The Role of Native Plant Collections - A Blue Print for the Future

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Historical background

It was soon after Cook's first voyage with Banks and Solander in 1769 that the first New Zealand plants found their way back to Europe and into botanical collections at Kew Gardens. *Phormium tenax* and *Clianthus puniceus* found their way into collections and were two of the first plants illustrated in Curtis' Botanical magazine.

In New Zealand the first major native plant collection was established in the Christchurch Botanic Gardens. In 1867, soon after the gardens were established, John Armstrong was appointed as the second Government Gardener and during his 22-year tenure was assisted by his son Joseph (Christchurch BG management plan). By 1875 they had established a native section of the Garden. According to Leonard Cockayne (Cockayne 1911), the Armstrong's recognised the value of the plants for horticultural purposes, and used their collection as a living museum of plant material which students could consult. It is interesting to speculate what influence this collection would have on Cockayne when he proposed the development of a national collection of native plants at Otari 10 years later. Armstrong published many scientific papers based on his work with the collection. The collection grew to 500 species including the largest collection of New Zealand Veronica species.

At the same time, native plant collections were being developed in other New Zealand botanic gardens. In Dunedin, the Gardener Alexander Begg reported in 1865 that *"I have now distributed upwards of thirty collections of native seeds, each containing upwards of seventy different varieties , to nearly all parts of the world, for which I am now receiving ample returns"*

In the Wellington Botanic Garden there was also much interest in establishing collections of NZ plants. The Botanic Garden Board supported collectors such as Henry Travers, John Buchanan and Thomas Kirk in their plant collecting trips and by 1877, there were 63 introduced native species. The Garden like others in New Zealand also sent native plants overseas and in 1882 -3 collections of plants and seeds were sent to Botanic Gardens at Kew, Jamaica, Hobart, Washington, and Melbourne.

Private collectors were also establishing plant collections including William Alexander Thomson of Halfway Bush, Dunedin. Over a period of 40 years in the early 20th century he established a major plant collection at FernTree House containing over 1200 species, most collected by himself.

Native plant material was sent overseas in large quantities during the nineteenth century. Charles Nelson (1989) described the major role NZ plants have played in the horticultural development of English and Irish gardens. Few NZ species were introduced into European gardens before 1840. In 1839 77 lots of New Zealand seed were given to Kew and other lots with 90 and 56 species came in 1841. The Irish Nursery of Rodger, McLelland and Co offered seventeen NZ species and cultivars for sale in 1879. Many commercially available cultivars at this time had French names suggesting they were raised there.

In the United States, too the flow of plants was two way. During the nineteenth century many America species were imported into New Zealand for economic purposes. Importation of NZ plants into North America began in 1860 with pohutukawa, now one of San Francisco's most popular street trees. In 1915 the Panama Pacific International Exposition took place in San Francisco. New Zealand mounted a major display as part of this, which included a large selection of New Zealand native plants. Following the Exhibition, the NZ Government gifted 150 plants to Golden Gate Park. These became the basis for a NZ collection in the Strybing Arboretum, one of the most important offshore NZ plant collections. In 1936 the Strybing inventory listed 289 NZ woody taxa in 89 genera.

An historical summary would not be complete without some mention of Dr Leonard Cockayne. Dr Cockayne recognised the importance of plant collections as a resource for researchers in systematic botany as well as their role in encouraging the use of native plants in horticulture. He established his own experimental garden at his house in Sumner , Christchurch. Later, after his move to Wellington it was Cockayne, along with JG McKenzie, Director of Parks and Reserves who established a major national resource at Otari in 1926.

Otari Open Air Native Plant Museum:

Otari was a large reserve partly covered in native forest in the Wellington suburb of Wilton. Cockayne saw its potential as a national botanic garden. Along with JG McKenzie, Director of Parks for Wellington he commenced development in 1926. Cockayne's vision for Otari was published in 1932 (Cockayne1932). Cockayne directed the philosophy and development of Otari and laid down four major objectives for the reserve:

1. **The flora.** A collection shall be made of all the New Zealand species possible to cultivate in the Museum. The species will be arranged as far as possible according to their families.
2. **The Vegetation.** Examples shall be artificially produced of various types of the primitive vegetation of New Zealand, for instance kauri forest, southern beech forest.
3. **Restoration of the forest.** The forest of the Museum shall be brought back as far as possible to its original form....
4. **Horticulture.** The use of indigenous plants for horticultural purposes shall be illustrated in various ways....

