

*The* NEW ZEALAND  
Rhododendron

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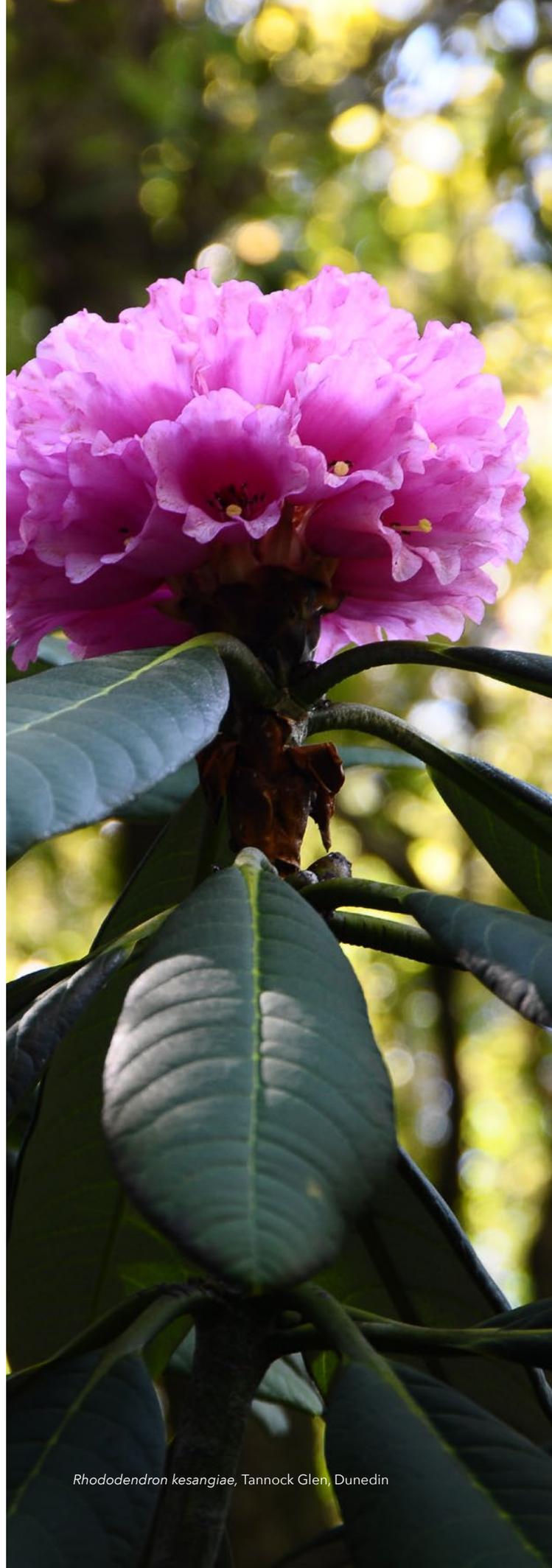
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Association



*Rhododendron kesangiae*, Tannock Glen, Dunedin

# FOREWORDS 2019

The Pukeiti Rhododendron Trust Board has spent a significant amount of time this year working through a number of issues that have been identified during the Ex-situ Rhododendron Conservation Project which is being led by Dr Marion MacKay. The important issues I want to highlight include:

- The continuation of identifying and verifying collections of species rhododendrons, particularly a significant collection in Dunedin
- That the Board was able to support Jeremy Thompson and Shashil Dayal in the collection of wild sourced seed. Seed has germinated and is now growing on at a number of locations
- That the Board signed an MOU that saw the creation of a Rhododendron Collection and Projects Officer position based at Pukeiti. This position is held by Andrew Brooker who will fulfil key tasks directly associated with the national rhododendron collection strategy
- That for many years Pukeiti has benefited from strong relationships with a number of international partner agencies, many set up by Graham Smith. The Board has been

keen to ensure that these relationships continue into the future, particularly as personnel across all of these agencies has changed over the years. Graham Smith and Andrew Brooker undertook a successful visit to Australia meeting with the key rhododendron garden people and agencies there. More visits are in the pipeline to other places in 2020

- That a key role of the new Collections Officer is to regularly meet with the Pukeiti Collections Forum of Graham Smith, Alan Jellyman, Peter Catt and Lynn Bublitz. Together they impart their collective wisdom to provide all manner of advice on things horticultural for the continued improvement of the garden at Pukeiti
- That under Lynn Bublitz this joint bulletin and regular journals continue to be first class publications
- That two new Board members were co-opted during the year – Neil Tapsell and Dr Susan Davies/Gardiner.

We have been back using The Lodge for a whole year now and despite some minor teething issues I think it is definitely proving well worth the wait.

The Board is now concentrating on finding ways of adding value for our members, including by arranging trips and exchanges. With the collection at Pukeiti being constantly added to, resulting in its increased recognition in international circles and reconnection with kindred organisations, the Ex-situ Conservation Strategy has certainly provided plenty for the Board to focus on.

What has been made clear during the research phase of the Ex-situ Rhododendron Strategy is that while many collections have plants that are doing very well they also contain others that aren't. The main reason for this is that they are growing outside their optimum conditions. In other words they would prefer slightly colder, warmer or wetter environments to flourish.

Part of the Strategy is to recognise this and once plants are propagated they will be dispatched to locations where the environment should see them thrive. In time this should also result in these plants becoming available to members.

*Gordon Bailey – Chairman Pukeiti Rhododendron Trust Inc. Board*

It is late September and signs of spring are all around us. Magnolias and flowering cherries are looking spectacular. Bud set on our rhododendrons is very sparse. Many of our plants will be flowerless and several others will have very few flowers. I am told this is general in our area. Last year's flowering was exceptionally good so we accept that our plants need a rest.

Work has continued on the conservation of rhododendron species and NZ raised hybrids. Dr Sue Davies/Gardiner is very focused on the species and has continued to propagate a wide variety. Owners of an extensive collection of species in a Dunedin garden have been very accommodating, giving Sue access to cuttings. Pukeiti has now been able to take advantage of this opportunity as well – yet another example of NZRA and Pukeiti working together for a common cause. This relationship has

been further developed with Sue being co-opted onto the Pukeiti Rhododendron Trust Board. Sue, Andrew Brooker and Doug Thomson from the Dunedin Botanic Garden, plan to visit the Dunedin garden during flowering this year to further enhance the naming process of the hundreds of species.

It is disappointing that NZRA is about to lose both their Treasurer and Secretary. Mike Wagstaff as Treasurer and Chris Wilson as Secretary have carried out their roles in a very efficient manner. They have both taken on tasks not required of the Secretary or Treasurer. Their excellent service has been much appreciated. Both positions have been filled, and to aid the handover of these roles to new personnel, now and in the future, two laptop computers were purchased by the Association during the year.

Our Registrar, Brian Coker does his very best to encourage people to register their hybrids, that is, those hybrids worthy of registration. He is aware that there are named hybrids that are not registered being sold

through nurseries. The Registration form is on the NZRA website and filling it in is not too onerous.

Paul Shaw, ably assisted by his wife Carol and the very supportive organising committee, worked tirelessly to ensure that this year's conference, based in Rotorua, ran smoothly and was an enjoyable experience for attendees. The number of registrations was disappointing, especially so for the organising committee. One reason I am sure, is our ageing membership. For those members who were unable to attend conference, do keep supporting the Association. Our Newsletter Editor, Chris Wilson, produces three interesting newsletters each year. Along with 'The New Zealand Rhododendron', an excellent publication, all members are provided with plenty of informative written material to maintain their interest in rhododendrons.

*Joy O'Keefe - President - New Zealand Rhododendron Association Inc.*

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R. 'Joybells' at Heritage Park,  
Kimbolton, New Zealand

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## The NEW ZEALAND Rhododendron

Volume Seven 2019

The NZRA Council and the Pukeiti Rhododendron Trust Board are pleased to make material in this publication available for reprinting, with acknowledgement, in other horticultural publications. Credit must be given to both the author and this journal. Financial assistance has been provided by the Taranaki Regional Council through the partnership agreement with the Pukeiti Rhododendron Trust. Thanks are extended to all the contributors, authors and those who have provided photographs and advice.

**Editor:** Lynn Bublitz

**Special thanks** to Gordon Bailey for accessing articles and to previous editors for their help and advice.

**Designed by:** Sam Design, New Plymouth

**Printed by:** Fisher Print

## INTRODUCTION

# CHOOSING THE RIGHT RHODODENDRONS - THE JEWELS OF YOUR GARDEN

Lynn Bublitz

The *ex-situ* project (protecting species by growing them in places other than their native habit) has given new life to the Pukeiti Rhododendron Trust. The full extent of this project would not be possible without the support of the Taranaki Regional Council which manages the Gardens and activities associated with Pukeiti. This project is part of a world-wide movement to conserve endangered species and thus preserve biodiversity. The work that Dr. Marion Mackay and her team are doing has been recognized internationally and of course enhances Pukeiti's international reputation and fits nicely with biodiversity and associated pest control work with which the TRC leads New Zealand.

Most of the species rhododendrons are grown in gardens or parks such as Dunedin Botanic Garden, Tannock Glen, Pukeiti, Heritage Park, Eden Gardens - noted for its vireyas - and of course Crosshills and other gardens associated with nurseries. It is this last group which most gardeners rely on to source their rhododendrons. Looking through catalogues and visiting garden centres, the variety of plants from which to choose is increasing as the popularity of rhododendrons waxes. While a few true species such as *R. yakushmanum*, *R. arboreum* and its various forms, some maddenia, and *R. macgregoriae* among the vireyas can make good garden plants, most chosen are hybrids.

Choosing the most appropriate plant for the garden is a challenge. Many things must be considered, among them, local climate, soil type, altitude, drainage, amount of shade and of course the part of the country in which the garden is situated. Rhododendrons cannot withstand salt winds and frost damages the flowers of those that bloom early. Trends too have changed. While the larger growing types are well suited to large country gardens, home gardens in towns have become smaller, making room for only a few plants. Talking to nurserymen, flower colour, always subject to the fashion of the day, is the main driver of choice particularly among the vireyas. Foliage form and size to which the mature plant grows must also be considered. Once chosen, growing conditions will decide the success and display the plant provides.

The care given after planting is critical. This includes fertiliser and spray regimes to control pests and diseases, to which some are more susceptible than others. Pot-grown plants such as many vireyas, prefer more fertiliser than those grown directly into the garden. Climate change is beginning to have an effect too. Reduction in frost numbers and rising winter temperatures result in a number, particularly those grown for colder climates, to abort flowering even though their buds are seemingly well formed, as they need a

period of cold during the winter to initiate blooming. *R. 'Lem's Cameo'* is an example. Increasing temperatures and drier summers and autumns have led to increasing likelihood of attack by pests and diseases. Mildew, which infects the young emerging leaves is a problem with some vireyas and old well known hybrids such as *R. 'Fragrantissimum'*. Rust fungus has almost completely eliminated *R. cinnabarinum* and most of its hybrids from New Zealand gardens. The root fungus phytophthora, can and does completely kill plants, especially those grown in warm wet damp soils. All diseases can be controlled but the hardest to overcome is phytophthora. A



The lawn garden at the Bublitz Garden

number of large-leaf rhododendrons at Pukeiti have died and been removed because of this fungus.

Pests also will be an increasing problem as the climate changes. Among them, thrips are the most apparent, sucking the sap from the leaves, turning them grey. They enjoy the warm dry summers and are more evident under the canopy of larger trees. Their effects can be seen on gardens like Heritage Park where in the past thrips were rarely seen. Some rhododendrons are more susceptible than others; particularly prone is *R. 'Unique'* and various similar hybrids.

There are however, some varieties which are quite resistant to both pests and diseases, including different forms and hybrids of *R. arboreum*, and those of *R. yakushmanum*.

These problems all compound to make choosing for the home garden more difficult. This edition of the Journal gives some guidance in selecting the best plant for your garden's location and growing conditions. It is always advisable, though, to check with other growers and nursery people in your area.

Despite all the problems, given care, rhododendrons are the jewels of a spring garden.

# ANACAPRI THE EVOLUTION OF A GARDEN - A PERSONAL STORY

*Gordon Collier*



Early days at Pukeiti

Many years ago when I was only just green-fingered, my Mother, knowing only the puce-flowered varieties was desperate for a scarlet rhododendron. After many false alarms she sourced one bearing the name 'Cornubia,' and when it flowered it was indeed 'red.' I was hooked on rhododendrons ever after.

When I was a student at Massey College (as it was then) rhododendrons became a serious interest. Not only did I work weekends in Dr Yeates' auratum lily patch where he also hybridized deciduous azaleas in the Ilam fashion, but I became fascinated by the goings on in the glass house behind the Pink Hostel which was home to many unruly students. It was in this glass house that the infant New Zealand Rhododendron Association and Snow Henderson produced plants for its members, then an exclusive bunch of rhodo obsessed enthusiasts. Smallish plants were raised by cuttings and grafts though the latter were strictly rationed. Deciduous azaleas were all the rage and members could order six plants, the showier the better. There were few hybrid rhododendrons available in the trade then, certainly no species, so the plant distribution was a big lure for intending members.

A word or two about those early days of the Association; it was a group that zealously guarded its flanks. To become a member one had to be nominated and seconded. Fortunately

I had Dr Yeates as my mentor so I joined - for two pounds and two shillings per annum. (I attended my first Conference in Hawkes Bay a few years later and when white jacketed waiters served afternoon tea, I thought I had indeed 'arrived.')

My very first job out of Massey in 1956 was at Tupare, New Plymouth - famous then and perhaps even more famous now with its recent NZ Garden Trust award of six stars. And when the Loderi varieties flowered in spring and at the 'Open Weekend,' Labour Day, hordes of people invaded this wonderful garden. Among the visitors that year I remember such people as Russell Cook, Tom White, Roland Stead and Douglas Cook; horticultural royalty! Looking back it's no wonder I became keen on rhododendrons for Russell Matthews was also busy launching Pukeiti, to become a Mecca in due course. I spent countless Saturdays there on working bees that Russell organised and looked on in disbelief when many treasured shrubs were trimmed by resident possums and invading goats.

After a year in this environment it was no wonder I determined to make a garden for myself, though it was 35 years chasing sheep on my family's Taihape farm that became my lot. But Titoki Point eventually emerged, three acres on a north facing clay-bound hillside. Very soon I discovered the golden rule of gardening: plant what likes you, not what you like - in other words find the right plant for the right place.

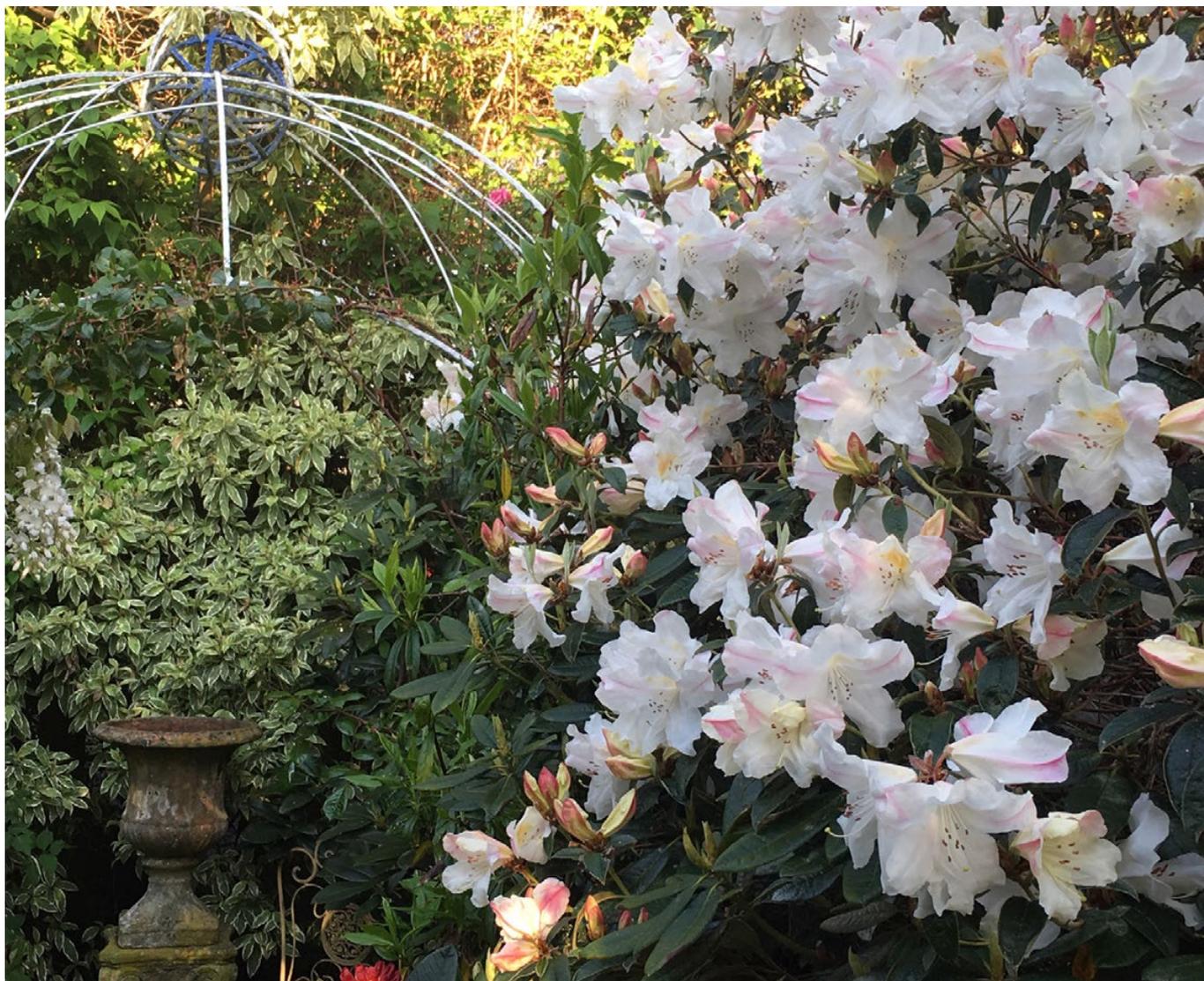


R. 'Loderi Venus' at Titoki Point

So it was that I soon found this bare, sunny hillside was no place for rhododendrons. But undeterred, I bought a few, among them *R. 'Loderi Venus'* from George Huthnance who then had a thriving specialist nursery just out of New Plymouth. After 61 years in a sheltered position, this is a veritable giant. I killed a few too and remember very clearly the wonderful large leaves of *R. KW 2111*, that had perhaps the largest leaves of all. It thrived a few seasons before departing.

