

**UNIVERSITY OF BRITISH COLUMBIA BOTANICAL GARDEN  
PLANT INTRODUCTION SCHEME**

A. BRUCE MacDONALD

Botanical Garden  
University of British Columbia  
Vancouver, B.C. Canada

(See Western Region, page 121)

**THE COMMERCIAL EXPLOITATION OF NATIONAL PLANT  
COLLECTIONS**

A.D. SCHILLING

*The Royal Botanic Gardens, Kew, Wakehurst Place,  
Ardingly, Haywards Heath, West Sussex, RH17 6TN*

In order that I may relate my subject matter to a personal level of experience I have restricted this paper to the national plant collections I know best — namely those of The Royal Botanic Gardens of Kew and Wakehurst Place.

It would be tempting also to give wide attention to the many other national collections which our islands hold, such as the many National Trust properties, the Royal Botanic Garden, Edinburgh, plus its three annex gardens and the various arboreta managed by the Forestry Commission (Westonbirt, Bedgebury, etc.)

The mother station, Kew Gardens, by the banks of the Thames at Richmond near London is world renowned, covers 300 acres and has a long and fascinating history. Much of that history is related directly to the subject of commercial exploitation of plants.

Kew's annex garden (Wakehurst Place, Ardingly, Sussex) is almost 500 acres in extent, and within its 14 mile boundary it nurses a very rich and varied collection of temperate plants with accent on species from Asia and the southern hemisphere. It also includes a 125 acre botanical reserve for the conservation of the flora of the Weald, and a well-established Seed Bank.

To the uninitiated visitor, Kew is seen as a glorified public park but it is, of course, first and foremost a national botanical research institution with many different responsibilities. These include the studies of taxonomy, cytology, physiology, palynology, and biochemistry. The Herbarium and Library hold the largest collections of their kind in the world, and the Museum Division curates, represents, and exhibits the immense wealth that economic botany offers for the use of mankind.

Historically, Kew has much to be proud of and has been directly involved in many projects which over the years have afforded long-term benefits to commerce both at home and overseas.

Economic botany and agriculture have worked together via Kew's long-standing quarantine service, and growers of cocoa, coffee, cotton, rubber, bananas and sugar have benefited in consequence. The rubber plant (*Hevea brasiliensis*) was originally introduced to Asia from Brazil via Kew glasshouses and has since revolutionized the economies of both Sri Lanka and Malaysia in particular.

Earlier still, in 1789, a Kew botanist, David Nelson, was sent in quest of the breadfruit, *Artocarpus altilis*, from Tahiti, but en route he had the misfortune to be cast adrift with Captain Bligh and died soon after he reached landfall in Java. A few years later two other Kew men, Christopher Smith and James Wiles, successfully obtained the breadfruit and introduced it to St. Vincent.

Kew and the world of economic medicine are also inseparable mainly because of a plant named *Cinchona*. The various species of this South American genus were introduced to India via Kew thanks to the bravery and persistence of Cross, Markham, Spruce and others who risked life and limb to despatch seed and seedlings from the slopes of the Andes to the quarantine houses at Kew. A few years later a life-saving dose of quinine was being sold throughout India for the equivalent of "half a farthing". Today, a branch of *Cinchona* is incorporated in the Armorial Bearings of The Kew Guild in order to signify the Garden's important links with economic botany.

These few random examples of past endeavours serve to illustrate what economic results have stemmed from the various activities of Kew, but what about the endeavours of the present and future?

The Seed Bank, based at Wakehurst Place, is a section of Kew's Jodrell Laboratory. It stores millions of seeds of wild plants from all over the world in refrigerated containers. Many of these seeds are potential crops for the Third World and scientists from many countries may draw on the bank for

research into such topics as forage production, chemical extracts, cancer control, etc. Its commercial potential is therefore enormous.

Extracts from the seeds of a legume (*Dolichos biflorus*) is invaluable for swift blood grouping. When mixed with blood samples this extract ignores more common groups and reacts within seconds to red blood cells of Group A1. In consequence, the National Blood Transfusion have been rapid in making use of this technique.