Otari became New Zealand's foremost plant collection and the only botanic garden devoted exclusively to native plants. Over the past 70 years of development, Otari has developed a world class reputation and built up a major collection of native plants. Today it contains about 1200 species and cultivars, represented by about 4000 accessions. Major influences on the development of Otari and its plant collections include Walter Brockie who came from the Christchurch Botanic Garden in 1948. He established the rock garden and travelled throughout New Zealand and its off shore islands in the 1950's collecting plants. Raymond Mole became Curator in 1963, and he developed the horticultural role of Otari and selected many plants with horticultural potential. During his time the Wahine storm opened up areas of forest which he developed into the present day Fernery, Wild Garden and Dracophyllum Garden.

More recently a major redevelopment of Otari and its collections fronting Wilton Road has seen the establishment of a major alpine garden planted in ecological associations complete with mountain tarn and boglands. This development, developed under the guidance of assistant curator Anita Benbrook reflects the modern day focus of botanic gardens on natural habitats and associations of plants.

Survey of Native Plant Collections

In 1999, the author undertook a survey of New Zealand plants being grown in major public and private gardens, both in New Zealand and overseas. This first survey was based on the authors' personal knowledge of native plant collections, and historical records showing which overseas gardens had received major shipments of plants and/or seed in the past. Sixteen New Zealand and thirteen overseas collections were sent survey forms. Those gardens written to are detailed in appendix 1. The questions were:

A Survey Of New Zealand Native Plant Collections

1) *Please list your major collections of New Zealand plants and give the following details:*
   - i) *Size and composition of each collection. For in stance: Hebe collection comprising 45 species and 92 cultivars.*
   - ii) *Objectives of the collection. Is it for educational, conservation, and /or research purposes?. Please describe in detail.*
   - iii) *Does each collection have a formal policy? If so could you please include a copy here?*
   - iv) *How do you collect plant material for the collection?*
   - v) *Do you keep records of the collection? Are these kept manually or electronically?*
2) *How long have you been collecting New Zealand plants? Do you see this collection as increasing in size and importance in the future?*
3) *Are your New Zealand collections under any type of threat?, for instance lack of funding, lack of skills to look after them , property being sold and so on.*
4) *Please provide any other information about your collections that may be of interest.*

Survey forms were returned to the author by 31st July 1999. Only one garden did not reply to the survey. In addition, another 9 collections were identified by recipients of the survey. These are listed in table 2 but have not yet been contacted for information at the time of writing this paper.

Main results of the survey

There are a wide range of native plants in cultivation. Whilst an assessment was not carried out of the total number of NZ species in cultivation a wide range of plant material is being grown including many uncommon and threatened species. Many collections have multiple accessions of some species, increasing the value of these collections for research and/or conservation purposes.

Collections within New Zealand understandably had the most comprehensive collections of naturally occurring taxa. Conversely many overseas collection had very comprehensive collections of cultivars. This perhaps reflects the major focus in the UK in particular, on cultivated plants and the development of garden forms. It also reflects the increased awareness of the need to conserve historic cultivars. Several of the UK collections were national collections managed under the auspices of the National Council for the Conservation of Plants and Gardens (NCCPG). It is of concern in New Zealand that no collections surveyed mentioned they were specifically collecting and/or conserving cultivars.

Important collections in private hands

This survey reinforced the pattern in other surveys both here and overseas: many major collections are in

private hands. These are developed over many years by enthusiasts who build up a detailed knowledge of the plants they grow. However, the collections are vulnerable to loss or dispersement once the person passes away. The case of Tony Druce's collection that is now held by Percy's Reserve in Lower Hutt is a welcome exception to the rule with all of the collection remaining intact and professionally managed.