My second choice for a prospective garden was no more promising than the first. Less than 800m of flat sand and pumice - certainly no trees, no shade, no stream or even a lichen encrusted rock, enough wind to drive a turbine but plenty of water in the nearby lake. Like Bruce and the

spider, success loomed eventually and Anacapri does now sport a few of my favourite plants. 'Mi Amor' leads the spring fling - all the varieties of *R. nuttalli* are worth a place in any garden. A cutting grown *R. yakusimanum* FCC arrived in a pot and is now so large it may soon leave in a wheel barrow for garden number 3. *R. 'Rubicon'*, my all-time favourite, has out-grown its path-side position - despite its reputation this is not a small shrub. Growing nearby is another Ron Gordon rhododendron, *R. 'Fragrantissimum'*, which he claimed to be a superior form. A few years ago when the Conference loomed in Taupo a few small plants of *R. williamsianum* parentage were added to hold the fort. Ironically there is now too much shade in this garden, but that suits me.



### *Rhododendron fragrantissimum*

Ron Gordon always told me that the **Rhododendron fragrantissimum** he grew was a superior form; I suspect he got cuttings from one of the gardens he visited in England. I brought a young plant with me to my new garden in Taupo in 2001 and until now I didn't take much notice of it.

This spring however it has really impressed visitors to my garden where it scrambles all over the top of *R. 'Rubicon'* in full flower. Each terminal bears three richly scented and textured florets, each fully 11 cm across. It is superb.

This is a rhododendron everyone would want to have. It should be propagated.



*R. rubicon* at Anacapri

# TANNOCK GLEN

John Henderson



*R. amoenum*

MJ

This is a garden of some 3.5 acres that was established in the mid 1970s and was promoted by 3 original trustees, members of the Dunedin Rhododendron Group; Ralph Markby, hybridiser Bruce Campbell and nurseryman Chas McLaughlin. The land is owned by the SPCA, and serves as a buffer between the houses on one side and the kennels on the other, in the hill suburb of Opoho not far from the Dunedin Botanic Garden. It was principally in pasture at the time of first establishing the garden. The land slopes to the south-east and has the disadvantage of heavy clay with poor drainage. There have been several attempts to improve the drainage and soil conditions, and I think that we can say now after some 45 years, that the growing conditions are much improved.

The focus has been to concentrate on species rhododendrons and locally-bred rhododendron hybrids amidst an attractive garden setting. We were fortunate that both the late Alistair Blee of Edendale and Brent Murdoch of Dunedin were importing seed from overseas and Tannock Glen was able to purchase special rhododendrons from them for many years. In an article published in 2003 it was stated that there were 132 species in the garden. Since then there have been regular additions as new stock becomes available for purchase each year, and the garden has become a source of stock plants for growers to access cutting material. Two special Dunedin hybrids in the garden are *R. 'Ed Hillary'* (*R. grande* x *R. williamsianum*) and *R. 'Lovelock'* (*R. chrysodoron* chance seedling). Some of my favourite species in the garden are *R. argipeplum* (formerly *R. smithii* in subsection *Barbatum*), *R. excellens*, *R. dalhousiae* and *R. spinuliferum*.

Of the numerous trees, there are currently eleven different varieties of magnolia. Among the shrubs,

an addition a few years ago that has caught my eye is *Arctostaphylos manzanita* which is lovely in flower and in bark. I also love *Illicium simonsii* for its floral display.

The system of labelling plants has changed over the years. Etched plastic labels riveted to alloy pegs were durable until people weeding backed into them and broke them, as the plastic had become brittle. We have now changed to thicker plastic labels that are etched, then glued and tacked to the angled top of a wooden post. The gate is latched but never locked, so the garden is always accessible to visitors. So far we have not suffered from vandalism. We have a donation box near the gate but donations are never sufficient to cover the expenses of plant purchases, weed spray, mower fuel and the services of an arborist from time to time, so we are pleased with any profit from the annual plant sales to members. We use glyphosate on the paths and some of the beds.

Sycamore seedlings are one of our major ongoing problems, as they establish from trees on adjoining sections. A few years ago we were approached to see if a convicted driver with a sentence of 100 hours community service could carry out his sentence by working at Tannock Glen. Since he had gardening qualifications we were happy to make use of his services, and he went through the whole garden, weeding it thoroughly. Since then we have endeavoured to keep on top of things with our volunteer members. Working bees are held regularly once a month with a small number of keen supporters. A common weed is *Pseudopanax crassifolium* (Lancewood). It seemed such a shame to throw them away that I have planted some in a grove by themselves. Other free-seeding plants that are not a problem are candelabra primulas. However, generally we are not enthusiastic about adding herbaceous material because of the extra maintenance involved.

Photos MJ - Mark Joel, MW - Martin Wilkie



*R. sinonuttallii*

MJ



*R. spinuliferum*

MJ



*R. davidsonianum* 'Exbury Pink'

MJ



*R. fletcherianum*

MJ



*R. facetum*

MJ



*R. edgeworthii*

MJ



*Rhododendron smirnowii*

MW



*R. niveum*

MJ

**GEMS AT TANNOCK GLENN** Photos Mark Joel (MJ) and Martin Wilkie (MW)



*R. 'Little Glendoe'*

MJ



*R. 'Katie'*

MW



*Rhododendron dalhousiae*

MW



*R. arizelum*

MJ

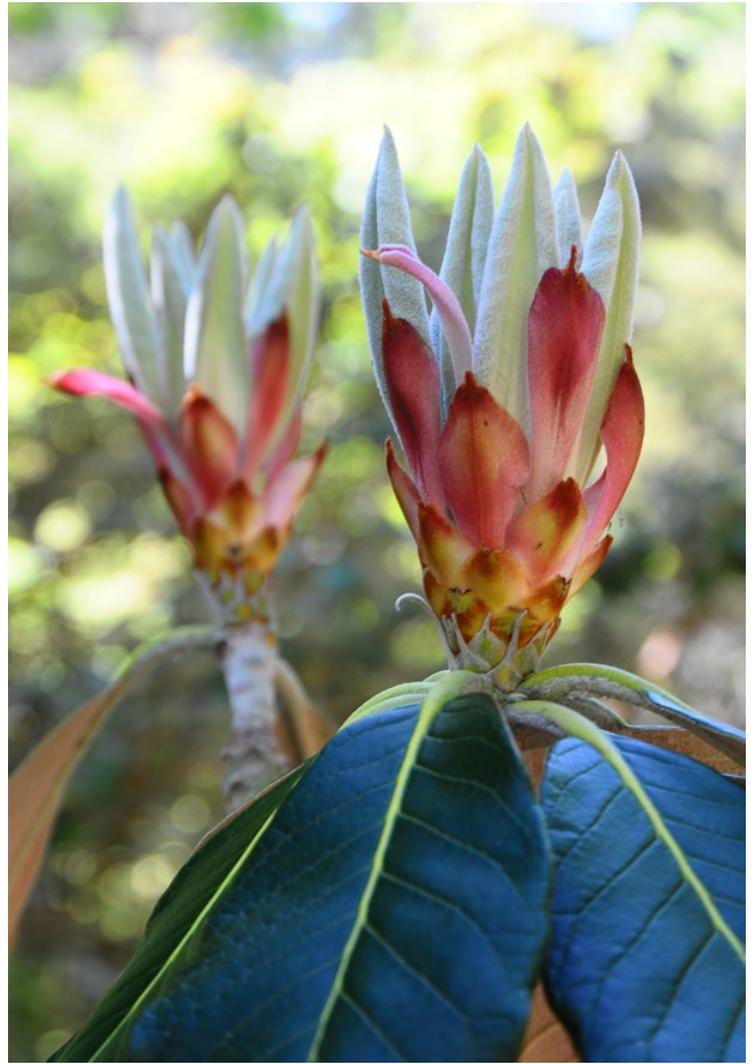


*R. platypodum*

MJ



*R. protistum*



*R. macabeanum*

## THE MAGIC OF RHODODENDRON LEAVES Photos by Martin Wilkie



*R. lanigerum*



*R. argipeplum*



*R. denudatum*



*R. campanulatum* ssp. *aeruginosum*



*R. pachysanthum*



*R. brachycarpum*



# DISCOVERING SIKKIM

*Joy O'Keefe*

*Rhododendron thomsonii*

Having experienced the thrill of discovering beautiful plants in the wild in 2012 when on the Pukeiti Trust Tour of Yunnan, the opportunity to do the same in Sikkim, April of this year, was too tempting to refuse.

For the 3 years I was editing the NZRA newsletter, tour organiser Liz Light advertised her tours 'Colour India, Eastern Himalayas in Bloom'. The tour description read, "Sikkim is renowned for the diversity of its indigenous flora including orchids, magnolias and 35 species of rhododendrons, many of which will be in bloom when we are there." Day walks in National Parks sounded appealing and Bernie and I felt we were still fit enough, so the decision was made, "let's do this".

We were part of a very small group, all New Zealanders, 7 in total including our guide Brent Atherfold. Brent's horticultural background spans 42 years. He has managed nurseries and orchards in New Zealand, worked as a landscape contractor in London and is now a project manager for Natural Habitats, a landscape company, in Auckland. Brent is particularly fond of India, the people and the diverse flora and landscapes in the Himalayas. Brent's wife Marlene, an experienced leader of tours to India, was also in our group. Her expertise on Indian cuisine was most helpful.

The first 3 days of our tour were non-botanical, visiting New Delhi, Old Delhi and Agra, home of the Taj Mahal. Visiting the Taj Mahal at sunrise was a highlight. Built with perfect symmetry, wonderful proportions and amazing ornamentation it certainly is one of the great architectural wonders of the world.

Having been told how beautiful Kashmir is, we were looking forward



Picking tea

to going there. However, because of unrest causing tension in the region, the decision had been made before leaving NZ, to go to Dholpur in Rajasthan, some 50km south of Agra, instead. Our accommodation in Dholpur, the Dholpur Palace, was set in a 5ha garden. A few dairy cows milked by hand, and a very impressive, very large, organic vegetable garden supply the restaurant with produce. The brilliant red flowers of the Bombax tree (commonly known as the Red Silk-Cotton Tree) drew attention. Its new foliage was still to open. This tree produces capsules, which when ripe, contain white fibres like cotton, used for filling in pillows.

A long drive took us back to Delhi from where we flew north to Bagdogra. Here our Sikkimese guides Neelam and his assistant, Santosh, met us. Neelam is a very experienced trekking guide with vast local and plant knowledge.

He is intensely interested in orchids and is about to establish a personal collection of species orchids. Neelam never failed to spot orchids, often high up on banks and in the forks of trees. Being aware of our special interest in rhododendrons he geared the tour accordingly, willingly sharing his knowledge, very patiently and frequently spelling plant names for me. Santosh, another experienced trekking guide, had joined our tour group to gain more botanical knowledge.

From Bagdogra, we were driven up to Darjeeling, famous for tea production. There are 87 tea estates covering 19,000ha. Huge expanses of *Camellia sinensis*, the tea-producing tree, grow on rolling and sometimes-steep hill country. Women handpick the tips and place them in baskets carried on their backs. Observing the women bringing their baskets in for weighing then



The touring group

taking a tour of the factory, gave us a real insight into the processes involved in getting tea from the plant to the packet.

Excitement built as the next day was to be the first of our botanical treks, the Tonglu Track. Our itinerary stated that “on this ridge, in 1850, JD Hooker, the first botanist to deeply examine the Eastern Himalayan flora, was fascinated with the many species of magnolia, oak and rhododendron he encountered.”

On our drive from Darjeeling to the track, we saw several examples of *Magnolia hodgsonii* and *Michaelia doltsopa*, their white blooms standing out on the forested slopes. After visiting the local conservation tourist centre, we were then driven to the start of the Tonglu track, high up on a ridge on the Nepalese border. It was from here we got our first expansive view of the mighty Himalayas. Despite a mild dose of Delhi belly, I was determined to walk the track. Along our 8km walk, we observed several rhododendrons, the most prominent one being *R. arboreum* in varying shades of pink through to blood red. Most were large trees nearing the end of their flowering season. *R. barbatum* was also prevalent with its bristly branchlets and leaf stalks. We were frequently checking the backs of leaves to decipher which big-leafed rhododendrons were *R. grande* and which were *R. falconeri*. The most healthy plants of these species were growing down the gullies and slopes beyond our reach. Nearing the end of our walk we were drawn to a small-leafed, small-growing compact plant with flower buds about to open, that looked like it could be a rhododendron. Neelam identified this as *R. vaccinoides*. Our rhododendron bible on the trip, a handbook called ‘The Rhododendrons of Sikkim’ by KC Pradham, stated “it is a rare species, its larger cousins inhabit the hot humid and cool temperate forests of Malaysia to Papua New Guinea. The very presence of a solitary species falling under section *Vireya* is of great botanical interest.”

Seeing such a special plant gave us a real buzz. Other plants of interest were *Primula denticulata*, a single clump of *Meconopsis* not in flower, *Arisaema griffithii* and numerous trees including oaks, the beech *Castanopsis indica*, *Magnolia campbellii*, *Acer campbellii* and *Daphne bholua*.

Darjeeling is a short distance from the Sikkim border. It was here Hooker based himself (1848) for 2 years, making his botanical forays into the mountains. He had help from his friend and naturalist Brian Hodgson and Dr Archibald Campbell who accompanied him into Sikkim. Hooker “introduced 25 new spectacular rhododendron species into Britain and helped create the rhododendron craze in British gardeners”.

On the road soon after leaving Darjeeling the next day, Neelam signalled to the driver to stop and pointed out a flowering plant up on the bank, *R. dalhousiae*. This species has a close association with India, having been named after Lady Dalhousie, wife of the Governor General at the time Hooker was exploring the area.



Conservation Centre Display Board

Our next stop was Kalimpong, lower in altitude than Darjeeling, where the climate tends to be semi-tropical. The plants growing in the extensive garden where we stayed were different to those we had seen so far. *Datura* thrived as did several different species of orchid, Bird of Paradise, the Lipstick Plant *Aeschynanthus radians* to name a few. A visit to the Shanti Kunj Nursery gave us the opportunity to view a range of succulents, cacti and tropical plants.

Later that day we crossed the border into Sikkim at Rangpo on our way to Gangtok. Neelam dealt with the paper work required by the officials. Sikkim is a small, northeastern state of India, just 80 km wide and situated between Nepal, Bhutan and Tibet. It is the least populated state of India with just 700,000 people. As of January 2016 Sikkim became the world's first organic state. The government pushed progress, backing it with farmer education and the gradual banning of pesticides, herbicides and fertilizers. It strives to be plastic bag free and we were told not to be seen with a plastic water bottle as we could be fined 500 rupee!

Our accommodation in Gangtok, The Hidden Forest Retreat, was surrounded by an immaculately kept garden and a small nursery. We found their collection of maples and magnolias in the nursery interesting, studying closely the methods of grafting used. A lush vegetable garden supplied the restaurant, and many flowering plants in the ornamental garden were very familiar to us e.g. alstroemeria, oriental lilies, viburnum and orchids.

A six-hour mountainous drive the next day took us to Lachung at 2900m. JD Hooker described Lachung as the most picturesque village of Sikkim. Along these narrow, winding roads, full of potholes and washouts, we passed through diverse climate zones and vegetation. On the first part of this journey we travelled through subtropical broadleaf forest with ferns draping the banks, then gradually moved into temperate broadleaf forests. Numerous interesting trees and shrubs were seen along the way.



*R. dalhousiae*



*R. niveum*

*Acer sikkimensis* with its purplish bronze new growth contrasted nicely with the green of other forest trees. The teak tree with its large leaves was easily identified. Standing out was a tall shrub with yellow flowers in ball shaped trusses. This was *Edgeworthia gardneri*, common name Nepali Paper Bush, its bark fibres being used to make high quality paper. *Cymbopogon citrates*, a large grass growing in the under growth, produces citronella oil used as an insect repellent. Large stands of bamboo were common. At the higher altitudes, *Picea smithiana* and *Abies densa* were the predominant trees.

Agricultural terraces followed the contours of the steep valleys. Rice is grown in the monsoon season and is followed by a crop of maize or barley. Fields of cardamom were flourishing, cardamom being Sikkim's main export crop.

Expectations were again high knowing we were going to the Yumthang Valley, an area where 22 of Sikkim's 40 rhododendron species can be found. The road to higher altitudes was closed, the result of a recent avalanche, limiting our access to more varieties. However, it was pleasing

to see *R. thomsonii*, *R. hodgensonii*, *R. niveum*, *R. ciliatum*, *R. arboreum*, *R. barbatum* and *R. glaucophyllum* growing amongst *Daphne*, *Abies densa* and *Sorbus*. At the time of the earthquake in Nepal in 2015 a huge avalanche came down through the area we were viewing. *Abies* remain flattened as do power poles but the rhododendrons remain standing – testament to their toughness. (Sikkim lies along the same unstable fault zone as Nepal). Like *R. arboreum*, the red colour of the flowers of *R. thomsonii* varied from plant to plant. Being long established plants the smooth, peeling bark was very noticeable. *R. niveum* stood out with its tight round trusses of smoky blue/purple flowers. A *Rhododendron niveum* Sanctuary was established near Lachung in 1970 but was swept away by an avalanche after having been established for 15 years. This species now exists sporadically in the Yumthang region. *R. campanulatum* is said to be one of the most common rhododendrons in the Sikkim Himalayas, however we saw just a few. Other rhododendrons pointed out by Neelam, but not in flower, were *R. lepidotum*, *R. virgatum*, *R. triflorum* and growing epiphytically was *R. camelliflorum*.

It was amazing to see a sizeable rhododendron growing so high up on a tree. Bark from the variety of Himalayan daphne growing amongst the rhododendrons has been used for centuries to make paper for religious scriptures and even banknotes. Its long, naturally self adhesive fibres create strong, durable paper. *Piptanthus* with its bright yellow pea-like flowers was common. At ground level the mauve flowers of *Primula denticulata* provided masses of colour.

