

The New Zealand Plant Collection Register: A workshop report

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Introduction

On 29 July 2010 the Royal New Zealand Institute of Horticulture (RNZIH) hosted a workshop that explored the future development and updating of the RNZIH New Zealand Plant Collection Register. Many of you will be familiar with the register first developed in 1989 and last updated in 1993 (Hammett, 1993). This early register has been reproduced on the RNZIH website (www.rnzih.org.nz/pages/plantcollectionregister2.html) and continues to draw enquiries from far and wide.

In the 17 years since the 1993 update, horticulturists across New Zealand have become increasingly concerned about the loss of both native and exotic plant diversity throughout the country – particularly at the cultivar level for natives, but also at the species level for some exotics. While we do not seek to debate biosecurity policy here it is clear that there are failings in the MAF Plant Biosecurity Index (PBI) and that plants lost to cultivation in New Zealand (no longer growing or without current validation) are difficult to re-import into this country. What is also clear is that many collections are disappearing or being dismantled as owners move on to other interests, are no longer able to maintain them, or pass away with no succession plans for their collections. Compounding this is the narrow range of 'in fashion' plants now offered at the larger garden centres and the loss of smaller specialist nurseries who collectively grow a much wider diversity of plant material.

New Zealanders have long recognised the value of our native plants and have made great progress documenting, protecting and developing recovery programmes for them. However, it would be naive to suggest that this task is anywhere

near complete and for our native and exotic flora there are also large gaps in recognising and capturing their cultural, heritage and horticultural values.

The RNZIH, with one of the most diverse memberships of any horticultural organisation in New Zealand, sees its role as an advocate and facilitator to represent the national interests associated with recording plant collections.

A related workshop on cultivated plant names – *Documenting New Zealand's cultivated flora: 'A supermarket with no stock inventory'*² – held 9 September 2009 brought together interest groups from across the horticultural spectrum, introduced them to the New Zealand Organisms Register (NZOR) and recognised the importance of wide sector participation to capture the presence of and names for cultivated plants. One of the outcomes of the workshop recognised that each organisation had a role to play in capturing cultivated plant data and actively linking with the wider NZOR project (an initiative that aims to record all living organisms in New Zealand). The RNZIH had already begun updating its own register (the New Zealand Plant Collection Register) so the previous workshop and the NZOR project provided added momentum for advancing the register in the context of these wider initiatives (Sole, 2009).

At the workshop

At the July 2010 scoping workshop, we were fortunate to have Mike Oates and Dr Marion MacKay attend, both of whom played key roles in the establishment of the original RNZIH plant collection register. The register was originally based on similar work that had been undertaken in the United Kingdom by

the Royal Horticultural Society and in Australia by the Australian Institute of Horticulture. Marion MacKay already held and continues to hold a large private database of woody tree and shrub species in New Zealand.

During the morning session, Marion commented that there are problems in managing large amounts of data, and that spreadsheets in particular, although simple to use have real limitations. Both Marion and Mike reflected on the huge amount of work involved in collating the original RNZIH register and the commitment needed to maintain it. Resources, both funding and voluntary time, had begun to dwindle at the last revision in 1993. In those days access to technology was restricted and expensive. Today the volume of work remains but the software tools and internet technology is much more advanced and accessible, making it easier to interconnect resources and allowing many people to contribute to the same information platform.

Mike Oates noted that there were gaps in entries for native genera in the original register and in a survey he conducted in 1999 (Oates, 2000). There is evidence that native cultivars are being lost from horticulture and it is important that remaining cultivars are captured in the new collections register database. Published checklists that list all known cultivars of native genera are valuable and related reference works. For example, the RNZIH have published an international register of *Hebe* cultivars (Metcalf, 2001). Further authoritative cultivar checklists should be published (such as the *Metrosideros* checklist in this issue of the *New Zealand Garden Journal*) and/or made available online.

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² See the *New Zealand Garden Journal*, Vol. 12, No. 2, December 2009 for workshop presentations and Dawson (2010) for the full workshop report.

As a member of the New Zealand Plant Conservation Network, Mike has seen their database grow since its creation to the point where maintaining it is increasingly expensive. Mike also noted that the RNZIH must be clear about its objectives – the most fundamental of which should be the protection and conservation of cultivated germplasm. The workshop on cultivated plant names held September 2009 (Dawson, 2010) set a good cross sector background to this.