Integrity and objectives of collections

The vast majority of collections had comprehensive records and many were recorded on electronic database. Five of those surveyed submitted a listing of all extant taxa in their collections. Most also grew plants from wild sourced material.

Few gardens had specific and clear objectives for their collections and mentioned general educational and conservation goals without really defining what they meant or how they were going to be achieved. Some, however, like Christchurch Botanic Gardens had very clear, specific objectives. For instance the objective of the Rock Garden collection is to:

"Grow a wide range of New Zealand alpine, subalpine and montane plants, including those that are rare and endangered, with an emphasis on plants of the Canterbury Region"

Few described in detail how their collections contributed to conservation or research programmes. Edinburgh Botanic Garden was the only one that identified their collection of NZ Apiaceae were part of a research programme on the taxonomy of this family.

Few collections mentioned they had an ethnobotanical or economic focus and only Pukeiti mentioned they were working with local iwi. There would seem to be some major opportunities here that are not being exploited.

Co-ordination between collections

Collections in the UK are co-ordinated through the NCCPG collection scheme, which sets minimum standards for collections. In New Zealand there was no obvious co-ordination between collectors although many did mention they worked with each other and donated plants and seed to other gardens. Some gardens, such as Christchurch were focussing on regional collections, whilst several Wellington collections participated in a regional plant conservation network in association with the Department of Conservation. A similar scheme operated in Auckland.

A future role for plant collections: an integrated network.

There are advantages in developing greater integration and co-operation between the major native plant collections both here and overseas. This would enable us to broaden the genetic diversity of our plant collections and share responsibility for conservation amongst gardens. It would also enable greater clarity regarding the continued export of plant material at the time of the Convention on Biological Diversity.

Benefits

- Conserve as wide a range as possible of our native germplasm amongst gardens and avoid overlaps. In particular heirloom collections of cultivars that are becoming lost to cultivation
- Provide official collections for use in selection, breeding, evaluation and introduction and taxonomic study. This will, in some cases take pressure off wild populations with the increase in unauthorised collecting.
- Give gardens a much more focussed approach to developing their collections and the ability to concentrate on collecting specific genera and or species
- These collections will serve as reference centres for plant identification, cultivar registration, nomenclature and plant exploration.

How do we do it?

So where do we start and how do we carry out the work needed to make such a system work? Such collection schemes have been tried before and failed. The key is

- to keep such networks simple and have them regionally based at first provided
- Develop national standards and policies. Such policies should be based on those currently operative in many botanic gardens and international conventions such as the Convention on Biological Diversity.
- Develop national collections for specific species and cultivars, particularly those that are not currently represented in collections. This will involve a further survey to identify the gaps.
- Work with iwi to identify issues and possible collections focussing on ethnobotanical/ cultural/ economic themes.

Such an initiative is compatible with current initiatives such as the Gardens Association and regional plant conservation networks. The RNZIH is an ideal organisation to pick up and run with such an initiative. The time is right.

Table 1: New Zealand Collections

Collection	Est.	Objectives	Major plant groups	Total number of taxa/ accessions	Records	Collection Policy	Threats
Landcare Research, Lincoln, Canterbury	1954	Research, large cultivar collection. Material changes from time to time depending on research being carried out.	Coprosma (54cvs), Corokia (14cvs), Pittosporum (46cvs), Hebe (119cvs), Phormium (61cvs)	Over 650 species	Yes, electronic	No written policy	Once research projects finished some plants are surplus to requirements. These are usually offered to other botanical institutions such as Christchurch Botanic Gardens.
Grounds Department, Victoria University of Wellington	1988	Landscape values, education primarily for students studying courses in biological sciences	Phormium (36cvs from Rene Orchiston collection) , divaricates (25spp.), Chatham Islands (12spp.), Cordyline (4spp, 9 selections).		Yes, electronic	No. NZ planting policy applies on campus	• University expansion taking grounds for new buildings. • Future focus and priorities for University
Auckland Regional Botanic Gardens	1975	• Conservation, particularly in threatened species recovery programme • Education • Amenity	Phormium, Leptospermum, Metrosideros, Lepidium, Hebe.	about 1200 accessions	Yes, electronic. Full species list provided	General collection policy. Plant Conservation Policy for ARBG.	None
Fernglen Native Plant Gardens, North Shore City	1950's	Education and conservation	Ferns and sub alpines. Outlying islands.	about 300 species	Yes	Management Plan. This has some broad policy statements	North Shore City have taken over the garden and ensured its survival and future development. Formerly the private home and collection of Muriel and William Fisher.
Massey University Grounds		• Education • Research • Amenity	Wide range of plants suited to the conditions. Large forest remnant.	Over 400 species and cvs.	Yes	No formal policy	