Neelam told us about *R. sikkimensis*, commonly known as the Sikkim Rhododendron, thought to be a natural hybrid of *R. thomsonii* x *R. arboreum*, growing up to 5m tall. It is a reasonably recent discovery and the shrub is quite rare. Neelam was hoping to be able to show us one but it was not to be.

An old derelict nursery site, part way up the Yumthang Valley proved interesting. It was good to see several different rhododendron species growing together in a confined area. The remnants of pots were still present. As we botanised, yaks grazed, unperturbed at our presence.

That afternoon we were driven up a mountain across the Teesta



The Himalayas from Shingba Rhodo Sanctuary



*R.campanulatum*

River from Lachung. The air was cold but the panoramic view was impressive. Sizeable groups of *R. ciliatum* and *R. arboreum* were looking very healthy, much more so than those in the Yumthang Valley.

It was on our drive out of Lachung that we got our very best views of the mighty Himalayas. So often, they are shrouded in cloud/mist but this morning they were clear.

The most amazing event of our trip occurred the next day on the outskirts of Gangtok where we stopped to view the mountains from a viewing platform. I thought the chances of meeting someone we know when travelling in India would be nil. I was wrong! Who should appear but Jeremy Thomson and Shashil Dayal. They were at the start of their adventure, ours was nearing its end.

A visit to a Government Nursery the next day clearly illustrated the effort that the Sikkimese government is putting into reforestation and conservation. It was pleasing to see *R. cinnabarinum*, a species we had hoped to see in the Yumthang Valley. There were nursery beds of cutting-grown *R. arboreum* and *R. glaucophyllum* in pots. Other beds contained seedlings of *Ficus sikkimensis*, *Michelia*, *Acer palmatum* and several others. Recent plantings of sizeable specimens, especially *R. arboreum* were seen on the road verges along our route to Pelling.

Pelling is a mountain village, approximately 26km from Kanchenjunga National Park. Mt Kanchenjunga is the world's third highest peak, India's highest. Hooker spent time botanising in the foothills



*R. virgatum*

of this mountain. Despite waking and peering out at 5.30 a.m. hoping to see the mountain, we still did not see it. It remained invisible behind a bank of cloud for the two days we were in Pelling. From here it was back to Delhi for our flight home.

We were very impressed with how the Toyota Innova cars we travelled in handled the rugged roads and we were even more impressed with the skill of our drivers. We had great faith in their ability to handle any situation. Apparently the road death toll is very low. Maybe some of the clever road signage is a contributing factor, e.g. "Chance takers are accident makers".

Bernie and I were privileged to have Neelam travel in our vehicle a good bit of the time. We learnt so much about the areas we were travelling through, the plants we



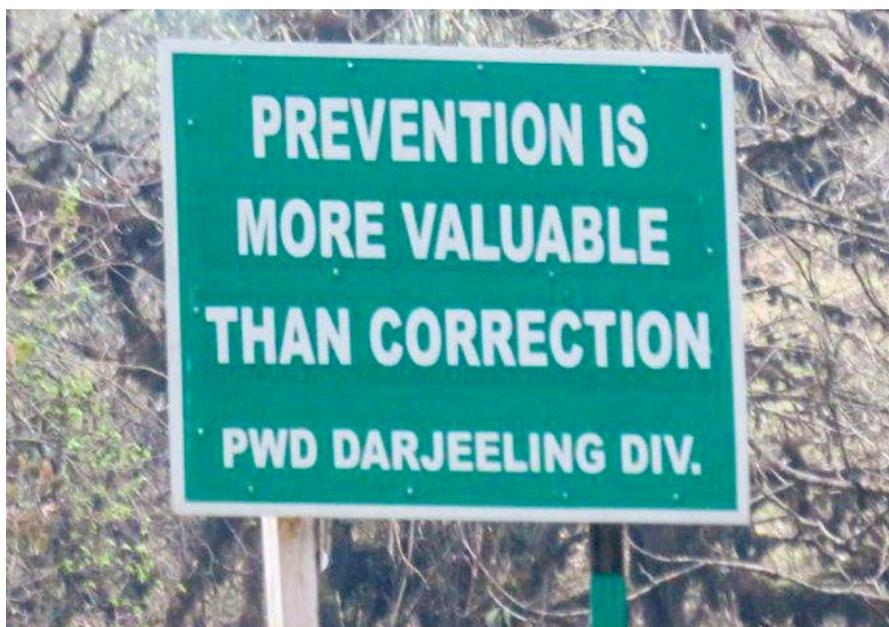
*Pieris sp.*

were seeing and the efforts being made to make Sikkim clean green. The plant knowledge and attention to detail of our NZ leader Brent also added greatly to our experience.

This tour was not designed specifically for rhododendron enthusiasts, although there was a strong focus on botany. Not only did we learn about plants, there was much to learn about geology, climate, culture, religion, history and tradition. Looking back one realises just how much ground we covered and how much knowledge we gained, and there is certainly something special about seeing rhododendrons growing in their natural habitat.

*Reference used:*

K C Pradhan: Handbook 'The Rhododendrons of Sikkim'





# THE NEW ZEALAND EX-SITU CONSERVATION PROJECT REPORT

Marion MacKay

*R. hellwigii* held in only one site - Pukeiti.

**I**t has been a busy year for the New Zealand Rhododendron Conservation Project and I am pleased to report on some great progress and exciting future developments. Readers may recall that the project was initiated by Pukeiti Rhododendron Trust as a collaboration with a project team, and participants include scientists, collection holders, botanists and conservation authorities in New Zealand and internationally. In this article I will review the context of the project, give a summary of progress to date and outline

our future plans. The project team is listed in Appendix 1.

## International and national context

The New Zealand *ex-situ* Rhododendron Conservation Project takes place within the context of recent international research and conservation initiatives, starting with a series of recent analyses of *Rhododendron* taxa in cultivation internationally (MacKay et al. 2018; MacKay & Hootman 2018; MacKay & Gardiner 2017a; MacKay & Gardiner 2017b; MacKay et al. 2017; MacKay et al. 2016). Those analyses showed that New Zealand holds a rhododendron collection of world

interest, including the collection at Pukeiti, and proposed international priorities for *ex-situ* conservation of *Rhododendron*. (These priorities are subgenera *Vireya* and *Azaleastrum* (MacKay & Gardiner 2017a) and taxa from China, Indonesia and Papua New Guinea (MacKay & Gardiner 2017b).)

The aforementioned analyses were derived from the MacKay database, which is the largest and most comprehensive global description of the conservation status of around 1400 *Rhododendron* taxa and their presence in cultivation. The dataset has been developed over 10 years and encompasses some 380 data sources, which cover 29 New Zealand collections, 15 international collections,

and 4 global datasets. Because of its extent, which includes data from private collections and species offered for sale (mostly through specialist growers and societies), the MacKay database captures a different range of data to the main database of world botanic gardens held at Botanic Gardens Conservation International (BGCI) in London.

An exciting recent activity was the 2018 Rhododendron Conservation Workshop (Virginia USA), initiated by BGCI, and planned and directed by Paul Smith, Secretary General of BGCI, and myself (underpinned by analysis of my database). Fifteen people from twelve countries were invited to attend. A critical result was the formation of the Global Rhododendron Conservation Consortium (<https://www.bgci.org/our-work/projects-and-case-studies/a-global-conservation-consortium-for-rhododendron-gccr/>), under the umbrella of BGCI and in association with Royal Botanic Garden Edinburgh (RBGE).

Since the workshop, BGCI has appointed Noelia Alvarez de Roman as Plant Conservation Project Manager, and Noelia and I have been working on a series of international action plans. The first of these was a project overview and work plan (GCCR 2019a). The second and third plans (not yet published) are for Critically Endangered (CR)<sup>1</sup> taxa as these are the highest priority for conservation, and for Not Evaluated (NE) taxa as preparation for the eventual Red List assessment of those taxa. The next priority will be to research Data Deficient (DD) taxa, also for an eventual re-assessment of those taxa. Noelia is also developing several international collaborations (GCCR 2019b). These are: (i) with Guizhou Minzu University in China for *R. liboense* (CR), (ii) with the Sabah Forestry Department of Indonesia for *R. monkoboense* (CR) and *R. tuhanense* (CR), (iii) with the International Centre for Tropical Highland Ecosystem Research and Botanic Garden in Vietnam for *R. fleuryi* (CR), *R. langbianense* (EN) and *R. triumphans* (EN). (EN is a conservation assessment

of Endangered.) Noelia has also been planning two expeditions. One is to Papua New Guinea (PNG), in association with Mr Michael Lovave of Lae Botanic Garden, where the target is to investigate some of the many Data Deficient taxa from that country. The second expedition is to Vietnam; however a funding proposal was unsuccessful and this expedition is presently on hold until 2020. In 2018 Royal Botanic Garden Edinburgh (RBGE) agreed to become lead agency for the Rhododendron Consortium and in 2019 Dr Alan Elliot joined the Consortium as part of his duties as Biodiversity Conservation Network Manager at RBGE.

Nationally, there are two important aspects of context for the project and the first of these is the collaboration with the New Zealand Rhododendron Association (NZRA). For some years NZRA has taken a keen interest in species and their cultivation in New Zealand and has supported the collection and propagation of species for conservation purposes (Davies L 2003, 2000; Davies S 1997, 1996; Joel 1996; Smith 1995). This programme, led by Sue Davies/Gardiner, is now merged into the New Zealand *ex-situ* Rhododendron Conservation Project.

The second aspect of national context is the research collaboration between Massey University, The New Zealand Institute of Plant & Food Research Limited (Dr Sue Davies/Gardiner and Dr Claudia Wiedow) and international associates to use molecular techniques to investigate diversity and taxonomy of *Rhododendron* accessions from New Zealand and international collections. Sue is presently leading a project, sponsored by the New Zealand and Australian Rhododendron Societies, on the relationships among the Australian species and their likely relatives from PNG. In 2020 Sue and I will be supervising a PhD student who will investigate the presence of wild-source material in cultivation and undertake a molecular analysis of selected accessions to examine their genetic diversity.

## Progress on the New Zealand Project 2016-2019

Since the initiation of the New Zealand project in 2016, progress has been made on several fronts. A first step was to expand the MacKay database, particularly to increase the number of New Zealand collections recorded but also to broaden the international data. This development involved the addition of 30 data components (15 private New Zealand collections, two international updates (BGCI, Edinburgh), and 13 new sets of international data), with 18 of those data elements sponsored by Pukeiti Rhododendron Trust. Private collection holders in New Zealand were invited to participate in the project and relationships have been formed with, and data received from, 15 collection owners. Relationships have also been developed with staff at Pukeiti Gardens, the New Zealand Rhododendron Association (NZRA), the Rhododendron Species Foundation in USA, and the Global Consortium.

An essential part of the project has been the fieldwork by Doug Thomson and Graham Smith who have inspected, recorded and verified collections in North and South Islands. Fieldwork is also the core of a collaboration with Sue Davies/Gardiner and NZRA. Sue leads a project on identification, propagation and research into a significant collection at a private site in Dunedin (where plants are unfortunately unlabelled) with assistance from Doug Thomson, Andrew Brooker, Joy O'Keefe, Lindsay Davies, and occasional help from me. The fieldwork was supported by the transcription by Anne Howard (Pukeiti Rhododendron Trust) of a handwritten ledger that was provided by the previous owner of the site.

The strength of a large dataset is that it allows analysis, and the first exercise was determination of priorities for importation of further material into New Zealand. The aim was to prioritise species which currently have relatively poor representation in New Zealand, such as a narrow range of accessions or limited wild-source material (actually, that includes most

<sup>1</sup> Red List categories (Gibbs et al. 2011), in decreasing order of rarity or threat are: Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), and Data Deficient (DD), the latter being used where a conservation problem is likely but there is insufficient data to make a proper assessment. Least Concern (LC) is used for those taxa that do not have a conservation problem, and Not Evaluated (NE) is used for taxa that have not yet been assessed.

species. Many species that are in New Zealand appear to have few known wild-source accessions). Following this analysis, in late 2018 Doug Thomson imported wild-collected seed of 18 species from a 2018 expedition to NW Yunnan by Jonny Larsen of Norway. Later, in April 2019 Shashil Dayal and Jeremy Thomson undertook an expedition to Sikkim, partly sponsored by Pukeiti Rhododendron Trust. Ninety packets of seed of 24 species were collected, including 11 species for which there was previously no wild-source material in New Zealand.

Another analysis of the data focussed on priorities for propagation from New Zealand collections, with the aim of propagating and dispersing species held on fewer than three sites. Subsequently, propagation material has been gathered from South Island collections (Doug Thomson, Graham Smith, Sue Davies/Gardiner), and from North Island collections by Graham Smith and Andrew Brooker. Once grown to a suitable size, plants will be distributed to sites that provide optimal growing conditions.

The possible rediscovery or reintroduction of species presently lost from cultivation in New Zealand is another area of activity. Because the MacKay database includes historical data (e.g. from old collection lists, old commercial trade lists, sales lists from old NZRA newsletters), species that were once here but which lack a current record can be identified (about 130 taxa). With the help of Peter Catt and Heather Robson we are searching historical publications, trade lists, collections lists and archives to develop a dossier of evidence on *Rhododendron* species that have been lost from cultivation in New Zealand. We hope to identify further locations where accessions of endangered species or species uncommon in New Zealand might be found. For example, Eastwoodhill once had *R. aucklandii* 'Rubrum' – this plant was extant in the 1990s – and if it is still alive it should be propagated and dispersed.

The 'people' aspect of the project has been progressed by several excellent connections and collaborations. Our collaboration with NZRA has been

strengthened by the appointment of Sue Davies/Gardiner to the Board of Pukeiti Rhododendron Trust; having a direct link to the NZRA Species Subcommittee will be very useful. Given the importance of the Pukeiti collection, our collaboration with Taranaki Regional Council (TRC) is also most important. Earlier in 2019 TRC appointed Andrew Brooker as TRC Rhododendron Collection and Projects Officer and Andrew has joined the project team. In June 2019, along with Gordon Bailey and Lynn Bublitz, I met with Stephen Hall (TRC Director of Operations) and reported on the project and the proposed future work, with the aim of developing the best possible collaboration. Connections with international colleagues are also important; in person if possible. In July 2019 Andrew Brooker and Graham Smith (sponsored by Pukeiti Rhododendron Trust) visited the collections at Emu Valley and Olinda in Australia and met with staff for discussions on conservation and management of collections (Brooker 2019).

Finally, telling our story is an important part of the project and a range of publications and presentations have been completed. Doug Thomson attended the American Rhododendron Society and German Rhododendron Society joint conference in Bremen in 2018 (sponsored by Pukeiti Rhododendron Trust) and gave an oral presentation on the project (Thomson 2018a). Also in 2018, I presented (by video link) a current global summary at the 2018 workshop in USA (MacKay 2018a). Several articles and reports have been published on various aspects of the project (Brooker 2019; MacKay 2018b, 2018c, 2018d, 2018e, 2017a, 2017b, 2016a, 2016b, 2016c; MacKay et al. 2018; MacKay & Hootman 2018; Thomson 2018b, 2017, 2015). Some of these articles have been picked up and republished in the Journal of the American Rhododendron Society (MacKay 2017c) or the Rhododendrons International journal (MacKay & Hootman 2019; MacKay 2018e, 2018f) thus increasing our international exposure.



*R. barbatum* 'Meteor' at Cross Hills. New wild-source material of *R. barbatum* was collected from Sikkim by Dayal and Thomson in 2019. (Cross Hills 2019).

## FORWARD ACTION

Having got this far, what next? Several aspects of the project will be ongoing. The first of these is continuation of the 'search, identify and propagate' activities, with propagation hubs in Palmerston North (Sue Davies/Gardiner), Dunedin (Dunedin Botanic Garden via an arrangement with Pukeiti Rhododendron Trust and Taranaki Regional Council), Pukeiti, and with assistance from NZRA as appropriate. The second ongoing aspect is the continued building of the research dataset as new information is obtained, including the dossier on species that were present in New Zealand historically. Thirdly, analysis of the data will continue to be used to determine priorities for propagation and acquisition of new material.

What will happen to the material that is being propagated? We know that collections can run out of space for new accessions so some planning is needed for distribution and housing of the propagated material. Using analysis of the national dataset, and in discussion with key parties, we will develop a draft framework for a national collections network through the following processes:

Examining the current characteristics of key collections nationally, to define which taxonomic groups are securely held and which are not, and the extent to which duplicates already exist



*R. phaeochrysum* var. *laevistratum* at Tannock Glen in 2014. A new seed-lot of *R. phaeochrysum* was acquired from Jonny Larsen in 2018.



New wild-source material of *R. lepidotum* (Nepal, India, Bhutan, Burma) was collected from Sikkim by Dayal and Thomson in 2019. (Pukeiti 2017).



*R. chamaethomsonii*, Vulnerable, from China, is a high priority for propagation as it is recorded on only two sites in New Zealand. (Edinburgh 2008).



*R. javanicum* subsp. *moultonii*, Data Deficient, (Malaysian Borneo), is held at only one site and is a high priority for propagation. It was offered for sale in 2015 so there is some chance it may be elsewhere; however, there is no record of who purchased plants. (Pukeiti 2017).



*R. scopulorum*, Vulnerable, (China), is held on two sites and is a high priority for propagation. (Pukeiti 2016).



*R. beanianum*, Vulnerable, (Burma, India, China) is on three sites in New Zealand and is a high priority for propagation. (Edinburgh 2013).



*R. meddianum*, Vulnerable, (China), is on four New Zealand sites and is a medium priority for propagation. (Woodchester 2016).



*R. lindleyi* is a common species that is found on several New Zealand sites; however, the yellow form is not so commonly seen. (Cross Hills 2017).



Specifically for the largest collections in each of North and South Islands, reconfirming the collection focus, but also defining which taxonomic groups are not suited to those sites, and therefore must be held elsewhere. At the same time, nationally,

Determining which taxonomic groups are best suited climatically to which sites

Using all of the above, proposing an allocation of taxonomic groups to collection sites, with the aim of covering all groups nationally.