The tropical mucuna bean (*Mucuna* spp.) holds a high concentration of the drug known as L-Dopa, which is used for the treatment of Parkinson's disease. All the various herbarium holdings of this plant have been screened in order to gain an extensive knowledge of the species' natural distribution. Seed has since been obtained from each known area in order for the various L-Dopa concentrations to be compared from each population. *Mucuna* is now being commercially grown in Paraguay and elsewhere.

Biochemical research at Kew is also being pursued in the field of natural insecticides. Because of escalating production costs, and for various safety reasons, synthetically based insecticides are currently falling from favour and what has already been done by the use of extracts from *Pyrethrum* is now being attempted by researching into the use of other plant by-products. Recent results indicate that certain isolated plant chemicals deter such important pests as locusts and beetles.

One of the most recent, important and far reaching projects taken up by Kew is the one known as SEPASAT (The Survey of Economic Plants of the Arid and Semi-arid Tropics). This is backed by funds from OXFAM and is designed to identify plants which will be economically valuable for culture in desert and semi-desert regions, regions which amount to almost half the land surface area of the world.

The Herbarium and the Economic Botany section of the Museums are being screened for plants which could be useful for food, fuel, forage, resins etc., and over the last 18 months 3,500 plants have been listed for their potential value.

From the point of view of this paper the commercial horticultural exploitation of Kew's collections is normally directed towards what is now termed, "The Living Collections Division."

This division of Kew Gardens is the Kew which the public knows best. Its collections hold over 120,000 accessions representing almost 50,000 different types of plants encompassing 352 families and 5,465 genera. Collectively these make up a living reference collection for scientific research, for pleasur-

able visual enjoyment, for educational purposes, and for the commercial horticulturist to visit for plants of new, forgotten, or unusual potential.

Everyday the L.C.D. despatches living plant material to the four corners of the world in support of plant breeding programmes and for many other reasons besides. The collections hold increasing stocks of wild collected authenticated species (over 6,300 accessions in 1982) and regularly propagates and distributes rare and endangered plants. These are raised conventionally, or by way of tissue culture in the Micropropagation section.

Bulking-up limited stocks of rare or endangered plants is now a routine operation for it has been proved that the best way to keep a plant securely in cultivation is to propagate it and then distribute it as widely as possible.

One current project of particular interest is the part Kew is being asked to play in the compiling of a computerized genetical stock list of *Malus* species. This project, which is based in this country at East Malling Research Station, is a complex and international one. It is backed by a division of the United Nations Food and Agriculture Organization (FAO) in Rome, namely the International Board for Plant Genetic Resources (IBPGR), as well as by the fruit section of the European Association for Research in Plant Breeding (EUCARPIA). From this project it has been realised that Kew's collections hold at least 34 different *Malus* species which are of significant scientific interest to the project.

Wherever possible Kew attempts to represent a species from as wide a range as possible, even to the extent of sometimes deliberately growing what one might consider to be an inferior or poor form in order to exhibit the range of variation.

In contrast, a commercial nurseryman usually restricts his stock to plants of a high and immediate amenity value. He selects his plants deliberately with an eye for certain visually appealing qualities such as a dwarf habit, the colour of foliage, the long flowering period or winter hardiness. In other words, he clonally selects and generally narrows down the genetic variation of his material, seeking uniformity and consistency of stock. Obviously there are exceptions to these rules such as the mass production of plants from seed (*Betula pendula*, *Berberis wilsoniae*, etc.).

From these two generally opposite philosophies it is at first difficult to understand how botanic gardens and commercial nurserymen can have any common ground upon which to communicate, but of course they do.

Botanical gardens usually cultivate a plant for at least one of the following three reasons:

- 1) its scientific and research value or potential
- 2) its educational value
- 3) its amenity or aesthetical value

The common denominator which links botanical gardens to commercial horticulture obviously comes under the third of these headings, namely amenity.