Collection	Est.	Objectives	Major plant groups	Total number of taxa/ accessions	Records	Collection Policy	Threats
Pukekura Park, New Plymouth		Education, Amenity	Ferns (110 spp.), Phormium (Orchiston)	Not given	Yes	Formal policy being developed	Lack of skills
Otari - Wilton's Bush, Wellington	1926	• Education • Conservation - species recovery programme with DOC. Wellington Plant Collections network. • amenity	Taxonomic collections, geographic collections, alpine and rock garden plants, threatened species,	over 3000 accessions	Yes, electronic. Full accessions list supplied	General collection policy. Individual policy for each collection.	Pressure on funds through annual plan funding.
Christchurch Botanic Gardens, Christchurch	1875	• Education • Conservation • Amenity	Cockayne Memorial Garden, Hebe (86spp, 65cvs.), Phormium (29cvs.), Pittosporum (14spp., 22 cvs), Sophora (5spp., 3cvs.), Leptospermum (2spp.,10cvs.), Lophomyrtus (2spp., 10cvs.), Olearia (24spp., 5cvs.). Ferns (50spp.). Theme areas include NZ Lake, NZ Bush, River margin and Dryland, rock Garden, alpine plants.	<650 spp & <250cvs	Yes	Yes. Specific policies for each theme area.	
Dunedin Botanic Garden, Dunedin	1865	Education and conservation	Alpine plants, Asteraceae, Hebe (95 spp.), Coprosma (37 spp.), Brachyglottis (23spp.).	3430 accessions. 967 spp and 256cvs.	Yes, electronic. Full species list provided.	Outlined in 1993 Management Plan.	Disease in some collections such as Olearia.
Oratia Native Plant Nursery, West Auckland	1975	Plant production, Conservation	Range varies depending on availability of material.	Over 650 spp. and cvs.	Yes	No	
Pukeiti Rhododendron Trust, Taranaki	1951	Amenity value (back drop to rhododendron collection). Conservation	Threatened species, Sub Antarctic	Not known at this stage	Yes	No	Lack of funding
Timaru Botanic Gardens, Timaru	1981	Educational, conservation	Association beds, Flax bed, grasses, South Canterbury collection, Fernery, endangered species.	About 650 accessions. 84 threatened species	Yes, electronic. Full species list provided		

Collection	Est.	Objectives	Major plant groups	Total number of taxa/ accessions	Records	Collection Policy	Threats
Percy's Reserve, Lower Hutt	1988	• Conservation - DOC Recovery programmes • Research - Material supplied to researchers • Education - Polytechnic course based here.	Accessions include Hebes (251), Coprosma (63), Olearia (71), Celmisia (103), Carex (111), Brachyglottis (50). Includes Tony Druce plant collection. Contains no cultivars.	2300 accessions	Yes, electronic	No. Performance criteria in Contract with the Hutt City Council.	New road alignment may reduce reserve area.
Arnold Dench, Newlands, Wellington	1966	Conservation and threatened species. Growing a wide variety of natives in a small section.	Lianes and trailing plants. Ferns, orchids, grasses, rushes, Hebes (80spp. 80cvs.). Celmisia (20spp.), Myosotis (20spp. 6 hybrids), Carex(36spp.), Uncinia (15spp.), Leptinella (19spp.).		Yes	No	Private collection in small suburban garden
Grant Bawden, Christchurch	1989	Show the range of alpine plants suitable for show purposes, both species and hybrids.	Aciphylla (12 spp.), Raoulia (19spp.), intergeneric hybrids.	<150 accessions	Yes. Full species list provided.	No	
Peter Nicol and Evan Hooper, Wairarapa	1988	Plant production and conservation		500 - 600spp.			
Joanne Orwin, Christchurch	1970	alpine plants		100+ spp.			
Graeme McArthur, Lothlorien Nursery, Canterbury		Greater use of natives especially those not well known. Threatened species.		250 spp.70 forms and cvs.		No. Plants will be passed to another charitable trust	
Talisman Nurseries Otaki	1973	Educational and conservation	Hebes 75 spp. Subalpines 150spp. Inc grasses, composites, herbs, low cushion shrub	>1200 spp. And cvs	Yes	No	