Following (or, in association with) the above analysis, we will hold discussions with holders of likely collection sites with respect to achieving a set of sites that will hold particular groups of species (Graham Smith and Andrew Brooker have already made some useful contacts in this regard.) In due course, plant distribution will be made among the propagation hubs and the specific sites. Obviously there is a 'job of work' to do here and I expect that this process might take place gradually over a couple of years or so.

A key part of future collection planning is obtaining wild-source material. *Ex-situ* conservation collections should ideally be based on known wild-source material as this represents the wild type. 'Known' is the operative word and accessions should be of known provenance with source details. A common problem is that accessions are listed as wild-sourced but the location details have been lost, or, accessions have a collecting number but no source details are attached. A second part of this issue is that often the same wild-source accession circulates in cultivation, i.e. there is insufficient diversity present to adequately represent the species. An informal perusal of the MacKay data suggests that in New Zealand we have insufficient wild-source accessions for many taxa; a structured analysis of this issue is another one of the forward actions for the project. (This analysis will be integrated with the forthcoming international analysis by the student who will be undertaking research in 2020).

In relation to wild-source material, we hope to have New Zealanders participate in wild-source collecting expeditions where possible and where we can find funding. Opportunities via the Global Consortium include an expedition to PNG (possibly in 2020) and another to South Vietnam, which did not obtain funding in 2019 but may go ahead in 2020. An opportunity to participate in an RBGE expedition to North Vietnam is another possibility, as are visits to China with Professor Guan Kaiyun. Where we cannot participate directly, we will subscribe to seed collections such as the seed-lots obtained recently from Jonny Larsen. As well as obtaining new material from overseas, we will work with our international colleagues to send any unique material that we may have to other international collections. Readers will be aware that trips such as those led in the past by Pukeiti and the late Ron Gordon brought material into New Zealand that other international collections may not have – sharing that material, where we can, is part of the overall programme.

Publication and presentation will also continue, with team members writing and presenting on appropriate topics in appropriate forums. Later in 2019 Doug Thomson is giving the keynote address at the NZRA conference in Rotorua, while Andrew Brooker is making a presentation on Rhododendron Conservation at Puke Ariki in New Plymouth in November. Sue Davies/Gardiner will present preliminary results from the Australian vireya project to the Australian Systematic Botany Conference in Wellington in November 2019, as well as to the Australian Rhododendron Society conference in November 2020. Doug will speak at the 75th conference of the American Rhododendron Society in Portland in May 2020. Other team members may also attend these conferences as resources allow (I would love to go, but I still have the eye condition that stopped me from going to Virginia in person in 2018. Australia is probably my limit for now.) Later in 2020 we plan that Gordon Bailey and Sue Davies/Gardiner will travel to China to develop the collaboration between Professor Guan

Kaiyun, Kunming Botanic Garden, and the project; however, at the time of writing no specific arrangements have been made for this activity.

Our final forward action will be to maintain contact between the *ex-situ* project and other related activities, in a similar manner as previously. These contacts will include, the research undertaken through Massey University and Plant & Food Research, the Global Consortium and its developing international strategy, the activities of the NZRA Species Subcommittee, any further analysis of the MacKay dataset, and the collection at Pukeiti and its further development. Any new activities that arise will be added to our contacts as appropriate.

Having been involved with the New Zealand *ex-situ* Conservation Project for several years now, I can attest that it is full of interesting and challenging activities. On one hand, we have a tiger by the tail; on the other hand, there is a great range of things to do from identification and propagation, to searching archives and old trade lists, right through to field expeditions and research. Our overall aim is to position the 'New Zealand' collection of *Rhododendron* as well as possible so that it can fulfil a useful role in international *ex-situ* conservation; I believe we have made a good start.

## Acknowledgements

This project succeeds because of the valuable and varied contributions of many people and Institutions. I gratefully acknowledge the contributions from the project team, Pukeiti Trust Board and its associates, the 2016-2018 funding provided by Pukeiti Trust Board, Taranaki Regional Council and the staff at Pukeiti Gardens, private collection holders in New Zealand, the New Zealand Rhododendron Association, Dunedin Botanic Garden, Botanic Gardens Conservation International, members of the Global Rhododendron Conservation Consortium, Massey University and the New Zealand Institute for Plant & Food Research Limited.

## Appendix One: The Project Team

Dr Marion MacKay, Massey University and Pukeiti Rhododendron Trust. *Ex-situ* conservation specialist. New Zealand Project leader, researcher for the Global Consortium and member of the Consortium steering committee.

Dr Sue Davies/Gardiner, Principal Scientist, New Zealand Institute of Plant & Food Research Ltd., and Past President of the New Zealand Rhododendron Association (NZRA). Molecular DNA and genetic diversity analyst, chair of the NZRA Species Subcommittee, Rhododendron propagation specialist. Board member of the Rhododendron Species Foundation (USA) and the Pukeiti Rhododendron Trust.

Doug Thomson, Dunedin Botanic Garden and Pukeiti Rhododendron Trust. Rhododendron curator at Dunedin Botanic Garden, expert in rhododendron cultivation, propagation, identification and collection management.

Graham Smith, former Director of Pukeiti gardens. Global expert in rhododendron cultivation, propagation, identification and collection management, with particular expertise in subgenus *Vireya*.

Andrew Brooker, Taranaki Regional Council and Pukeiti Gardens, expert in rhododendron cultivation, propagation, identification, collection management.

Associated New Zealand partners include Pukeiti Rhododendron Trust, the New Zealand Rhododendron Association, and Taranaki Regional Council (Stephen Hall, Greg Rine) and the Pukeiti Garden Forum (Alan Jellyman, Graham Smith, Lynn Bublitz, Peter Catt, Greg Rine). International connections include the Kunming and Xizang Botanical Institutes through Professor Guan Kaiyun, the Rhododendron Species Foundation in USA, the Global Consortium, Botanic Gardens Conservation International, and Royal Botanic Garden Edinburgh.

## References

- Brooker A. 2019. Dandenong Botanical Garden and Emu Valley Rhododendron Garden – a whistle stop tour. *NZRA Newsletter August 2019* 12: 5.
- (GCCR) Global Conservation Consortium for Rhododendron. 2019a. *Overview and draft programme of work*. Botanic Gardens Conservation International, Richmond, UK.
- (GCCR) Global Conservation Consortium for Rhododendron. 2019b. *Global Rhododendron Conservation Consortium: 1st year report*. Botanic Gardens Conservation International, Richmond, UK.
- Davies L. 2003. Notes from Heritage Park on the performance of *Rhododendron* species collected by Shashil Dayal and Jeremy Thomson. *NZRA Bulletin* 91: 15-17.
- Davies L. 2001. *Rhododendron roseatum* in flower – a postscript to plant hunting in Yunnan, October 1992. *NZRA Bulletin* 89: 55-58.
- Davies L. 2000. *Rhododendron excellens* AC435 – a first flowering. *NZRA Bulletin* 88: 50-51.
- Davies S. 1997. National *Rhododendron* Collection. *NZRA Bulletin* 85(2): 11.
- Davies S. 1996. National *Rhododendron* Collection. *NZRA Bulletin* 84: 33.
- Gibbs D, Chamberlain D, Argent G. 2011. *The Red List of Rhododendrons*. Botanic Gardens Conservation International, Richmond, UK. Online at: [https://www.bgci.org/plant-conservation/rhododendron\\_red\\_list/](https://www.bgci.org/plant-conservation/rhododendron_red_list/)
- Joel M. 1996. Dunedin *Rhododendron* Group Inc. Dunedin Species Project. *NZRA Bulletin* 84: 51.
- MacKay MB., Hootman SE., Smith GF, Thomson D., Gardiner SE., Smith P. 2018. *Updated global analysis for ex situ conservation of Rhododendron L. (Ericaceae)*. Report to Botanic Gardens Conservation International, January 2018. Massey University, Palmerston North, New Zealand, and Botanic Gardens Conservation International, Richmond, UK. Online at [https://www.arboretumwespelaar.be/userfiles/file/pdf/180000\\_MacKayETAL\\_2018\\_Report\\_RhododendronGlobalUpdate06.pdf](https://www.arboretumwespelaar.be/userfiles/file/pdf/180000_MacKayETAL_2018_Report_RhododendronGlobalUpdate06.pdf)
- MacKay MB., Hootman SE. 2019. Examining the significance of the *Rhododendron* collection at the *Rhododendron* Species Botanical Garden (Federal Way, Washington State, USA). *Rhododendron International* (2019) 4(1): 1-15. Online at <https://www.rhododendron.org/ri/v4p1.pdf#zoom=175>
- MacKay MB., Hootman SE. 2018. Examining the significance of the *Rhododendron* collection at the *Rhododendron* Species Botanical Garden (Federal Way, Washington State, USA). *Rhododendron Species* (2018) 13: 55-69.
- MacKay MB. 2018a. *Overview of Rhododendron Conservation*. Keynote address to the *ex situ Rhododendron* conservation workshop at Oak Spring Garden, 17-18 April 2018, Virginia, USA.
- MacKay MB. 2018b. Report on the *Rhododendron* Conservation Workshop held at Oak Spring Garden, Virginia, 17-18 April 2018. *The New Zealand Rhododendron* 6: 24-27.
- MacKay MB. 2018c. Searching for the 'lost' *Vireyas*: the next phase of the New Zealand *ex situ* conservation project. *The New Zealand Rhododendron* 6: 84-90.
- MacKay MB. 2018d. *Development of a New Zealand ex situ conservation strategy for Rhododendron: contract report 05 (Massey University and Pukeiti Rhododendron Trust): end of March 2018*. Report to the Pukeiti Trust Board. Massey University, New Zealand.
- MacKay MB. 2018e. *Vireya* from West and East: distribution and conservation of *Rhododendron* section *Schistanthe*. *Rhododendron International* 2(2):138-151. Online 7 May 2018 at <https://www.rhododendron.org/ri-index.htm>.
- MacKay MB. 2018f. A project to develop an *ex situ* conservation plan for *Rhododendron* species in New Zealand collections. *Rhododendron International* 2(2):112-127. Online 7 May 2018 at <https://www.rhododendron.org/ri-index.htm>.
- MacKay MB., Gardiner SE. 2017a. A model for determining *ex situ* conservation priorities in 'big genera' is provided by analysis of the subgenera of *Rhododendron* L. (Ericaceae). *Biodiversity Conservation* 26 (1): 189-208. DOI 10.1007/s10531-016-1237-0. Published online 25 October 2016.
- MacKay MB., Gardiner SE. 2017b. Geographic analysis of Red List *Rhododendron* (Ericaceae) taxa by country of origin identifies priorities for *ex situ* conservation. *Blumea* 62: 103-120. <https://doi.org/10.3767/blumea.2017.62.02.05>
- MacKay MB., Smith GF, Gardiner SE. 2017. New Zealand collections of *Rhododendron* as a resource for *ex situ* conservation. *New Zealand Journal of Botany* 55(2): 193-214. <http://dx.doi.org/10.1080/0028825X.2017.1291434>.
- MacKay MB. 2017a. Uncommon *Rhododendron* species in New Zealand: are there any at the bottom of your garden? *The New Zealand Rhododendron* 5: 32-39.
- MacKay MB. 2017b. Development of a New Zealand *ex situ* strategy for *Rhododendron*: project report to the end of June 2017. *The New Zealand Rhododendron* 5: 26-29.
- MacKay MB. 2017c. A project to develop an *ex situ* conservation plan for *Rhododendron* species in New Zealand collections. *Journal of the American Rhododendron Society* Fall 2017: 208-211.
- MacKay MB., Smith G., Gardiner SE. 2016. Analysis of geographic and taxonomic groups informs conservation of *Rhododendron* L. subgenus *Vireya* (C.B. Clarke) H.F. Copel. (Ericaceae). *Blumea* 61: 170-180 doi. [org/10.3767/000651916X693275](https://doi.org/10.3767/000651916X693275).
- MacKay MB. 2016a. Development of an *ex situ* conservation plan for *Rhododendron* species in New Zealand. *The New Zealand Rhododendron* 4: 26-27.
- MacKay MB. 2016b. Early *Rhododendron* collections in New Zealand: species collected by Douglas Cook. *The New Zealand Rhododendron* 4: 38-45.
- MacKay MB. 2016c. *Vireya* from west and east: diversity and distribution of *vireya* rhododendron, *Rhododendron* subgenus *Vireya*. *The New Zealand Rhododendron* 4: 64-69.
- Smith G. 1995. National *Rhododendron* Collection. *NZRA Bulletin* 83: 8-9.
- Thomson D. 2018a. The New Zealand *ex situ Rhododendron* conservation project. Oral presentation at the American *Rhododendron* Society Conference, Bremen, May 2018.
- Thomson D. 2018b. Partnering Plants and People. Report on the 2018 American *Rhododendron* Society Conference, Bremen. *The New Zealand Rhododendron* 6: 28-39.
- Thomson D. 2017. *Rhododendron* species collections verification. *The New Zealand Rhododendron* 5: 22-25.
- Thomson D. 2015. Dunedin well-placed to play a significant conservation role. *The New Zealand Rhododendron* 3: 43-45.



# EX-SITU CONSERVATION AND WILD-SOURCE PLANT MATERIAL

Marion MacKay

*R. sinofalconeri* DT311. This Near Threatened (NT) species from China and Vietnam is held on 14 sites in New Zealand with two wild-source accessions recorded. (Heritage Park 2017).

One of the next phases of the New Zealand *ex-situ* project, and indeed the global project, will be to investigate the presence or absence of known wild-source plant material in cultivation. Wild-source accessions are a key requirement for *ex-situ* conservation, as these represent the wild form of the species that we are trying to conserve by holding them in cultivation. However, there are a number of challenges to acquiring, managing and cultivating wild-source material of sufficient quantity and quality to represent any particular species. Two key concepts are ‘representative’

and ‘known’, and herein lie two of the weaknesses of the suite of accessions of most species that are held in cultivation.

Representation is a problem in three ways. Firstly, it is a problem because many accessions that are in cultivation are not from wild-collected material, they have come instead from cultivated sources of often unknown provenance. (Also, as we know, any rhododendron seed from cultivated plants that is not from a controlled pollination is likely to be a hybrid.) Secondly, it is a problem because ‘representation’ means having enough accessions to capture most of the genetic diversity of the species and, in general, we do not have enough accessions in cultivation to achieve that goal (Volis 2017a, 2017b).

How many is ‘enough’ accessions? How much is ‘most’ of the genetic diversity? Therein lie some thorny problems. Protocols for sampling for *ex-situ* conservation by seed-banking indicate that 50 individual plants should be sampled (Volis 2017b) from 5-50 populations (Volis 2015). However, to capture genetic diversity, sampling should take account of the distribution and biology of a species (Hoban & Strand 2015). Large and widespread species need additional samples to capture the geographical and environmental variation of those species (Volis 2015). For rare species of limited distribution, that may not have 50 plants in existence, the sample may be the entire population, e.g. the 15 plants of *R. griersonianum* that are extant in the wild (Liu et al. 2019; Sun et al. 2019).



*R. formosum* var. *formosum* 'Ten Tashi' was wild-collected from Sikkim and acquired by Pukeiti as cuttings in 1986. (Pukeiti 2018).

The third problem of representation is that, even when a suite of wild-collected accessions is broad and well-recorded, we still do not know much about the actual genetic diversity of many rhododendron species (as opposed to morphological diversity or geographical diversity). There is a developing body of research on this aspect (Bruni et al. 2012; Kuttapetty et al. 2014; Li et al. 2018; Li et al. 2015; Liu et al. 2012; Wu et al. 2017; Wu et al. 2014; Xu et al. 2017); however, with some 1300 rhododendron taxa we presently lack this information for most species. As a general principle, species with wider genetic variation will need wider sampling to achieve representation (Volis 2015), and species with distinct populations will need sampling from each population (Li et al. 2015). However, at present, for most species we have only geographic range and morphological variation as a proxy for judging genetic diversity.

The second concept, 'known' wild-source material, is indicative of another key problem of *ex-situ* conservation – the need for accurate labelling and record keeping. Furthermore, this needs to be long-term. An accession of *R. fortunei* held in a North Island collection in

New Zealand illustrates the point. The accession is BDM62/98, a plant that came from the South Island collection that Sue Davies/Gardiner is presently researching. We know from the collection ledger that this plant was a controlled pollination from the Rhododendron Species Foundation

in 1994, and was 64/055 x 76/340 – but what exactly was that cross? We need to follow the trail through the Species Foundation records to determine the origin of this accession.

In another example of why details matter, Pukeiti has a pink form of *R. formosum* var. *formosum* and the old Pukeiti records show it is 'Ten Tashi' that was wild collected in Sikkim by Mr Schick of California. Pukeiti acquired it by cuttings and so the Pukeiti plant can still be described as wild-collected, whereas seed, unless from a controlled pollination, would not qualify as wild-collected. In many other instances, the New Zealand data shows accessions that may have come from a wild-collection; however, there are no accompanying details to verify the source. Some accessions carry a collector's number and it may be possible to eventually find the details that relate to such numbers. Other accessions carry an ARS (American Rhododendron Society) or a RSF (Rhododendron Species Foundation) number, which are sometimes wild-sourced or from controlled pollinations, and it may be possible to track the source details for those accessions.

Internationally, much wild-source material has been introduced into



*R. fortunei* BDM 62-98 was a controlled pollination that originally came from the Rhododendron Species Foundation in 1994, but it may not be from wild-source accessions as details of the cross are unknown. (Heritage Park 2017).



*R. auritum* is a Critically Endangered (CR) taxon that is present on five sites in New Zealand but there are zero wild-source accessions recorded. (Pukeiti 2018).

cultivation; old ARS seed lists and RSF sales lists show many wild-source accessions that have been offered for sale over the years. Similarly, unpublished data from Edinburgh (Knott 2018), Kew (Wenham 2018), the Rhododendron Species Foundation (Hootman 2017) and other large international collections (Camelbecke 2018; Justice 2018; Moon 2018; Schepker 2018, 2018a; Widyatmoko 2018) report many wild-source accessions. New Zealanders have also been keen plant hunters and over the years folk like Graham Smith, Ron Gordon, Keith Adams, Shashil Dayal, David Binney, Os Blumhardt and others have been on expeditions and brought wild-collected material into New Zealand (Anon. 2003a, 2003b; Davies 1992; Smith 1979, 1987). Seed from expeditions conducted by other people has also been imported to New Zealand in years past (Anon. 1971; NZRA 1953), for example, NZRA subscribed to several expeditions conducted in the 1950s by Frank Kingdon-Ward (NZRA 1952, 1953, 1954).