Plants of potential commercial interest could be a species, a sub-species, a variety or form, a clone of a natural or deliberate hybrid, a mutation or a sport. Whatever it is, if it is attractive and qualifies for that somewhat meaningless but all important title, "a choice plant", then it appeals to the eye, the aesthetic senses and, most pertinent of all, the financial instincts of the nurseryman.

It could seem to the commercial world of horticulture that holders of national collections such as Kew could do more than they do to guide and assist those who are willing and interested to exploit a new or little grown plant.

On the other hand, it could perhaps be just as readily argued that the commercial grower could do a lot more to help himself by using our living reference collections more readily. After all, if one requires knowledge from a book one visits a good library. The fundamental difference is, of course, that one can generally only borrow a book, whereas with an interesting plant one usually wishes to possess and keep it and, of course, by pursuing the official channels, one invariably can. Last year alone, Kew distributed over 5000 surplus natural-source seedlings to other arboreta and specialist collections, and outgoings of material for all purposes have recently doubled.

Commerce commonly sells the public the idea that a new car model is something to be desired, so why doesn't the nursery trade sell similar but far more worthy ideas to the gardening public? All too often the easy line is taken, of restricting one's stock to the popular plants which the public already knows and demands, and they probably only demand them because they are unaware of the alternatives.

× *Cupressocyparis leylandii* is currently produced by the million for screening off one Englishman's castle from the one next door. Now it looks as if suburbia is about to be smothered by a sub-topian carpet of the two golden Leyland cypress clones, 'Robinson's Gold' and 'Castlewellan'.

What is wrong with selected forms of × *Cupressocyparis notabilis*, *Chamaecyparis lawsoniana*, *C. nootkatensis*, *Thuja*

*plicata*, *Tsuga heterophylla*, and our native yew, *Taxus baccata*? None of these are particularly slow-growing in spite of what is stated to the contrary. What price speed? All the leisure time one is supposed to have as a result of labour-saving devices in homes and gardens doesn't really give the individual all that more real spare time for doing other things. Does it really matter if a newly planted hedge takes a couple of extra years to fill out? We live in an age of quick foods, cash and carry service, instant take-away meals and built-in obsolescence in much of the machinery we purchase. Must we really add instant gardening to the list? Gardeners are by tradition a patient breed of people, so why do they need to be subjected to the near-frantic pressure for "the immediate"? Surely the desire to grow something different is a far more noble goal to aim for. I would welcome the birth of a late 20th century equivalent of the 19th century game which the arboretum owner played by way of his harmless "one-upmanship" gardening philosophy. The mature glories of these games now give an enormous amount of pleasure to the gardeners of today — Westonbirt Arboretum, Borde Hill, Hergest Croft, Dawyck, Benmore, Bicton — the list is almost endless. Why not a new version of the old, already proven, game but for the majority instead, and with higher returns for those who produce the articles necessary for it to be played?

The small garden owner can be encouraged to be "a plant ahead" of his neighbour (some already do play this game) and nurserymen can fuel this fashion by tempting the players with new and interesting plants as necessary. Why not a "Plant of the Week" in the local Garden Centre instead of the "Car of the Week" in the garage showroom down the road?

Forgotten plants are coming back into fashion and new plants are coming to light all the time. Two notable recent introductions are *Diascia rigescens* and *Phygelius aequalis* (yellow form), both coming from South Africa but hardy enough for our milder counties at least.

The Royal Horticultural Society rare plants sales area at Wisley is doing brisk business by selling material which is generally difficult to come by elsewhere, and other specialist nurseries are giving a similar service to the more discerning gardener.

I know of at least one well-established and respected nurseryman who not only sells unusual plants, but actually organises his own expeditions in order to add to his stock. Taking things a step further, it could be suggested that those who do decide to grow wild collected material from legitimate sources might well pay more detailed attention to collecting records. A

plant collection's number is not a sign of ego or a quaint snob factor, it is a means of precisely identifying a given collection. If it is lost from a plant it can seldom be relocated. Careful attention to names is also important. I have known of several amusing mistakes being made through lack of care, the best perhaps being when the Award of Merit form of *Rhododendron arboreum*, known as 'Rubaiyat', was written as 'Rubber Mat'.