Emphasised at our workshop was the importance of getting many specialist plant organisations and sectors on board to feed into the New Zealand Plant Collection Register (ideally with linkages to NZOR) rather than relying on a few people to do all the collating. Also highlighted, and still an issue, is the wide range of formats in which information is stored. These include people's memories, invoices, hand-written lists, simple spreadsheets and rudimentary databases. Taxonomy was and remains a recurring issue with plants being variously described, at times fancifully, and as a result of name changes.

There could be up to 40,000 plant taxa in New Zealand of which there is likely to be more than 5000 Orchidaceae alone and more than 10,000 woody plant taxa. Eastwoodhill and Hackfall's arboreta and the collective botanic gardens plant lists and databases probably hold the bulk of records relating to woody plants. Of all plant groups, woody plants are also likely to be best documented in private collections, public records, grower's records and research institutions.

There will be overlap in names used in all the various sources of records. Looking forward it will be important to articulate to all stakeholders the importance of participating in the development of the register, to adopt it as their own resource, and to contribute to its ongoing maintenance.

To date Philippa Foes-Lamb has been canvassing the collection owners listed in the original 1993 New Zealand Plant Collection Register to verify that their holdings still exist. There has been a slow response with several letters returned

to sender. This should come as no surprise but reinforces our concern at the poorly documented and possibly declining state of the country's plant collections. There were concerns raised regarding privacy but these will be addressed as hidden (not publicly accessible) fields in the database, as they have been in the past register. We must continue to respect privacy to encourage full participation in the future. Philippa continues to follow up on the existing database verifications and has completed 1500 line entries into a spreadsheet. The original register listed plants only to the genus level whereas the updated records list plants to finer taxonomic levels (e.g., species and cultivars).

With the assistance of Murray Dawson, the following provisional fields have been established in order to collect the information and record it within a structure that can easily be imported into a database at a later date. These fields, set in July 2010 are:

- Collection number
- Genus
- Species/subspecies/cultivar
- Number held
- Common name(s)
- Holder
- Registered by
- Location name
- Address
- Address permission (Y/N)?
- Suburb
- Town/City
- Region (Auckland, Canterbury, etc.)
- Local Authority
- Location description
- Public accessibility
- General notes (publicly viewable)
- Administration notes (hidden notes to help administer records)
- Email address (not publicly viewable).

Jerry Cooper provided the workshop with an update on the New Zealand Organisms Register (NZOR) project (www.nzor.org.nz; also see Cooper and Wilton, 2009). The project will develop a national catalogue of names, taxonomic opinions (synonymy according to an authority) and evidence for presence/absence within New Zealand with data automatically being derived from

authoritative sources, both nationally and internationally. This will contribute to and ensure:

- Centralised aggregation of taxonomic data of native and introduced biota
- Better management of existing information (there are approximately 100,000 names of organisms relevant to New Zealand – including unwanted organisms, plants, animals, fungi etc.)
- Consistent consensus data on synonyms and taxonomic hierarchy for taxa
- Provision of vernacular and Māori names
- Available evidence for the presence/absence in New Zealand.

Of interest to horticulturists are issues currently faced by MAF Biosecurity New Zealand (MAF–BNZ). These issues were outlined (also see Dickson, 2009) and some of those that NZOR could help address are:

- Currently MAF–BNZ has numerous separate databases
- Names and synonyms within these databases are not managed together
- The lists have incomplete synonymy
- Spelling mistakes are easily made.

Stated simply, the NZOR project is funded by the Terrestrial and Freshwater Biodiversity Information System (TFBIS) programme over three years. The TFBIS programme supports the aims of the New Zealand Biodiversity Strategy. NZOR is managed in three tiers of governance: Steering, Advisory and Technical groups. What happens beyond 2012 is not clear at this stage. The programme to capture and deliver the NZOR data is:

- Year 1 – Landcare Research, NIWA and Te Papa as data providers. MAF–BNZ as data consumers
- Year 2 – Department of Conservation and another organisation as data consumers
- Year 3 – all other data providers and consumers.

To date the system design is complete, an online 'name harvester' is being developed, and the manual

harvesting of 100,000 names has been carried out. NZOR has become the first regional provider to the international Species 2000 / Integrated Taxonomic Information System Catalogue of Life (CoL; www.catalogueoflife.org)³. Future development of CoL will see dynamic linking of regional databases, such as NZOR into the CoL. Further development of NZOR will see the availability of tools to support spell checking of user checklists and verification of taxonomy against authoritative sources. Ultimately the NZOR and CoL data will facilitate the linkage of all kinds of taxonomic related digital data (checklists, collections, descriptions, observations, DNA sequences etc.) using Globally Unique Identifiers (GUIDs). Data linking using GUIDs provides a technical mechanism for resolving the issues of using ambiguous name strings, for which there can be many spelling variations, and with one name applied to multiple taxa, and one taxon with multiple names.