Overall, what range of wild-source material is in cultivation nationally and internationally, and where is it held? How many different wild-sources are there? Are rare species included? How much early material is still extant? Do we see the same pattern for *ex-situ* collections in general, where common species are well represented while rare species are often poorly represented (O'Donnell & Sharrock 2017)? For New Zealand, an informal perusal of the MacKay database indicates several scenarios with respect to wild-source accessions in New Zealand collections:

- Red List taxa<sup>1</sup> that are present in a reasonable number of New Zealand collections, but with no wild-source accessions recorded. Examples here are *R. auritum* (CR), *R. dalhousiae* var. *rhabdotum* (VU), *R. dichroanthum* (VU), and *R. goodenoughii* (DD).
- As above, but with 1-2 wild-source accessions recorded in New Zealand. Examples of this status are *R. aberconwayi* (VU), *R. cilicalyx* (DD), *R. eliottii* (VU), *R. griersonianum* (CR), *R. niveum* (VU), *R. sinofalconeri* (NT) and *R. sinonuttallii* (VU).
- Least Concern (LC) species that are nevertheless uncommon in New Zealand collections, with only one wild-source accession present. This status is frequent for vireya taxa in New Zealand including *R. hellwigii*, *R. crassifolium* and *R. edanoi* var. *pneumonanthum*. Yes, they are common species; however, the Pukeiti vireya collection is important globally and it is desirable to have wild-collected material in that collection.
- Least Concern (LC) species where several wild-sources are in cultivation in New Zealand. For example, about 15 different accessions of *R. decorum*, five different accessions of *R. falconeri*, and four different accessions of *R. macgregoriae* are held in New Zealand collections.
- Red List or Least Concern taxa where New Zealand once had wild-source material but it has been lost from cultivation (or, from recorded cultivation). Some of these wild-source accessions have been offered for sale in the past through Plant for Members lists, so may be present on sites as yet unknown. In this category are *R. atlanticum* (LC), *R. carringtoniae* (LC), *R. charitopes* (VU), *R. exasperatum* (NT), *R. haematodes* (NT) and *R. uniflorum* (NT). These taxa are presently extant in collections, but through material of cultivated provenance.
- Taxa that have no current record in cultivation in New Zealand, but were here once. For example, New Zealand *Rhododendron* Association

<sup>1</sup> Red List categories (Gibbs et al. 2011), in decreasing order of rarity or threat are: Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), and Data Deficient (DD), the latter being used where a conservation problem is likely but there is insufficient data to make a proper assessment. Least Concern (LC) is applied to those taxa that do not have a conservation problem.



*R. dichroanthum* is a Vulnerable (VU) taxon from China that is recorded in seven New Zealand collections but there are zero wild-source accessions recorded. (Davies 2017).

sold wild-collected material of *R. albrechtii* in the 1940s and 1950s (NZRA 1945, 1948, 1951, 1952) but there are no current records of the species or any wild-sourced material.

To advance the New Zealand *ex-situ* project and the work of the Global Consortium, and determine priorities for development of collections, we need a better picture of which taxa are represented by how many wild-sources, as well as the geographical location of those sources. To this end, two studies of wild-source material will be conducted over the next year or two:

- I will undertake an analysis of wild-collected material held in New Zealand. The present MacKay dataset has information on wild-source material in New Zealand, but I have not processed the detail of the number of accessions, the number of different accessions, or the number of sites on which those accessions are held.
- Ms Ling Hu (Massey University PhD student) will examine material wild-collected internationally; however, we are yet to determine the precise scope of that study. For international data the MacKay dataset only records that wild-source material is present, but does not describe how many accessions, or from where they were sourced. I will provide



*R. griersonianum* is a Critically Endangered (CR) taxon from China. Two wild-source accessions are in New Zealand and this species is held on nine sites. (Davies 2017).

Ms Hu with a ‘starter’ dataset of species names and origins and she will develop the additional detail needed to describe the range and number of accessions of the selected group of taxa that are in cultivation.

- As we embark on these investigations we will have to establish some criteria and boundaries. Firstly, judgements will be needed on what is categorised as wild-sourced. For example,

accessions with a collector number can be included even if we do not presently have the source details for that accession (I optimistically hope that we can find some of these details). Conversely, I omit samples that have come from a known collector but have no collecting number, unless source location details are on the record. Next, we have to define a timeframe. I have previously defined ‘current’ as having a record of a live plant in the last ten years; we can then compare the range of ‘current’ and ‘previous’ accessions. (From my experience there will be many accessions that are ‘previous’ – were once extant but have since been lost from cultivation.) We will then make an analysis and develop a summary. Factors might include the number of accessions of common and rare taxa, how many accessions are ‘current’ or ‘previous’, and the range of representation of taxa from different countries. Ms Hu will then use a selected set of species (possibly from subsection Maddenia) and perform a molecular study using advanced DNA Sequencing technology, supervised by Sue Davies/Gardiner of the New Zealand Institute of Plant & Food Research, to examine the genetic diversity of those accessions. It is quite possible that a proportion of those accessions will be found to be replicates!



*R. ciliicalyx* is a Data Deficient (DD) taxon that present in several collections, with one wild-source accession recorded at Pukeiti. (Cross Hills 2017).



*R. sinonuttallii* is a Vulnerable (VU) taxon from China and Myanmar. This accession is Cox 10005 from Arunachal Pradesh. (Pukeiti 2018).

Having analysed the range of wild-source material in cultivation, we can determine priorities for taxa that require additional field collections, or accessions that are held on few sites and which should be propagated and dispersed. We should also be able to identify taxa that are well-placed in cultivation and are a relatively lower priority for any action. Of course, the New Zealand circumstance should be related to the international situation. For example, we have no wild-source accessions of *R. atlanticum* in New Zealand; however, there are many such accessions of this North American species in cultivation internationally, so our lack of wild-source material is relatively unimportant. In contrast, many vireyas are uncommon in cultivation and as many of our vireya accessions were collected by New Zealanders, and are unlikely to be held in other international collections, our accessions are relatively important and should be shared internationally if possible.



*R. decorum* is a Least Concern (LC) species from China and Burma that has about 16 wild-sourced accessions in New Zealand, most of those held in a collection at a South Island site. (Davies 2018).



*R. macgregoriae* Yellow Form (LC) was wild-collected by Graham Smith in PNG in 1983. (Pukeiti 2018).

This study is likely to generate some interesting aspects (e.g. ambiguous labelling, incomplete records, wild-collected hybrids and aff. taxa) and our search may lead to some interesting places. In summary, our study of wild-source material in cultivation will advance our knowledge of *Rhododendron* and its management for conservation.

## References

- Anon. 2003a. New Zealand Plant Hunters. *NZRA Bulletin* 91: 28-33.
- Anon. 2003b. Graham Smith's Papua New Guinea collections. *NZRA Bulletin* 91: 47.
- Anon. 1971. Material from *Rhododendron* Venture 1971. *NZRA Bulletin* 58: 57.
- Bruni I., De Mattia F., Labra M., Grassi F., Fluch S., Berenyi M., Ferrari C. 2012. Genetic variability of relict *Rhododendron ferrugineum* L. populations in the Northern Apennines with some inferences for a conservation strategy. *Plant Biosystems* 146(1): 24-32.
- Camelbeke K. 2018. *Excel spreadsheet listing Rhododendron accessions at Arboretum Wespelaar*. Unpublished data provided for the *Rhododendron* Conservation Workshop, April 2018.
- Davies L. 1992. Lindsay Davies, North West Yunnan 1992. *NZRA Bulletin* 91:40.
- Gibbs D., Chamberlain D., Argent G. 2011. *The Red List of Rhododendrons*. Botanic Gardens Conservation International. Richmond, UK. Available from [bgci.org](http://bgci.org).
- Hoban S., Strand A. 2015. *Ex situ* seed collections will benefit from considering spatial sampling design and species reproductive biology. *Biological Conservation* 187: 182-191.
- Hootman SE. 2017. *Inventory of the Rhododendron collection at the Rhododendron Species Botanical Garden, March 2017*. Unpublished collection inventory, *Rhododendron* Species Botanical Garden, Federal Way, USA.
- Justice D. 2018. *Excel spreadsheet listing the Rhododendron collection at University of British Columbia Botanic Garden*. Unpublished data provided to the *Rhododendron* Conservation Workshop, April 2018.
- Knott D. 2018. *Excel spreadsheet listing the Rhododendron collection at Royal Botanic Garden Edinburgh*. Unpublished data provided to the *Rhododendron* Conservation Workshop, April 2018.
- Kuttapetty M., Pillai PP, Varghese RJ., Seeni S. 2014. Genetic diversity analysis in disjunct populations of *Rhododendron arboreum* from the temperate and tropical forests of Indian subcontinent corroborate Saptura hypothesis of species migration. *Biologia* 69 (3): 311-324.
- Li M., Chen S., Shi S., Zhang Z., Liao W., Wu W., Zhou R., Fang Q. 2015. High genetic diversity and weak population structure of *Rhododendron jinggangshanicum*, a threatened endemic species in Mount Jinggangshan of China. *Biochemical Systematics and Ecology* 58: 178-186.
- Li S., Sun W., Ma Y. 2018. Does the giant tree rhododendron need conservation priority? *Global Ecology and Conservation* 15: e00421 <https://doi.org/10.1016/j.gecco.2018.e00421>
- Liu D., Sun W., Ma Y., Fang Z. 2019. Rediscovery and conservation of the Critically Endangered *Rhododendron griersonianum* in Yunnan, China. *Oryx* 3(1): 14.
- Liu YF, Xing M., Zhao W., Fan RJ., Luo S., Chen X. 2012. Genetic diversity analysis of *Rhododendron aureum* Georgi (Ericaceae) located on Changbai Mountain using ISSR and RAPD markers. *Plant Systematics and Evolution* 298: 921-930.
- Moon T. 2018. *Excel spreadsheet listing the Rhododendron collection at the National Rhododendron Garden, Australia*. Unpublished data provided to the *Rhododendron* Conservation Workshop, April 2018.
- (NZRA). New Zealand *Rhododendron* Association. 1945. Plants for members. *NZRA Bulletin* 1: 1-6.
- (NZRA). New Zealand *Rhododendron* Association. 1948. Plants for members. *NZRA Bulletin* 4: 2.
- (NZRA). New Zealand *Rhododendron* Association. 1951. Plants for members. *NZRA Bulletin* 8: 2.
- (NZRA). New Zealand *Rhododendron* Association. 1952. Plants for members. *NZRA Bulletin* 10: 1-4.
- (NZRA). New Zealand *Rhododendron* Association. 1953. Plants for members. *NZRA Bulletin* 12: 1-2.
- (NZRA). New Zealand *Rhododendron* Association. 1954. The Kingdon-Ward North Burma expedition 1953. *NZRA Bulletin* 13: 6-8.
- O'Donnell K., Sharrock S. 2017. The contribution of botanic gardens to *ex situ* conservation through seed banking. *Plant Diversity* 39: 373-378.
- Schepker H. 2018. *Excel spreadsheet listing temperate Rhododendron species held in all of Germany*. Unpublished data provided to the *Rhododendron* Conservation Workshop, April 2018.
- Schepker H. 2018a. *Excel spreadsheet listing vireya Rhododendron species held at the Rhododendron Garden, Bremen, Germany*. Unpublished data provided to the *Rhododendron* Conservation Workshop, April 2018.
- Smith G. 1987. Recent arrivals at Pukeiti. *NZRA Bulletin* 75: 58-59.
- Smith G. 1979. Acquisitions from Nepal and Sikkim. *NZRA Bulletin* 67: 23-25.
- Sun W., Ma Y., Blackmore S. 2019. How a new conservation action concept has accelerated plant conservation in China. *Trends in Plant Science* 24(1): 4-6.
- Volis S. 2017a. Conservation utility of botanic garden living collections: setting a strategy and appropriate methodology. *Plant Diversity* 39: 365-372.
- Volis S. 2017b. Complementarities of two existing intermediate conservation approaches. *Plant Diversity* 39: 379-382.
- Volis S. 2015. Species targeted conservation: time for conceptual integration. *Israel Journal of Plant Sciences* <http://dx.doi.org/10.1080/07929978.2015.1085203>
- Wenham J. 2018. *Excel spreadsheet listing Rhododendron species held at the Kew and Wakehurst Place sites (Royal Botanic Gardens Kew)*. Unpublished data provided to the *Rhododendron* Conservation Workshop, April 2018.
- Widyatmoko D. 2018. *Excel spreadsheet listing Rhododendron species held at Bali and Cibodas Botanic Gardens, Indonesia*. Unpublished data provided to the *Rhododendron* Conservation Workshop, April 2018.
- Wu F., Shen S., Zhang X., Yang G., Wang Y. 2017. Inferences of genetic structure and demographic history of *Rhododendron protistum* var. *giganteum* – the world's largest rhododendron – using microsatellite markers. *Flora* 233: 1-6.
- Wu F., Shen S., Zhang X., Yang G., Wang Y., Sun W. 2014. Genetic diversity and population structure of an extremely endangered species: the world's largest rhododendron. *AoB Plants* 7 plu082.
- Xu JJ., Zhang LY., Zhao B., Shen HF. 2017. Assessment of genetic diversity among six populations of *Rhododendron triflorum* in Tibet using ISSR and AFLP markers. *South African Journal of Botany* 108: 175-183.



*R. atlanticum* (LC) is from Eastern USA. There are zero wild-source accessions currently recorded in New Zealand, although Pukeiti once had three accessions. (Davies 2017).



# FIGHTING RHODODENDRON EXTINCTION INTERNATIONAL EFFORTS TO SAVE SPECIES, AND NEW ZEALAND'S INPUT

Doug Thomson

*R. taxifolium*

The title of this article 'Fighting Rhododendron Extinction – international efforts to save species and New Zealand's input' may sound a bit melodramatic – after all many of our gardens are brimming with rhododendron species and, including the sub-tropical vireyas, over 1300 species have been recorded in the wild. So obviously the genus *Rhododendron* is not under imminent threat of extinction.

However, three species *R. denudatum* var. *glabrovarium*, *R. longiflorum* var. *longipetalum* and *R. retrorsipilum* are now extinct, whilst one *R. kanehirae* is extinct in the wild and survives only in cultivation. Others, such as *R. taxifolium* are suspected but not, as yet, confirmed

extinct. In 2011 Botanic Gardens Conservation International [BGCI] in association with The International Union for the Conservation of Nature (IUCN) produced The Red List of Rhododendrons. To date, 1232 species have been assessed in the wild, 1215 by either Gibbs et al (2011) or Argent 2015 and by 17 other authors. The results of that assessment show that approximately 25% of rhododendron species are "under threat of extinction in the wild"; another 35% are so poorly known that their conservation status is uncertain, and they are assessed as Data Deficient. Along with BGCI, action must be taken by botanic gardens, rhododendron specialist gardens and enthusiasts to ensure all threatened rhododendron species are subject to *ex-situ* conservation while action also needs to be taken to protect them in their native habitats.

Awareness of species extinction and the deterioration in the natural environment has of course been growing for several decades. IUCN was founded in 1948, focused on saving species and promoting conservation. From an initial membership of 65 countries it has now grown to 140. As mentioned above The Red List of Rhododendron was released in 2011. To date, this is one of seven Red Lists produced since 1964 when the IUCN introduced the concept of an IUCN Red List of Threatened Species. These have become the principle source of information on the conservation status of species and the institution of the IUCN Red List is generally accepted as the world's main authority in this field. According to The Red List, there are 9 different categories; Extinct (EX), Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened

(NT), Least Concern (LC), Data Deficient (DD) and Not Evaluated (NE).

The first international agreement aimed at environmental security, however, was in 1881 with a focus on pest management.

Humans have grappled with the impact of pests and disease on their crops, no doubt since hunter gatherers were first inspired to stop their wandering and set down roots. It was not until the Great French Wine Blight in the mid 19th century though, that the international community were galvanised into action against the aphid *Phylloxera vastatrix* which spread the wine blight disease.

It is interesting that this was the catalyst for an international agreement on pest and disease control, rather than the Great Irish Potato Famine 36 years earlier in 1845. Clearly, to the ruling and political classes of the day, the threatened demise of the European wine industry was vastly more concerning than the death of 1,000,000 people and the displacement of 2,000,000 as a result of the potato famine.

1929 saw the signing of the International Convention for the Protection of Plants, however this was superseded by the International Plant Protection Convention in 1951. Revised four times since then, the IPPC established phytosanitary principles and measures covering crops and natural vegetation internationally, and is the origin of the phytosanitary certificate we need to sign when sending plant material overseas.

Another key international gathering, with 113 nations attending, aimed at fostering the sustainable interaction of humans with the environment, was held in Stockholm in 1972. It was titled the United Nations Conference on the Human Environment and has become regarded as a watershed in international conservation. For the first time, the need to prioritise biodiversity conservation rather than individual species was highlighted, and contained the origins of modern attempts to manage global biodiversity. In the years following that, a number of treaties including the Convention in Trade of Endangered Species (CITES) were signed. Awareness and interest grew, so that by 1992 when the Rio

Earth Summit was held in Rio De Janeiro, 178 states including 118 heads of state and 1400 NGOs attended. Also, in the years from 1987 to 1992 a working group had been set up by the United Nations Environment Assembly to explore synergies between existing biodiversity treaties, which in May 1992 resulted in the Convention on Biological Diversity (CBD). The CBD provides guidelines and a framework as the first steps towards adopting more specific obligations such as targets, time tables and mechanisms. These are embodied by documents such as the 2010 Nagoya Protocol

embarked on research, field studies and the implementation of their own specific measures and regulations aimed at protecting species in the wild.