Although I am critical of those who hold extremely limited stock, the case against overspecialisation must not be left unmentioned. I know of one very knowledgeable grower who specialises in just one or two tall growing woody genera and then complains long and hard that there is not a market for his plants. I have even known those who complain that botanic gardens don't buy their plants, seemingly oblivious to the fact that such institutions have little justification to oblige as they are a part of an international seed exchange system. They have many other scientific-based sources of supply besides. Exceptions are invariably associated with a desire to obtain a cultivar or, less likely, a species which is for political reasons currently unavailable through foreign negotiations. Obviously it is not possible for all and sundry to join the specialist market, for the demand simply isn't big enough. Not yet that is; given time and the opportunity to realise that there is more to gardening life than *Hypericum* 'Hidcote', *Rhododendron* 'Pink Pearl' and *Rosa* 'Super Star', the buyers of plants will, little by little, become more discerning and demanding in their tastes. The nursery trade should, therefore, think about the idea of carefully adding new plants to their stocks and, if the balance and sales technique is right, surely the extra returns will be forthcoming.

First and foremost, the commercial nurseryman's enterprise must be profitable in order to thrive and survive. If the profit margins turn out to be good enough, then why not diversify, and do the profession even more good?

National collections are institutions to be referred to and, within reason, to offer assistance and advice. Unfortunately, they rarely have enough time or resources to send out staff to act as travelling salesmen, except on special occasions when invited to address specialist bodies such as the I.P.P.S.

#### SUMMARY OF DISCUSSION

There is no equivalent to the U.B.C. discussion groups in Britain. The Royal Horticultural Society gives the Award of Garden Merit to deserving plants, and the National Council for the Conservation of Plants and Gardens is making national

collections of 60 genera around the country. Lists of these collections may be obtained from Donald Duncan at Wisley. The response to the Long Ashton Clonal Selection Scheme has been disappointing, as this is designed to select the best clones for commercial adoption.

There were conflicting views over the scope for further collecting of plants from the wild. Some held the view that there was still enormous potential in reselecting plants from the wild for specific characteristics such as hardiness or use in plant breeding. Many sources had not been fully exploited, even North America. The other view was that new plants would have to be genetically manufactured, as there was not much new material left in the wild.

On the whole botanists did not have any interest in the nursery stock industry, and nurserymen should seek out plants in Botanic Gardens. It was felt that positive action was needed to bring together all parties interested in the collection and dissemination of new plants.

## **LEAF SPOT DISEASES OF COMMERCIAL ORNAMENTAL PLANTS — THEIR RECOGNITION AND CONTROL**

DON GILBERT

*Agricultural Development and Advisory Service  
Ministry of Agriculture, Fisheries and Food  
Brooklands Avenue, Cambridge*

The taxonomy of fungi is a difficult topic. In the fungi there are some 47,000 known species. Imperfect fungi, with no known sexual stage, account for 15,000 species and many of these are capable of producing leaf spots.

While we might agree that disorders such as Black Spot of roses (*Diplocarpon rosae*), Leaf Blotch of chestnut (*Guignardia aesculi*), and Leaf Spot of willow (*Marssonina* spp.) should be easily recognised by horticulturists, I feel that this generalisation is incorrect and misleading. Advisory experience has taught me that the services of a mycologist is required to obtain a correct identification of leaf spot disorders.

Leaf spot of willow, for example, may be caused not only by *Marssonina* spp. but also by *Ascochyta*, *Cercospora*, *Cylindrosporium*, *Phyllosticta*, *Ramularia*, *Septoria*, and other fungi. There are more than 100 species of *Cercospora*. Regular control measures should not be considered until identification of the disorder is certain.