It is important that plant names databases, such as the updated RNZIH Plant Collection Register, link with NZOR as both a data provider and consumer, which will improve the data quality of both resources. The Plant Collection Register should allow the collation of cultivated plant data from a wide range of sources. NZOR is not seen as replacing databases such as the Plant Collection Register or the New Zealand Virtual Herbarium (www.virtualherbarium.org.nz), but will act as the authoritative source of nomenclatural and taxonomic opinion, and as a national 'clearing house' pointing to the evidence for presence/absence in New Zealand from resources such as the Plant Collection Register. At present the biggest digital data gap in NZOR, for both names and presence/absence, is the knowledge of New Zealand's cultivated flora. It is something of an irony that this is probably the most

closely described and classified group but the information is stored in a wide range of formats.

In discussing the collection and verification of data, Jerry Cooper indicated that free-keyboarding Latin names can result in up to 30% misspelt names, but that these can easily be corrected using validation tools. He also stressed that the original names within source lists should be captured accurately as they are, rather than the keyboarder's interpretation of what the current name (or spelling) for that taxon might be (e.g., according to Google searches or any other secondary source). Again, the current taxonomic interpretation of an 'old name' could follow later. This is critical because taxonomic lumping/splitting over time can obliterate data. For example, if a taxon was given an old name in a collection, but current opinion lumps numerous species together, it is tempting for the keyboarder to erase the old name and to use the new name. However, if subsequent taxonomic work shows that the original division was correct then by erasing this old name you will have lost the original correct interpretation for this collection. The only way of retrieving the correct interpretation is for an expert to re-examine the material, which may not be practical. It is one of the principle services provided by NZOR to allow old names to be interpreted with current taxonomic opinion, without obliterating original data. The New Zealand Virtual Herbarium project which accesses herbaria throughout the country through a single portal also has problems with taxonomy which need to be addressed. Provenance especially is being treated with high importance.

From the discussion at the workshop it became clear that there remains a substantial body of knowledge of plants and collections which is still not systematically catalogued. The development of a new plant collection

database, perhaps modelled after the New Zealand Notable Trees database⁴ will allow the capture of a wide range of raw data, from individual plants to collections. It should be a live database with the opportunity for continuous updating.

While this will require moderation it will not be the onerous task that it was in 1993. Ultimately it will allow us to identify threatened collections and also to develop national coordination and management of collections as well as providing the all important inter-database links.

During the afternoon session there was wide-ranging discussion about targets and objectives that eventually confirmed the need for a national plant collections database as a top priority. There was also discussion on what constituted a collection. While the RNZIH New Zealand Plant Collection Register has its prime focus on collections it also has a secondary role of collecting information about rare plants cultivated in New Zealand which ultimately also need to be disseminated through NZOR. Use of criteria established in the UK by the National Council for the Conservation of Plants and Gardens (NCCPG) was suggested (see www.nccpg.com/Conservation-resources/NCH-Handbook-2008.aspx).

Collections and plant information need to be captured in achievable 'chunks' of work. One or two examples successfully executed will showcase the new register and provide proof of concept. As the volume of work again increases it is important to recognise that the New Zealand Plant Collection Register should be a team project hosted and facilitated by the RNZIH with each key stakeholder taking responsibility and ownership by sourcing and inputting data from their specialist sectors.

There was discussion about the fields and the number of collections to be held on the register. Multiple collections of the same species

³ 10th edition released April 2010 listing 1.25 million species over 77 taxonomic databases – about half of the known living species.

⁴ Development of the Notable Trees online database (www.notabletrees.org.nz; Cadwallader, 2009) provides parallels to the RNZIH Plant Collection Register initiatives. The Notable Trees Register was developed from earlier beginnings, there were problems managing the original hardcopy information and a database was created but under-supported. The Notable Trees Register was relaunched when the RNZIH received funding and a new online information management system was created. This system has similar functionality to what is envisaged for the new Plant Collection Register – plant image upload, integrated mapping and log-on access for contributors and administrators to enter and update records. Ideally, the Notable Trees online register should interconnect with the Plant Collection Register as there will be shared records between these resources.

should be recorded as each accession will perform differently depending where it is growing in New Zealand's diverse climate regions. It also follows the same theme identified with taxonomy; the range of base data is an extremely important resource. This will provide insights into climatic ranges for cultivated plants in New Zealand and improve the 'on the ground' verification of data. Final field definition could be set after looking at database fields held by Botanic Gardens Conservation International (BGCI), NCCPG, the National Science Foundation (NSF) in the US and Australian plant collection registers.

