the circuit and two maps on Slievecoiltia. The use of more detailed signs is being considered.
- Labelling – This is a continuous process as labels are lost or stolen over time. The traditional engraved black plastic tag is being supplemented by an efficient portable system of black plastic tape affixed to a rigid plastic tag. There is an engraved black plastic label on the north and south sides of each forest plot.
- Operations – Techniques in cultivation and maintenance will continue to be demonstrated, e.g. mound planting in damp areas, best-practice pruning of specimens and the presentation of collections.

Education

- Trails – There are three self-guided trails and a self-guided nature trail, which is specifically aimed at school groups. A map and a guidebook are also provided.
- Guided tours – These are available on request for groups during the summer season, although the public is advised to make reservations in advance during the busy peak periods. Occasional open days are held in conjunction with National Tree Week, Heritage Week and National Tree Day. In addition to the usual guided walks or tree planting, there are often special displays.

Research

The whole arboretum may be considered a species trial. In the early years, height, diameter (single stemmed trees only) and crown spread of each specimen was measured every five years until the end of 1989. The growth of all trees in the forest plots was also recorded at five-year intervals until 1995. These are updated as plots are thinned. The figures include the heights of trees, and the volume of timber removed from each plot and that remaining in the plot.

The performance of a wide range of trees and shrubs will continue to be recorded as required and the adverse effects of climate, diseases or insects on them will be recorded, as will the results of subsequent remedial action. Plant records of a number of estates and gardens are held, including the lists for the collections of H.M. Fitzpatrick (1931 and 1932) and A.F. Mitchell and A.M.S. Hanan (1966 and 1968).

An international phenological garden is situated near the main buildings as part of a scheme to study the effect of climate on plants. This is one of five such gardens in Ireland and is part of a network of 89 across Europe. During the appropriate part of the season, daily observations are made of the first leaves, flowers, fruits, leaf colouring and leaf-fall. The results are sent to the Irish National Meteorological Service, the co-ordinating body for Ireland, which are in turn forwarded to the University of Berlin.

To the south west of the plant collection is a provenance display of major forest tree species on 8 ha, which demonstrates the extent of genetic variation within the natural distribution of each species. There are 80 provenances of Sitka spruce covering its entire range, from Alaska to California. Records have been kept of growth periods and morphology of open grown trees compared with those in plantations.

An elm adaptability test, part of an EU project on Dutch elm disease, is adjacent to the provenance display. Records were kept of height growth, and observations made of tree form, leaf colouring and incidence of disease. Many of these plots have succumbed to the disease at this stage.

Conducting studies of mutual interest with other organisations will continue. Examples in recent years include the supply of yew (*Taxus baccata* L.) cuttings to the Dept. of Pharmacology, TCD, for Taxol extraction; the supply of southern beech (*Nothofagus* spp.) cuttings to the New Zealand Forest Research Institute in a study of insect damage; and due to climate change the increased interest of the International Phenological Gardens group in information on the timing of key plant developmental stages. There also has been wide interest by COFORD, UCD Forestry and Coillte Research in the performance of the forest plots.

There is a meteorological station, where daily readings are made of air, ground and soil temperatures, rainfall, evaporation, sun duration and wind direction and run (in km). Returns are made to Met Eireann each month. A series of anemometers at selected locations around the arboretum has measured the build-up of shelter over the years. The coldest air temperature recorded, -8.4°C on 2nd January 1979, damaged quite a few specimens including some *Eucalyptus*, *Acacia*, *Hebe* and other spp.

Conservation

Endangered species and cultivars will continue to be included in the plant collections. Propagation material has been provided to outside bodies where plant species were unavailable elsewhere. Plant material will continue to be provided to other institutions wishing to establish arboreta.

Wildlife conservation

The Arboretum is a haven for wildlife. In the early years, 82 bird species were observed and a Baseline Survey of Birds was carried out in 1994/95. Current figures for abundance are 65 bird, 17 mammal and 20 butterfly species. The red squirrel (*Sciurus vulgaris* L.) is doing well and any invading grey squirrels (*Sciurus carolinensis* Gmelin; which first appeared in 2006) are being trapped. A programme of wildlife conservation has been drawn up by a staff member with the appropriate training.