One of the first countries to embrace the ideals of environmental conservation was Nepal, whose government passed the National Parks and Wildlife Conservation Act in 1973. In the same year it established the Chitwan National Park and since then has established over 16 protected areas covering more than 29,000km<sup>2</sup>, representing 20% of Nepal's land area. One of these protected areas is the Tinjure-Milke-Jaljale (TMJ) Area.



New hydrostation plus cement works

which regulates the use of genetic resources to prevent over-exploitation. The CBD also encouraged the formation of the Global Strategy for Plant Conservation which contains 16 outcome-oriented targets aimed at achieving a series of measurable goals. BGI has taken the leading role in implementing Targets 2 and 8. Target 2 of the GSPC aims for an assessment of the conservation status of all known plant species, as far as possible, to guide conservation action. Target 8 aims to have at least 75% of threatened plant species held in *ex-situ* collections, preferably in the country of origin and at least 20% available for recovery and restoration programmes.

Individual signatories to these conventions and treaties therefore

A recurring theme when reading about species conservation is the need to support communities to ensure that their livelihoods are not jeopardised by conservation measures. In Nepal this principle is covered by the Integrated Conservation Community Development Programme (ICDP) and is seen as one of the best models of community-based conservation. The TMJ Area with 25 out of the 30 species native to Nepal present there, is recognised as the Nepalese centre of rhododendron diversity. To locals, however, rhododendrons are valued as firewood, but by providing electricity and improved cooking stoves to the area, pressure on the rhododendron forest is reduced. This is just one aspect of a 58 point comprehensive



And the forest goes...

strategy aimed at ensuring:

- TMJ remains a sustainable conservation area
- Ways of preserving cultural heritage are identified
- Livelihood options for reducing poverty are developed
- Ecotourism for the management and conservation of natural resources is promoted.

One term that emerges early in any research on species conservation is 'biodiversity hotspot' and refers to a region of the Earth that contains at least 1500 species of vascular plants as endemics, but where 70% of the original habitat has been lost. Fitting into this category is Arunachal Pradesh in India. It harbours nearly 50% of the total flowering Indian plant species which are dominated by rhododendrons along the cool temperate, subalpine and alpine zones in the Arunachal Himalaya. The

Indian Himalayan region contains about 98% of Indian rhododendron species, 85% of which are in the Arunachal Himalaya. That is 61 out of a total of 72 species in India.

In India rhododendrons have sacred, medicinal and economic values. The dried flowers of *R. arboreum* are used to check diarrhoea whilst, due to their acid-sweet nature are also used, both dried and fresh, to help dissolve fish bones that get stuck in the gullet. In the Darjeeling Hills, they are also brewed into a wine to prevent altitude sickness. The wood is used for making 'khukri' handles, pack saddles, gift boxes, gun stocks and posts. Leaves of *R. campanulatum* are ground with tobacco and used as snuff, reputed to be useful for colds, chronic rheumatism and sciatica. The leaves of *R. anthopogon* are mixed with juniper to make incense, widely used in Buddhist monasteries. *R. cinnabarinum* corollas are used to make jams by

Lamas and Tibetans. In Sikkim they are fried and eaten as a delicacy. In N Sikkim, *R. falconeri* leaves are used to pack apples and the indumentum on *R. fulgens* is scraped off to make fire-lighting wicks. *R. hodgsonii* is carved into cups, handles and walking sticks whilst its leaves are used for packing yak butter, cheese and apples. Aromatic oils are distilled from *R. setosum* and used in perfumery, cosmetics and soap manufacture. In the Lachen and Lachung villages of NE Sikkim, the vegetative parts of *R. thomsonii* are boiled to make a highly poisonous extract used as a natural insecticide. These uses all take their toll on rhododendron populations, but the most serious impact is felt from unsustainable harvesting for incense and extraction of timber for firewood. As in Nepal, rhododendrons are prized for fuelwood due to the presence of poly-flavenoids and other resins giving it the ability to burn even

when fresh. In some instances, this is on an industrial scale where hundreds of trees are clear-felled and burned to melt coal-tar for road construction.

Extensive shifting cultivation and reduced fallow periods plus animal husbandry, fodder extraction, forest fire and roadway construction all encroach on and cut into forests and affect tree regeneration.

Compounding these threats is climate change, bringing heavier rain and snow causing run-off and avalanches which scour and strip away seedlings and saplings, whilst higher temperatures push cool

temperate species poleward and to higher elevations. Species with small geographical ranges are not only more acutely threatened by land use changes but are also more vulnerable to climate change due to limited variation and restricted genetic plasticity which limit their adaptability.

India has established 572 protected areas, including national parks and wildlife sanctuaries covering 150,809.6km<sup>2</sup>, or 4.8% of the country's area. Arunachal Pradesh has 13 protected areas covering 12.03% of the state, but these largely cover only the lower to mid-elevation forests. Lower elevation populations

are at particular risk from both human pressures and warming temperatures, however 23% of the state is above 3000m. Thus, higher elevation species already classed as Vulnerable in The Red List, such as *R. chamaethomsonii*, *R. cinnabarinum*, *R. dalhousiae* var. *rhodotum*, *R. falconeri* ssp. *eximium*, *R. hookeri*, *R. papillatum* and *R. pemakoense* remain under threat.

In 2004 the World Wildlife Fund-India began mapping rhododendron-rich forest patches and categorized forest areas under different degradation regimes in West Kameng and Twang districts of Arunachal Pradesh. It has also been implementing rhododendron forest conservation through a community management programme with support from WWF-Japan and WWF-International whilst the North Eastern Regional Institute of Science and Technology have studied rhododendron population levels to some degree.

Sikkim's GB Pant Institute of Himalayan Environment and Development has been evaluating the status of rhododendrons in their native habitat since the mid 1990s. It has extended protection by establishing 2 national parks, 4 wildlife sanctuaries and 1 biosphere reserve – a label given by UNESCO to help protect ecosystems with plants and animals of unusual and scientific interest. Unlike national parks, wildlife sanctuaries allow limited human activities and biosphere reserves allow limited industrial activities whilst also promoting sustainable management, research and education in ecosystem conservation. These protected areas combined guard 36 species of rhododendron from grazing and human interference. Protected areas are the logical choice for *in-situ* conservation programmes where manual cross-pollination and transplanting can be done undisturbed, as has been done for *R. niveum* in Lachung Valley in W Sikkim.

There is also a clear need to ensure the safety of rhododendrons outside protected areas affected by habitat fragmentation and population loss. Studies have shown that the loss of even one individual from a small population can adversely affect



*R. niveum*

population viability and increase the risk of species extinction. Although it must be tempting to try *in-situ* conservation in such precarious situations, efforts are best spent on *ex-situ* programmes where the safety of new plants and seedlings can be ensured. The hope is that endangered species such as *R. niveum*, *R. maddenii*, *R. pendulum* and *R. leptocarpum* ssp. *micromeres* can be conserved by systematically propagating seed held in arboreta and reserves. The resulting plants can then be included in forest planting schemes where their beauty can attract tourists who in turn increase the prosperity of the local populace. However, data on species diversity, population, location, extent of habitats, major

alarming toll on wild plants and the integrity of the ecosystem. The combined effect of environmental threats has been a tenfold leap in the number of threatened plant species since 1992 with now, more than 15% of native plants in China threatened or on the verge of extinction.

In 2005, in response to these mounting challenges, the Chinese Government introduced the concept of 'plant species with extremely small populations' (PSESP) to promote awareness of species facing elevated risk of extinction. *Rhododendron magniflorum* for example, is thought to have a population of only 10 plants restricted in habitat to only 1 mountain. Serious disturbance to its habitat has been wrought by

PSESP was devised to protect the most threatened plant species requiring urgent action and defined in simple terms for both government officials and local people. Species qualify as PSESP, if there are less than 5000 mature individuals in total and fewer than 500 mature individuals in each isolated population. The first group of 120 PSESP were selected for their status as national or provincial key protected plants, their restriction to only one or two known localities and their great potential for economic and scientific values. As a result, financial support from both central and local governments has gone towards accelerating the conservation of PSESP. This has netted more detailed information on population size and distribution as well as potential threats to all 120 PSESP that clarifies the need for and scope of targeted *in-situ* and *ex-situ* conservation initiatives.

In 2008 the Chinese government launched its national Strategy for Plant Conservation (CSPC) which covered 16 targets focusing on four key themes:

- Understanding and documenting existing plant diversity
- Conservation of plant diversity
- Sustainable use of wild plant resources and
- Generation of public awareness and education of plant diversity.

More than 3000 nature reserves have been established, covering 16% of the land area of China.

Amongst its raft of aims are:

- The development of a national network of herbaria including the construction of China's National Herbarium
- Establishing a 'virtual herbarium' with scanned images of pressed plants and associated information
- Launching a new national survey of plant species and habitats focusing on key areas and groups of plants
- Surveying *in-situ* and *ex-situ* conservation programmes
- Developing and scaling up models for the further conservation and sustainable use of plant resources in China
- Banning development projects



*R. jigganshanicum*

threats to species and changes in those species is lacking and unavailable for facilitating the design of a more comprehensive conservation strategy.

Dwarfing these other countries in all respects though is China. It has one of the most richly diverse range of plant species with approximately 33,000 species but has also recognised that many of these are increasingly vulnerable. As well as the anthropogenic threats already mentioned, the country's explosive economic growth built on rapid industrialisation and huge development schemes is taking an

a road and mine carved into the base of the mountain and walnut planting at the top. Others are *R. griersonianum*, of which there are only 15 individual plants occurring in the wild, *R. platypodum*, which is known from only a couple of small populations in Chongqing, *R. jinganshanicum*, known from just 200 individuals in a couple of localities in Jiangxi, *R. huidongense* with extremely fragmented populations and continuing to decline in Sichuan and *R. visciduifolium*, only ever collected twice and restricted to stream banks in Xizang.



*R. platypodum*

deemed likely to have an impact on biodiversity

- Ensuring that 70% of genetic diversity of major economic plants is conserved in seed banks
- Ensuring that plant diversity conservation is incorporated into the Chinese primary and secondary schools curricula
- Establishing an environmental education system of 'green nursery schools' 'green schools' and 'green universities' and incorporating environmental courses and lectures into non-environmental courses.

China has the largest rhododendron population of any country. It is home to approximately 571 rhododendron species, that is 55% of the global population. They occur in all its provinces except Xinjiang and Ningxia and over 74% are endemic. When we look specifically at *Rhododendron* in China, 12 areas with a high diversity of species have been identified covering 1.4% of China's land area. Five separate hotspots comprising threatened rhododendron species – S Chongqing, SE Tibet, NW Yunnan, SW Sichuan and N Guangdong - overlap 86.3% with these areas of species diversity.

In 2017 the Chinese produced their own Red List – the 'Threatened Species List of China's Higher Plants'. Included in the Chinese Red List are 122 rhododendron species categorised as either Critical, Endangered or Vulnerable. This is very concerning of course, but the fact that the data raises our concern is in its self a catalyst for action. Consequently, this ambitious project has illuminated the need for ongoing conservation measures in China and profiles those plants in most need of protection.

Conservation programmes are developed at many levels from broad governmental policies aimed at protecting whole ecosystems and environments, to smaller independent bodies focused on protecting a particular genus or species.

Up till now, conservation of *Rhododendron* has been dependent on individual organisations such as the Royal Botanic Garden Edinburgh (RBGE) establishing partnerships in at-risk regions. For example, RBGE and its satellite garden, Logan Botanic Garden, have been working with the authorities in Sichuan since the 1990s. Trips have been made to assist with field identification, instruction on propagation and cultivation

whilst also collating photographs for a book being jointly produced by RBGE and the Chinese. Since 2014 the Sichuan authorities have been setting up nurseries where propagated material can be grown on and reintroduced back to the wild.

Logan Botanic Garden has also been working with authorities in Hanoi, Vietnam and conducted plant exploration trips there. Richard Baines, Curator of Logan Botanic Garden, comments that one of the real problems is that some new species are being lost before they are described. One new *Rhododendron* species he observed, and which was yet to be described on Mount Fansipan, grew beside the main path to the summit and was in great danger of being cleared from the site. Richard adds that in his view, the most important work currently required therefore, is to determine the accurate conservation status of rhododendrons at species level. Once we have a clear picture of the range and degree of threat to rhododendron populations, more effective conservation measures can be employed.

Recognising the need for a more co-ordinated global approach to rhododendron conservation, Botanic

Gardens Conservation International facilitated a workshop at Oak Spring Garden, Virginia, in April 2018. It was attended by 17 people from 14 different countries, including Pukeiti Rhododendron Trust Board member Marion Mackay, who attended by video link and presented an Updated Global Analysis of *ex-situ* Conservation of Rhododendron. The key finding she released from that was that out of 1386 described rhododendron species, 1017 species, or 73%, are in cultivation.

The outcome of the workshop was the formation of the Global Conservation Consortium for Rhododendron (GCCR).

The conclusions and recommendations that emerged from the work shop were that:

- A wide range of rhododendron taxa are ‘in cultivation’, forming an excellent basis for development of an *ex-situ* collections network
- Neither taxa overall nor Red List taxa presently achieve the 75% required in cultivation to meet Target 8 of the Global Strategy for Plant Conservation
- Compared with other countries, Papua New Guinea, Indonesia, China and Malaysia have the lowest percentage of their Red List rhododendron species held in cultivation so are priority countries of origin for *ex-situ* conservation.

An action plan was drawn up with the long-term goal of implementing a comprehensive conservation plan for rhododendron that encompasses *in-situ* and *ex-situ* conservation of rhododendron in countries of origin, integrated with *ex-situ* back-up within the wider consortium. The resulting action points were:

- To identify and prioritise the rhododendron taxa of greatest conservation concern
- To ensure the world’s most threatened rhododendrons are represented in well managed *ex-situ* collections as an insurance against possible extinction and as part of fully integrated conservation plans
- To ensure that the future of the world’s most threatened rhododendron taxa are secure and populations are recovering *in-situ* through conservation action

- To empower partners and practitioners to undertake effective conservation of threatened rhododendron taxa
- To fund raise and mobilise other groups to act for threatened rhododendron taxa.

A comprehensive, yet to be published, analysis for Critically Endangered (CR) Rhododendron taxa with a proposed *ex-situ* conservation plan was produced by Marion MacKay and Noelia Alvarez from BGCI as a basis for future prioritisation of rhododendron integrated conservation projects.

A year on from the workshop, several important projects have been initiated.

Funding has been allocated or applied for by BGCI to fund rhododendron conservation projects in China, Malaysia, Vietnam and Papua New Guinea. In China *Rhododendron liboense* (CR) is the subject of an ongoing 3-year project funded by the Franklinea Foundation to be grown on in living conservation collections and reinforce populations *in-situ*. High mountain species *R. monkoboense* (CR) and *R. tuhanense* (CR) from Sabah, Malaysia are the subject of collaboration between Kinabalu Park, Sabah Parks and Royal Botanic Garden Edinburgh (RBGE). This is another 3-year Franklinea Foundation funded project. RBGE will support with technical advice on collection of material and propagation, plus the delivery of a capacity-building workshop in propagation of Rhododendrons and Conservation Horticulture in 2020. Three threatened species in Vietnam, *R. fleuryi* (CR), *R. langbianense* (EN) and *R. triumphans* (EN) are to be the focus of a 2-year project involving Malaysia’s International Centre for Tropical Highland Ecosystem Research (ICTHER) Botanic Garden, Bidoup Nui Ba National Park plus Logan Botanic Garden in Scotland. Funding is being sought from the Prince Bernhard Nature Fund with the aim of facilitating horticulture workshops and informal field training on collecting trips.

The Consortium is also applying for funding from The Mohamed Bin Zayed Species Conservation Fund for another two-year project, this time in Papua New Guinea. This will target vireya species *R. retrorsipilum* (EX), *R. hartleyi* (DD), *R. natalicum* (DD), *R. detznerianum* (DD), *R. gumineense* (DD), *R. kerowagiense* (DD), *R. brevipes* (DD) and *R. dielsianum* var. *stylotrichum* (DD). Michael Lovave (PNG member of the Global Consortium) believes that there is a good chance that *R. retrorsipilum*, currently thought to be extinct, may be rediscovered, hence the targeting of that species. However, this project also addresses another key conservation problem – Data Deficiency. This problem is particularly acute for taxa from PNG; most of the aforementioned species are known only from original type collections, and many have not been seen in the field for 50 years. The priority for these is to assess their true current status and set up an integrated system of conservation.

The forming of the GCCR and the resulting action plan represent a significant step forward in the conservation of *Rhododendron*. It is facilitated by the world-wide conservation networks developed over the past 50 years and is supported by all the relevant protocols and safeguards already in place. As an initiative specific to *Rhododendron*, not only is it founded on the work and experience of many of the world’s leading *Rhododendron* authorities, but efforts can now also be coordinated and monitored to much greater effect. Thus, the most threatened rhododendron species world-wide can be targeted more systematically for appropriate safe guards.

The very timely decision by Pukeiti Rhododendron Trust in 2015 to initiate a Rhododendron Conservation Project led by Marion MacKay, has meant that New Zealand is now positioned to make an important contribution to this global effort.

Comparative studies between lists of rhododendron species cultivated internationally show that New Zealand holds a rhododendron collection of world interest. We are particularly fortunate in having Marion lead the Project. Over 10 years, she has built

up a database which is the largest and most comprehensive global description of the conservation status of around 1400 rhododendron species and their presence in cultivation. It details 29 New Zealand collections, 15 international collections and 4 global datasets and encompasses a wider range of information than the BGCI database of world botanic gardens. It is this outstanding work and her reputation as a world authority on vireyas that earned Marion a place as a member of the GCCR team. Consequently, this makes us remarkably fortunate to have Marion as the leader of the New Zealand Rhododendron Conservation Project. Not only is she able to guide its development but she can also ensure that it fits most effectively into and benefits from initiatives in the global conservation strategy for rhododendron.

Since 2016 the Conservation Project has become a joint venture between Pukeiti Rhododendron Trust, Massey University, Taranaki Regional Council and New Zealand Rhododendron Association. The aims set out for the Project were to:

- Identify priority species for propagation, focusing on rare or threatened species
- Identify key collection sites in New Zealand where collections could be developed further on a national scale
- Establish roles for collection holders who wish to participate in the Project, such as holding and growing on certain sections of the genus suited to their local environment
- Embark on a programme of propagation and dispersal among participating sites.