Table 2: Overseas New Zealand Plant Collections

Collection	Est.	Objectives	Major plant groups	Total number of taxa/ accessions	Records	Collection Policy	Threats
Royal Botanic Gardens Kew, England	1800	Research, horticultural display.	Hebe	292 accessions representing 146 taxa	Yes	No	
Edinburgh Botanic Garden, Scotland	100 + yrs	Research (Apiaceae), Education	Celmisia (30spp.), Aciphylla (15spp.), Raoulia (9spp. & hybrids	391 spp.	Yes	Yes	
University of Bristol BG, England	1980	Landscape values, education, research	Rock garden plants. Hebe (58 spp. 81cvs.), Cordyline (5spp.).	About 200 spp. and cvs.	Yes. Full species list provided.		
Strybing Arboretum, San Franscisco, USA	1915	Education focusing on ethnobotany. Plants in Californian Horticulture.		About 200 spp. and cvs.	Yes. Full species list provided.	No	Major new developments following devastating hurricane several years ago.
Royal Botanic Gardens, Sydney, Australia		Education, Research and Recreation	Range of plantings at the main Garden in Sydney, with more thematic plantings at Mount Tomah. Future plans for a Gondwana type collection at Mt Tomah.	925 accessions representing 454 taxa.	Yes, electronic. Full species list provided.	Being reviewed.	
Inverewe Gardens, Scotland		NCCPG National Collection of Olearia	Olearia 46 spp & cvs (Aust as well)				
Mount Stewart Gardens, Northern Ireland		NCCPG National Collection of Phormium	Phormium (40cvs.)				
Ventnor Botanic Garden, Isle of Wight, England		NCCPG National Collection of Pseudopanax	Pseudopanax 15 spp. & 9cvs.				Many plants in the collection stolen several years ago. Collection being re established following donation of seed from New Zealand.

Collection	Est.	Objectives	Major plant groups	Total number of taxa/ accessions	Records	Collection Policy	Threats
Fingal County Council, Dublin, Southern Ireland		NCCPG National Collection of Olearia	Olearia 39spp. & 9cvs.				
Bicton College of Agriculture, Devon, England		NCCPG National Collection of Pittosporum	Pittosporum 70 spp. And cvs.				
G Hutchins, County Park Nursery, Essex, England		NCCPG National Collections of Parahebe and Coprosma	Parahebe 11 spp, 17cvs.	Coprosma 26spp. & 50cvs.			
M Searle, Guernsey		NCCPG National Collection of Hebe	Hebe 130 cvs.				
Siskin Plants, East Anglia, England		NCCPG National Collection of Hebe	Hebe 32 spp. & 53 cvs.				
N Hutchinson, Yorkshire, England		NCCPG National Collection of Hebe	Hebe 200 spp. & cvs.				

Table 3: Further Collections Not yet Assessed

Chelsea Physic Garden, London,England

The National Botanic Gardens of Arts, Culture and the Gaelacht, Dublin, Ireland

Tresco Abbey Gardens, Tresco, Isles of Scilly, England

Ulster Museum Botanic Garden, Belfast Northern Ireland.

John Matthews, 33 Sutton Road, New Plymouth

Chris and Brian Rance, Invercargill

John Donald Glendonald, RD 16 Fairlie

Steve Newall, Dunedin

Dr Josephine Ward, Canterbury University