Recreation

As well as providing a place to enjoy leisure in beautiful surroundings, young families are well catered for. There is a play area for different age groups, a maze and picnic site beside the tearoom and shop (Figure 4). A miniature railway runs during afternoons in summer in the south-western corner of the arboretum and there is a nature trail, aimed at school groups. The lake (Figure 5), with its rudd (*Scardinius erythrophthalmus*), mallard duck (*Anas platyrhynchos*) and water hens (*Gallinula chloropus*), is the most popular area.

In recent years, there have been special events including orienteering, inter-schools running, scouting activities, displays by woodworkers, craftspeople, pipe bands and family orientated eco-trail.



Figure 4: The picnic area, interspersed with different hedges and tables, leads to the tearoom. Older woodland forms a sheltering backdrop.



Figure 5: The lake is located in a corner at the JFK Arboretum, bordered by lawn and waterside plants, with shelter belts and mature Scots pine in the background.

Visitor centre

The visitor centre at 85 m elevation was built on the site of Ballysop House. The buildings are long and low, designed to blend into the landscape and they won an An Taisce award in 1970. There is a reception hall with displays, a lecture hall with the audio-visual show, toilet block and offices. Western red cedar was used externally and was left untreated to weather naturally, but some of it has decayed so it has been replaced by Iroko (*Milicia excels* (Welw.) C. Berg). Parana pine (*Araucaria angustifolia* (Bertol.) Kuntze) was used for the ceilings. The walls were of sandstone block and paving of limestone flag, both from Liscannor in Co. Clare. The roof was a copper faced membrane, which turns green with age.

The focal point is the memorial fountain, a single block of Wicklow granite with the words of President Kennedy: “ask not what your country can do for you...ask what you can do for your country”.

Other structures

These include four shelters, one with a toilet block, at intervals around the Arboretum road, constructed of the same materials as the visitor centre. There is a tearoom and shop a short distance from the car park, built of western red cedar and with a felt roof. Across the main road is the service centre which contains the staff canteen, toilets and showers.

Sale of produce

In addition to the standard gate charges, other forms of income generation have been attempted. Revenue from these sources accounted for approximately 20% of total income in the past, but only timber sales and letting of grazing continue today.

- Timber – This is produced from thinnings of forest plots, shelter belts and woodlands, and from trees blown down in storms. It is sold mainly as firewood, with some sold as poles. There will be a greater proportion of sawlog timber as trees grow in size.
- Christmas trees – Areas which must be kept free of tall plants, e.g. near the Meteorological Station, seemed ideal for growing Christmas trees. However, the scale was too small for it to be viable.
- Shrubs – The sale of shrubs was attempted on a small scale, but was unsuccessful. To be a viable operation, more staff would be required to manage it and as a much larger operation.
- Foliage – There is a small but steady demand for foliage, from florists.
- Mulch – This is made from branches which are too light for timber. Mulch was sold in the past, but currently all of it is used in the maintenance of the arboretum.
- Grazing – Letting of sheep-grazing is done in the Extension Area.

The arboretum is open throughout the year, except Christmas Day and Good Friday. Its appearance changes with the seasons, making it attractive for visitors year round. About 90,000 visitors come each year. In early summer, a blaze of scarlet flowers of the Chilean fire bush (*Embothrium coccineum* Forst. and Forst. f.) against dark woodland, golden ash (*Fraxinus excelsior* L. “*Jaspidea*”) gleaming behind a shelter belt; and weeping purple beech (*Fagus sylvatica* L. “*Purpurea Pendula*”), contrasting with the upright and golden forms, can be seen from the arboretum road.

Later in the year the autumn colour is spectacular – the red of Japanese maples (*Acer palmatum* Thunb.) seen against mature woodland; the scarlet of the Sargent’s Mountain Ash (*Sorbus sargentiana* Koehne), with the blue-leaved Sitka spruce behind and even the shelter belts themselves with red oak (*Quercus rubra* L.) and Japanese larch (*Larix kaempferi* (Lamb.) Carr.), contrasting wildly with grand fir (*Abies grandis* (Dougl. ex D. Don) Lindl.) and Lawson cypress (*Chamaecyparis lawsoniana* (A. Murr.) Parl.).

As one of the gardens in State care, it will continue to mature and serve the role for which it was established.

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