To those ends, relationships have been formed with 15 collection owners around New Zealand and species lists received from them. Field work has been carried out by Graham Smith and Andrew Brooker in the North Island and by myself in the South Island, to verify those lists as well as gather propagating material from some of them. In collaboration with Sue Davies/Gardiner and NZRA, one South Island site with an extensive, but unnamed, collection of species has been the subject of ongoing identification and propagation.

Propagation hubs have been established at Pukeiti, Sue Davies/Gardiner's property in Palmerston North and Dunedin Botanic Garden.

Through my Pukeiti Rhododendron Trust sponsored attendance at the joint American and German Rhododendron Convention in Bremen in 2018, I was able to update the wider rhododendron world of our progress and make valuable contacts. This led to an offer of wild collected seed for the Project from a recent Norwegian expedition to China which is now being grown on in Pukeiti and Dunedin. Fresh wild seed has also been received from Shashil Dayal and Jeremy Thomson who were part sponsored by PRT to collect in Sikkim.

The Project team will liaise with other sites to ensure that distribution of plant material is appropriate to cultivation requirements.

In another current activity, Marion has been gathering evidence on about 130 rhododendron species that have been lost from cultivation in New Zealand. Sources such as old nursery lists, journal articles or collections lists have been used to determine species that have been here in the past but which lack a current collection listing. From this activity we hope to be able to re-establish these species in collections and also import new genetic material.

As we move into the next phase, collaboration will continue with the GCCR and other international bodies to source and distribute selected taxa to increase the genetic diversity in New Zealand and to share wild accessions held here. There will also be ongoing analysis of data examining the range of wild source material currently held in New Zealand, identifying priority taxa for acquisition. Linked to that there may be the opportunity to collaborate with appropriate parties in support of, or directly participating in, upcoming expeditions to Papua New Guinea and Vietnam.

We will continue to write articles such as these promoting the Project and will also attend international gatherings such as the Australian Rhododendron Society and American Rhododendron Society conferences in 2020.

Related activities that will also benefit the Project include an international analysis of wild-source material being done by a Massey University PhD student and being supervised by Marion MacKay and Sue Davies/Gardiner. Some species will also be the subject of DNA analysis to assess their genetic diversity. This study is the latest example of joint collaboration between Marion and Sue exemplifying a strong partnership developed over several years. With Sue joining the Project it is reinforced by her scientific rigour as well as her experience on the NZRA Species Conservation sub-Committee. As a member of that committee, she has been propagating seed and cuttings for conferences and following leads in gathering material of threatened plants from gardens around New Zealand. Through the New Zealand Institute of Plant and Food Research Ltd., Sue is also involved in current research being funded by the NZRA and the Australian Rhododendron Society on the taxonomic relationships among Australian species.

Maintaining international contacts is an important aspect of our programme, and Andrew Brooker and Graham Smith recently made a trip to Olinda and Emu Valley in Australia to re-establish contacts there. As genetic diversity in the vireyas held in Pukeiti is quite limited, one aim of the trip was to discuss a reciprocal seed share arrangement to build up the diversity of the Pukeiti collection. The trip also gave an opportunity to observe cultivation and propagation methods for difficult species such as *R. ericoides* and *R. saxifragoides*. Additionally it offered a chance to compare plant record systems and labelling which are the key to any collection.

As with any discussion on conservation issues the challenges involved are daunting. We still do not have a clear picture of many threatened species' spread and viability, industrial and population pressures continue unabated in many areas and climate change continues to shift the goal posts on viable habitats. It is dispiriting that it has taken the stark realisation of widespread environmental degradation and the prospect of multiple extinctions to prompt a



*R. fleuryi*

purposeful response. However, it does now seem that the will is present, even at governmental levels, to take remedial action to at least preserve the most threatened species. Whether it will be enough remains to be seen, but the growing infrastructure of international conservation measures sets necessary boundaries and constructive guidance. In turn, those provide key interest groups and NGOs with the encouragement and reassurance to collaborate on projects with more localised and specific goals. Thus, implementing *in-situ* and *ex-situ* conservation of threatened rhododendron species in their countries of origin by the GCCR becomes an achievable aim. In addition, *Rhododendron* is relatively fortunate in that, even though Target 8 is not yet met, the wide range of taxa already in cultivation provides a good basis on which to build. That potential is also amplified by the fact that internationally, people with the highest calibre of skill and knowledge are available to tackle the problem.

New Zealand, with its diverse climatic conditions and terrain is well placed, as a member of the wider Consortium, to provide integrated support via *ex-situ* collections. We can grow a range of rhododendrons from the hardiest alpine species to the tender sub-tropical vireyas and we have the breadth of expertise to do it well. As the efforts build over the coming years our combined action will result in more effective targeting of conservation measures to protect the most threatened species. There are many interesting and exciting activities occurring in global rhododendron conservation, and the New Zealand Conservation Project is an important link in that programme for conservation of our favourite genus.

## References:

- Argent G. 2015. *Rhododendron* of the subgenus *Vireya*. 2nd edition. UK, Edinburgh: Royal Botanic Garden, Edinburgh, in association with The Royal Horticultural Society.
- MacKay MB, Hootman SE, Smith GF, Thomson D, Gardiner SE, Smith P 2018: *Updated global analysis for ex-situ conservation of Rhododendron L. (Ericaceae)*. Report to Botanic Gardens International, January 2018. Massey University, Palmerston North, New Zealand, and Botanic Gardens Conservation International, Richmond, UK.
- Basnet, Tiwari et al. 2010: *Tinjure-Milke-Jaljale Rhododendron Conservation Area A Strategy for Sustainable Development*.
- Onkar N Tiwari, UK Chauhan 2006: *Rhododendron Conservation in Sikkim Himalaya*.
- Wei-Bang Sun, Yong Peng Ma, Stephen Blackmore 2019: *How a Conservation Action Plan has Accelerated Plant Conservation in China*.
- Yongpeng Ma, Jens Nielsen, David F Chamberlain, Xiaoya Li 2019: *The conservation of Rhododendron is of greater urgency than has been previously acknowledged in China*.
- Hongwen Huang: *Plant diversity and conservation in China: planning a strategic bioresource for a sustainable future*. Botanical Journal of the Linnean Society 2019.
- Yu F Skidmore AK, Wang T, Huang J, Ma K., Groen TA. 2017: *Rhododendron diversity patterns and priority conservation areas in China*. Biodiversity Research 23: 1143-1156.
- Noelia Alvarez: *Global Conservation Consortium for Rhododendron Annual Report 2018*.
- Marion MacKay 2019: *Notes for the meeting of the Ex-situ Project Group*.

# RHODODENDRON YUNNANENSE - COLLECTING IN THE WILD

Gordon Bailey

Over the years there have been a number of articles written about the Ron Gordon - led trip to the Yunnan province of China in 1990. This was one of the early botanising trips allowed into China and resulted in a large number of plant species being collected and subsequently grown on back in New Zealand. In this article I want to share the collecting and subsequent growing on of *R. yunnanense*.

On March 6th 1990 my diary states:

“Left for Chuxiong at 8am in yet another bus. Our old bus driver had to take the broken bus back to Kunming which I imagine would have been a very slow trip. This new bus went really fast! Scenery very boring, fields of crops, wheat, barley, broad beans etc.

Stopped to botanise on a desolate knob covered with *Camellia saluensis*, *Pyracantha* spp. and *Pyrus* spp. Colours of the camellia varied from white to dark pink.

Went on further and stopped for botanising with *R. scabrifolium*, colours varying from white to pink. Both rhododendrons and camellias were growing in very barren soil, no topsoil at all. It had all been taken for burning or compost. Also growing here was *Pinus yunnanense*.

Lunched at a small town 15km from Chuxiong at 2 pm. Had fruit, mandarins, cherry, myrica berries which are like the fruit found on arbutus.

Went botanising 10km up a side road – dirt track actually. This was a national park. Mountain sides of *R. yunnanense* – from white – pink – mauve. Some good forms.

Some good forms of *R. spiciferum*, *R. decorum*, *Osmanthus delavayii* with a wonderful scent and *Michelia yunnanense* with a magnificent scent. Lots of *Pyracantha* in full bloom and *Pyrus* all in a man planted forest of *Pinus yunnanense* .....

On that day Denis Hughes and I spent some time collecting seed from the pinkest flowers and the best white forms with no blotch. Back in New Zealand they were germinated and grown on. Germination was so successful that Denis had a number of rows of *R. yunnanense* in his nursery for a number of years to assess the best forms. I think the rows are no longer in existence.

I planted several beds throughout the Gore area during my time as Parks and Recreation Manager for the Gore Council. Those in the photos are from a planting at Bannerman Park in Gore where the variation in form is clearly visible. These plants are now almost 30 years old and growing well and on the day of my visit were covered with bees.



*R. yunnanense* (Pink form)



*R. yunnanense* (White form)



*R. yunnanense*



# THE ROLE OF THE RHODODENDRON COLLECTIONS OFFICER - TARANAKI REGIONAL COUNCIL A BRIEF SUMMARY

Andrew Brooker

Within the last year this role was created within the Regional Gardens team in recognition of the importance the rhododendron collection at Pukeiti holds in the conservation of the genus, not just regionally but nationally and internationally. Working in partnership with the Pukeiti Rhododendron Trust, Massey University and the New Zealand Rhododendron Association this allows the region to play a significant part in the *Ex-situ* Conservation Project, in growing the collection and increasing the collective understanding of these majestic plants.

Since taking on the role in February of this year, I have been very busy here at Pukeiti and off site at various private collections around the country advocating for the project, collecting cuttings and establishing connections for the future of the genus. This work has seen the addition of new taxa to the collection, a regathering of plants we had lost and an opportunity to work with some very knowledgeable, like-minded people in the rhododendron world. Rhododendron cutting material has been collected from the following:

- Heritage Park at Kimbolton
- The private species collection at Crosshills
- Doff Tombleson's garden in Benneydale
- Sue and Mike Wagstaff's garden in Te Kuiti
- A private garden in Dunedin.

As not only rhododendron species, but New Zealand raised hybrid material is at risk of being lost, this is also forming part of the valuable work of the NZRA.



*Rhododendron macrosepalum* var. *linearifolium* looking great at EVRG, Tasmania

Work on the existing collection has seen targeted propagation of key species with the aim of building up replacement plants for Pukeiti and other gardens around the country to mitigate the risk of loss. This has also included finding sites within the Pukeiti garden for plants from our nursery to extend the rhododendron display. Where necessary hand pollination with the aim of harvesting seed has gotten underway, albeit on a small scale to start with. This seed production will allow us to play more of a role internationally in the future, as we share seed with other institutions around the world, as well as giving us the ability to grow replacement plants for those which cannot be cutting-grown.

As part of the greater project work, members of the team, Doug Thomson, Sue Davies/Gardiner and I have continued with the identification task at a private garden in Dunedin. This painstaking yet rewarding effort will continue for some time, with regular visits to this Dunedin hillside collection until all 1400 or so plants are correctly identified and labelled. October will see another concerted effort by the team as we work through the plantings, trying not to get too distracted by the flowers.

The importation of seed through international seed lists continues to be a part of growing the collection, with special focus on broadening the gene pool of taxa already present. Seed has been forthcoming from:

- The Index Seminum, Bremen
- The RHS Rhododendron Magnolia and Camellia group
- A Norwegian plant expedition to Yunnan, China

Where possible the seed we get in is from verified wild collected sources as this is of vital importance in developing that diverse gene pool for conservation purposes. This year we supplied seed to two of these groups, the Index Seminum and to Jonny Larsen in Norway who facilitated the distribution of the Yunnan expedition seed to Pukeiti and the Dunedin Botanic Garden.

Connections have also been re-established with our Australian counterparts in Melbourne and Tasmania. A very worthwhile visit to the Dandenong Botanic Garden at Olinda and the Emu Valley Rhododendron Garden in Burnie, as written about in the recent NZRA newsletter, saw the sharing of valuable ideas and information, starting to build what I'm sure will be a very strong and important relationship moving forward.

Heading into spring at Pukeiti the key tasks will be to continue with the hand pollination programme and plan the coming propagation season in such a way that the nursery doesn't become overwhelmed with plant material. I will also be collecting pollen from other private collections to use at Pukeiti to broaden the diversity of taxa held within our very important conservation collection.



Doff Tombleson with Graham Smith in her Benneydale garden. Working in the Dunedin collection.



# **RHODODENDRON VIALII**

## SECTION: AZALEASTRUM

Andrew Brooker

**T**his is an evergreen shrub, 1-3m in height, with small branchlets. The leaves are glossy green on top, with a lighter green underside, 3-10cm long x 1.5-3.5cm wide and obovate – lanceolate in shape. New growth appears purplish – red and is as handsome a feature as the flowers. The flowers are a very striking, distinctively tubular and red, giving the plant a tropical appearance. Individual corollas are 3-3.5cm long with 5 lobes sitting loosely in an attractive small truss.

The geographic range for *R. vialii* is through Yunnan (SW China) to Laos and Vietnam with small populations found at an elevation of 1300 – 2000m. At present this

species is classified as Vulnerable in the RED LIST, but recent survey work suggests this will need reviewing due to environmental changes in habitat. It is felt that rhododendron habitats at relatively low altitudes are currently at greater risk due to man's impact on the environment. Also noted for *R.vialii* in particular is its poor natural regeneration as a factor hampering recovery.

Pukeiti has grown *R. vialii* since 1985. According to import records two plants were purchased from the Species Foundation in the USA. These were put into the quarantine facility at Pukeiti as small bare rooted plants and grown on. Post quarantine cuttings were taken to ensure the investment was not wasted.

The two original plants were subsequently planted out on the

Ayckbourn Walk. As part of the Collection Strategy regular cutting material has been collected and there are now other representations of *R. vialii* growing around the garden at Pukeiti, all progeny from the original introductions.

Any opportunity to acquire your own plants of *R. vialii* is a positive step in global conservation of this taxa.

### **Bibliography:**

Pukeiti card index

Taranaki Regional Council: *Iris BG database*

Peter A Cox and Kenneth NE Cox: *The Encyclopedia of Rhododendron Species*

Douglas Gibbs, David Gibbs & George Argent: *The Red List of Rhododendrons*

[www.researchgate.net/.../264384291 the conservation of rhododendrons](http://www.researchgate.net/.../264384291_the_conservation_of_rhododendrons)

Scientific notes from various contributors.

# SEEKING MORE MADDENIA...

Andrew Brooker

Of all the rhododendron subsections represented within the Pukeiti collection, arguably the most successful has been subsection Maddenia which flourishes happily in all parts of the garden. The scented blooms, in a range of colours and sizes can be enjoyed from early September through to late December/ January, extending the flower display considerably for the rhododendron collection as a whole.

As you will all be aware the key to a good collection is keeping consistent and thorough records, and ours are now showing that some losses have occurred within the numbers of taxa represented and it is this which we are seeking your assistance with. We know that through the Pukeiti Plants for Members scheme, especially in the mid-90s, many of these had been offered as young plants and that they may well be residing in your garden today. Do you have any of these maddenia listed below, or records that would assist us in obtaining any of these?

- *R. fletcherianum*, or the Yellow Bunting Form
- *R. horlickianum*
- *R. dalhousiae* var. *rabdotum*
- *R. valentinianum* aff.

We are also interested in acquiring either cutting material or pollen, from any of the following taxa to help build diversity within the existing Pukeiti collection. (We would prefer that this material comes from plants that have not originated from Pukeiti.)

- *R. megacalyx*
- *R. lindleyi*, particularly the wild-collected accessions that were sold in the late 1990s.
- *R. lyi* (now considered a separate taxon to *R. leptocladon*)
- *R. burmanicum*
- *R. johnstoneanum*

If you feel you can help us with this as part of the *Ex-situ* Conservation Project please email Andrew at [andrew.brooker@trc.govt.nz](mailto:andrew.brooker@trc.govt.nz)



*R. dalhousiae* var. *rabdotum*



*R. megacalyx*



*R. burmanicum*



*R. horlickianum*



# FLOWERING TIME

Peter Ulvskov

Figure 1. *Rhododendron dauricum*

**F**lowering time is an interesting trait in rhododendrons. Most rhododendron gardens are an explosion of flowers in May in the northern hemisphere and it is thus of interest to put together a plant collection that offers something to look at over an extended period. It is entirely possible to have flowering from late February to early August. Through selection of provenances and clones within species and by hybridising between different species it should be possible to push the limits.

In times of climate change it is also fundamentally interesting to ask questions like: “Is flowering time controlled by how warm the spring is or do plants have a clock to look at so that they do not get fooled?” Plants are not easily fooled; they have a clock and they have the ability to measure day-length. Which day-length triggers

onset of flowering is set differently in different provenances of the same species growing at different latitudes. This we know not in the least from pioneering work at Umeå Plant Science Center near the Polar Circle in Sweden. A gene called *CONSTANS* is the hub of the internal clock in plants. The *CONSTANS* gene product is found in companion cells of the phloem, the cells that transport sugars in plants, and there it controls the amount of the protein *FLOWERING LOCUS T* which moves in the phloem to the shoot tip where it induces flowering. Day length is sensed by a protein called phytochrome which not only is light sensitive but makes an internal flip when it sees the shift to long wavelength red light at sunset.

The much better understanding of the molecular clock and regulatory systems that go with it will most likely lead to attempts to breed very deliberately for onset of flowering

in economically important species in years to come; and knowledge will trickle down and become useful also in rhododendron breeding.

But does temperature not play a role at all? Yes it does. While day length measurements establish the basis, temperature has a modulating effect. But it is not very simple, and the climate change we experience is not merely a rise in mean temperatures. While we have much less snow in Denmark compared to previously, we do have long, dry periods with sub-zero temperatures in late winter and while I do not have solid data to support it I believe that the incidence of sporadic late spring frost after a couple of warm days has increased. Late frost damage to flowering actually makes it desirable to breed for slightly later flowering in the earliest flowering species

Figure 1. *Rhododendron dauricum* is the earliest flowering species in

my garden. Its internal clock insists that it is time for flowering even if the weather is forbidding. The out-of-focus white blobs are snow and ice crystals visible on the leaves.