Consistency of information was discussed noting that many collection holders have their data stored in a wide assortment of ways. The small collection holders probably do not have databases as such and at best keep spreadsheet records. At worst there may be no written record.

The best solution is to develop an integrated online tool that can fully meet user's needs and avoid (if at all possible) duplications of record management. The new online Plant Collection Register could include user defined fields and fields that can accommodate wider data; contributors could access this data by logging on to edit/print/export/manage their personal records. Contributors could be given the option to hide or suppress these fields from public view according to their needs.

Database development will proceed as a matter of priority before engaging in the widespread collection of records so that it becomes a single action to collect and upload data rather than collecting, aggregating and uploading at a later date. It will also provide a standard format template for the collection of data. Discussion suggested that there be hierarchical layers which reflected critical information and that the range of fields may vary from critical to important to useful. At least one of these fields should contain a globally unique identifier probably via the NZOR. The International Transfer Format for Botanic Garden Plant Records (ITF) was mentioned as a possible existing standard which

could be adopted (www.tdwg.org/standards/102/download/102-525-1-RV.pdf).

Publicity of the scheme will be important. A pilot is being explored to demonstrate to key stakeholders and others, the importance of the project and the wider ramifications it has through links with projects such as the NZOR and ultimately, within New Zealand, to the plant biosecurity lists. Managed well, publicity will emphasise the potential for connections with wider global plant lists especially those related to conservation and biodiversity.

Like almost all projects involving databases, the updated New Zealand Plant Collection Register will need financial support for development and establishment of the database, maintenance and inputs. While much of the data collection work will be voluntary there will also need to be a central point of reference and administration.

Possible sources of funding for database development are:

- TFBIS
- Botanic Gardens of Australia and New Zealand (NZ)
- New Zealand Lotteries Commission
- RNZIH
- Other biodiversity funding – local and national
- Possible corporate funding.

Costs other than database development are:

- Administrative
- Web hosting.

To be completed before funding can be applied for:

- Support from stakeholders
- A robust business plan
- Terms of Reference for database and website – specifications
- Continue and complete, where possible, the verification of exiting register entries.

The key, but not exclusive, stakeholders to the project are:

- Royal New Zealand Institute of Horticulture (RNZIH)
- Botanic Gardens of Australia and New Zealand (BGANZ)
- Landcare Research
- New Zealand Organisms Register (NZOR)

- Nursery and Garden Industry Association (NGIA)
- Australasian Regional Association of Zoological Parks and Aquaria (ARAZPA)
- Universities
- New Zealand Recreation Association (NZRA)
- International Dendrology Society (IDS)
- Public Gardens – non-BGANZ affiliated
- New Zealand Tree Crops Association (NZTCA)
- Heritage plant organisations
- New Zealand Rhododendron Association and similar specialist groups
- Garden clubs and organisations.

Some of these groups may hold existing databases. These may not need to be replicated but ideally should interlink as part of this and the NZOR projects.

Summary

It was agreed at the workshop that there is a need for upgrading the RNZIH New Zealand Plant Collection Register into a user friendly and more comprehensive online database. It is also a timely intervention in the way that it will ultimately link with the New Zealand Organisms Register (NZOR). The data that will be captured fills a major gap in our collective knowledge on the existence, diversity and locations of New Zealand's cultivated exotic and native flora.

While the RNZIH has begun verifying their existing plant collection records the workshop was of the view that development of an online database is an important next step. A pilot programme now needs to be established and partners identified to sit alongside the database development. This in turn would support funding applications and allow the establishment of database fields against known and discreet taxa.

The workshop discussions confirmed the need for the project to be a working partnership of key stakeholders. Each will have direct connections to its members and is likely to be more effective at sourcing data. It became apparent that the scale of the project is very large so is

best broken down into discreet pieces of work to minimise and distribute the workload.

Effective communication and publicity will be essential to the long term success of the project. Early connection with key stakeholders, an effective business plan and outlining the wider implications of the project will be critical.

We should look 20–30 years into the future when we envisage there will be better usage and management of resources and increasing economic pressure on the services provided by plants. In doing so, we should record 'What', 'Where' and 'How many'.

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