I decided early on to record flowering times of the rhododendrons in my garden. I made one sensible choice and a couple of choices that I regret. I define onset of flowering at the time when the first flower of the plant is sufficiently open that the stamens can be seen. That is pretty well-defined. I then chose the week number as the timing unit. Not a clever choice. Use days since New Year – it is not sensitive to the principles of week number calculations and rhododendrons do not care when the year’s first Monday occurs. In the data to be presented below I have set the time point as the Wednesday in the week in question. What I would really like to relate the flowering times to are temperature sums preceding flowering. That would allow us to decide if it is only the temperature immediately preceding flowering that promotes or postpones flowering, or if the plants take a broader view of the preceding winter. The Danish Meteorological Institute would be perfectly able to provide me with temperature sums for the past 15 years for a fairly small area that includes my garden. However, this is no small piece of work and I have no trouble understanding that they would like to bill me if I were to ask them to provide me with the data. So, could I

ask a simpler question that available data could shed light on? There is a quite famous beech (*Fagus sylvatica*) called the Munkebjerg beech. Its claim to fame is its early budbreak, which is recorded meticulously every year. This is a domestic species adapted to climate and latitude, and hence day-length in Denmark. If a rhododendron with a flowering time earlier than budbreak in the Munkebjerg beech would vary more by year and correlate better with the Munkebjerg beech than a later flowering rhododendron, then we would be inclined to believe that the temperatures immediately prior to flowering are most significant. As scientific arguments go this is a bit lame, but let us look at it anyway and see if we can learn something.

Figure 2. Budbreak in the Munkebjerg beech and flowering times measured in days after New Year of *Rhododendron dauricum* and KH80. The two smaller plots on the right show the same data plotted with budbreak of the Munkebjerg beech on the x-axis. Data for 2012 is missing – I was traveling that spring.

What we learn from this is that the amplitude is much larger for the early flowering *R. dauricum* than for the later flowering KH80 and they are roughly equally well correlated with the Munkebjerg beech. KH80 is never directly affected by adverse weather during flowering so its fluctuations suggest that earlier temperatures have cumulative effects. This

probably also goes for *R. dauricum*.

Figure 3. KH80, or Klaus Hansen 80, is a hybrid with a somewhat uncertain pedigree - probably *R. aureum* x *R. 'Cowslip'*.

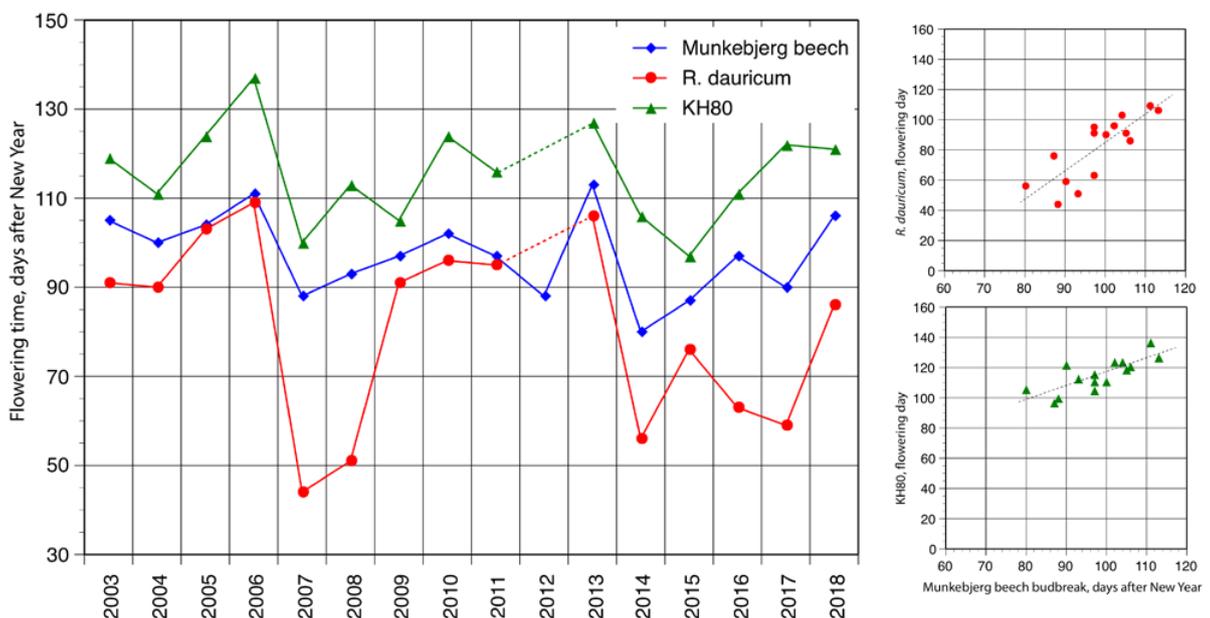
There is quite some hand-waving going on here and it is clear that this is no real substitute for correlating the data with actual temperature sums.

Apart from regretting the choice of week numbers rather than days after New Year, I also regret not recording flowering duration. Some species flower for ten days while other species flower for seven weeks and that makes flower duration a trait worth breeding for. I would encourage readers to begin recording both onset and duration of flowering in your area. End of flowering could be defined as the time where there is no longer a flower truss without some withered flowers on the plant.



Figure 3. KH80 probably *R. aureum* x *R. 'Cowslip'*

Figure 2.



Graph of Budbreak from 2003 to 2018



R. 'Frosted Ice'



R. 'Tahitian Dawn'

# PUKEITI AFTER THE TARANAKI GARDEN FESTIVAL

Lynn Bublitz



Yellow Clivia



Entrance protected by R. 'Fireman Jeff'



Chatham Island 'Forget Me Not'



R. 'Ivan D. Wood'



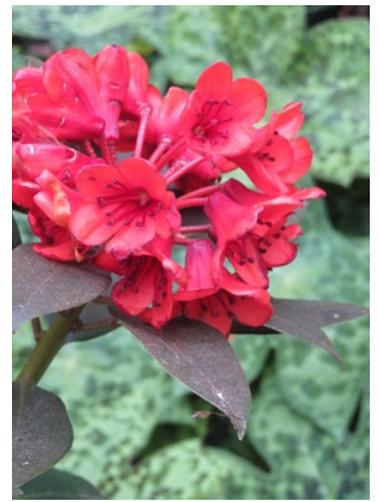
R. 'Madonna'



The Lodge from The Founders Garden



*R. himantodes*



*R. rarilepidotum*



*R. macgregoriae*



Garden Forum in discussion



An unnamed rhododendron hybrid in the Stead Block

# RHODODENDRONS AT AUCKLAND BOTANIC GARDENS

## A BRIEF SUMMARY

Jack Hobbs & Emma Bodley

In 2008 it was decided to hold a trial of selected rhododendron cultivars at Auckland Botanic Gardens (ABG) to determine those most suited to Auckland. Our previous experience had demonstrated that some were much better suited to our conditions than others, so we included in the trial a few that had previously performed well. We then turned to other experts, including Bev McConnell, for advice. Bev has successfully grown a range of rhododendrons at Ayrilies where the heavy soils are not dissimilar to ours.

The site chosen for the trial was a west-sloping bank in the Spring Blossom Valley near the Camellia Garden. The contour of the garden bed ensured rapid runoff of surplus precipitation to avoid waterlogging which so often is the downfall of rhododendrons in our wet climate.

Prior to planting we worked a generous quantity of compost into the soil, and after planting a woodchip mulch was applied. The rhododendrons were planted in autumn 2009 and in spring were fertilized with Nitrophoska Blue and sheep pellets.

We commenced evaluations once the plants had sufficiently matured. All plant evaluations at ABG rate performance against a range of criteria, with an overall rating then applied. Ratings are from 1 to 10, with 1 being very poor and 10 being outstanding. Plants that score an overall rating of 8 or higher are eligible for inclusion in our main display gardens, and those that score 9 or 10 are awarded Star Performer status. These can be

identified by a logo on their plant label. The objective of this system is to provide gardeners with a guide that improves their overall success rate and encourages them to become more active. Recommended plants are also promoted on our website and in printed 'Plants for Auckland' leaflets.

It should be noted we do not apply pesticides to our plants so they must perform in a spray-free environment.

Most of the rhododendrons in the trial performed reasonably well, which was as expected given the careful pre-selection process.

Rhododendrons assessed during 2016-2018 and their ratings

- 'Bibiana' - red flowers with dark foliage, 7
- 'Dame Nellie Melba' - shell pink flowers from early September to early October, 8
- *R. dendricola* - masses of white flushed pink blooms with a yellow throat, compact habit with flaky bark, 8
- 'Happy' - late flowering, 7
- 'Ivery's Scarlet' - large red blooms from late August to early October, 8
- 'Kaponga' - masses of red flowers, can be about 4m tall, 9 [Star performer]
- 'Ken Burns' - late early September to early October flowering, minor thrip infestation, does not self-groom, 6
- 'Lemon Ice' - white flowers with a yellow blotch, compact habit, 6
- 'Mount Victoria' - red flowers, compact habit but woody, 7
- 'Mrs George Huthnance' - white flushed pink blooms from early September to late October, 9 [Star performer]

- 'Mrs J. P. Lade' - late flowering with lavender blooms, 7
- 'Ruby Bowman' - poor habit but attractive pink flowers from late September to late October, 6
- 'Sir Robert Peel' - pink flowers from late August to late September, 8
- 'Van Nes Sensation' - slightly prone to thrip, later flowering than other rhododendrons with white blooms in early October, flowers are slightly fragrant, 7
- 'Vandec' - white flushed pink blooms from late September to late October, compact habit, 7
- 'White Doves' - masses of flowers, compact but does not self-groom, 6
- 'White Pearl' - leggy plant habit with white flushed pink blooms in early October, 6

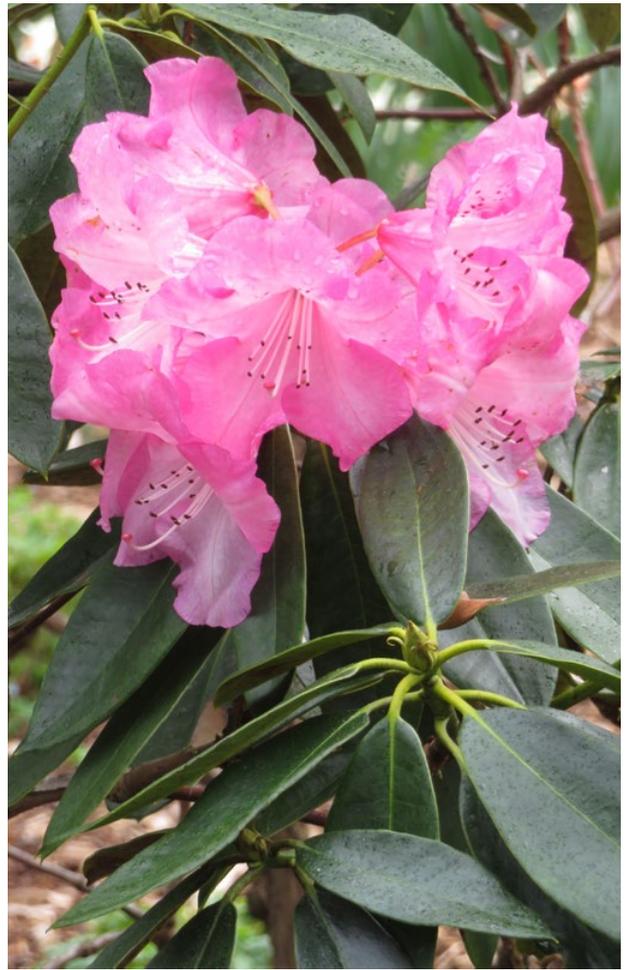
Final recommended rhododendrons (Rating 8+ and commercially available)
<i>R. dendricola</i> 8
'Dame Nellie Melba' 8
'Ivery's Scarlet' 8
'Kaponga' 9 (Star performer)
'Sir Robert Peel' 8
'Van Nes Sensation' 8

'Mrs George Huthnance' rated very highly (9) but we were unable to find a commercial supplier and therefore have not included it on the recommendations list.

It was noted that the floral display of some late flowering species/cultivars such as 'Mrs J. P. Lade' do not last well in Auckland as temperatures rise.



R. 'Mrs George Huthnance'



R. 'Dame Nellie Melba'



R. *dendricola*



R. 'Kaponga'



# AN AFTERNOON WITH BILL ROBINSON

Gordon Collier

Tikitere Nursery

It's early spring and magnolias at Bill Robinson's well known Tikitere Nursery, out of Rotorua, are in full swing. Despite the ravages of time Bill is in good spirits and making the most of the many wonderful plants he has for sale. Sitting at his counter, surrounded by double hellebores just landed from down south, he is ready for customers.

Bill Robinson, one of this country's best known people in horticulture, is quite a raconteur. Over a welcome cuppa he recounts some of his life's story, how in 1957 he was apprenticed at the Wellington Botanic Gardens and became seriously interested in plants. Soon after he came upon *Rhododendron* 'Unknown Warrior' and "I was 'hooked - that was that,'" he recalls. Rhododendrons have been his first love since, though looking around his nursery there are dozens

of other plants he fancies; *Helleborus* 'Betty Renicar', *Kalmia* 'Snow Drift', *Leucothoe* 'Crimson Globe', Camellia 'Fairy Blush', *Magnolia maudiae* var. 'Golden Temple,' and *Aralia cordata* 'Sun King,' a spectacular new Japanese perennial, are amongst dozens of others that he has on offer.

Bill spent a few years in the mid 60s deer culling and blames hunting in the steep Taihape back country for the knee trouble which now bothers him. He worked at Duncan and Davies for a couple of years under Trevor Davies, whom he thinks did more for horticulture in New Zealand than anyone else he knows. He also spent time at Taupo's Native Plant Nursery too, but soon found that potting on hundreds of 'pittos' was not very exciting. In 1970 he was asked to start up Thermal Nurseries in Rotorua.

He has been at Tikitere for 32 years now and all of that time he has

been indulging his love of plants; for years he has been importing all kinds. He has lost count of the number of rhododendrons he has brought in but he thinks that about 10% of those from the States were not any better than those already here.

Bill Robinson's interest in plants has never been confined to rhododendron, in fact any plant that takes his eye finds its way to Tikitere. Long belonging to the American Hosta Society he has introduced countless numbers of this popular genus; he thinks these take a lot of beating. *Hosta* 'Guardian Angel' is his favourite. Japanese maples were also favoured and he chooses *Acer palmatum* 'Mirte' and *A.* 'Yasmin' as being really special. Siberian irises are another group he likes and he has imported many varieties from the States over the years; *Iris* 'How Audacious' and *I.* 'Miss Apple' also get his vote. Tikitere Nursery lists many

varieties of magnolias too, mostly his own introduction - "I've got a couple of hundred 'mags," Bill says. *Magnolia* 'Deryk,' and *M.* 'Strawberry Fields,' both New Zealand bred, stand out for him. It is likely Bill holds the largest variety of magnolias available in this country. Finally he thinks *Rhododendron* 'Cranberry Swirl' and *R.* 'Nelda Peach' are the pick of the bunch of the many rhododendrons that he has introduced to New Zealand gardens.

"I have stopped importing now; it has just got harder and harder as the restrictions are so stringent and the numbers required are beyond the small grower," Bill says. While he still loves rhododendrons he wonders about the changing climate. "Last year was the worst for thrip I have ever known and I just don't know what the future holds. I just love plants. I grow anything that's good but when you have them you can't bloody well look after all of them."



Bill Robinson



One of the many hostas



*Helleborus* 'Betty Renicar'



*Magnolia* 'Deryk'

# RHODODENDRON MAGNIFLORUM

## AT EMU VALLEY

Maurie Kupcsh

In 2010 we were fortunate to receive a packet of seed of *R. magniflorum* NN0959, a new to cultivation rhododendron species in subsection Fortunea. These along with other seeds were sown in July of that year, soon germinated and slowly grew into nice robust plants and by the time of potting into 150mm pots we had 15 healthy plants.

*Rhododendron magniflorum* was first discovered and described by Chinese botanist W.K.Hu, in 1988. It grows into small trees 4-6m tall with oblong leaves 7.5 – 8.8cm wide by 22 – 25cm long, both surfaces glabrous, flowers are funnel-shaped, and creamy white with a smudge of greenish yellow in the throat. In October of 2018 flower buds appeared on 11 of the 13 plants, and in late January they flowered, which is quite late at Emu Valley.

The collector of these seeds, Jens Nielsen, wrote “A new to cultivation introduction of what could be one of the most interesting and rarest Fortunea. Judging from the type description, from 1988, this could be one of the largest

flowered rhododendrons with flowers 10cm long in trusses of 12-14 flowers and could well become threatened in its natural habitat by cutting or fire. Will probably be a late flowering plant.” He seems to be right with the late flowering bit anyway. We grow these plants in the Guizhou section of the garden.

Maurie Kupcsh  
Honorary Curator  
Emu Valley Rhododendron Garden

**Footnote:** Graham Smith and I travelled to EVRG in Burnie, Tasmania earlier this year and Maurie proudly showed us their planting of *R. magniflorum* in the garden. Thirteen healthy plants looking truly magnificent are a credit to the good work being done there. What makes this planting so precious is the fact that there are now known to be less than nine plants left in the wild and they are under severe threat from forest loss, putting this taxa in the CRITICALLY ENDANGERED category.

Andrew Brooker



*R. magniflorum*



R. 'Elegans' one of the largest in New Zealand growing behind the First World War, War Memorial, Inglewood.

# RHODODENDRON 'SIR ROBERT PEEL'

Lynn Bublitz

This hybrid was among the first rhododendrons to be grown in New Zealand gardens and like so many of the early introductions was probably imported from Australia. In parks, from one end of the country to the other there are trees over 120 years old. Planted in the 1890s a number in Pukekura Park in New Plymouth have trunks over 75cm in diameter and are 15m in height. Some of these trees are reaching the end of their lives and one of the biggest fell this year. These long lived trees thrive in gardens throughout the country and can be found in the warmer parts north of Auckland but are equally happy in Dunedin. They are hardy, resistant to fungal and pest attacks and have been used successfully as street trees.

Because of their ease of propagation, they were readily grown from cuttings while many other varieties were more difficult to grow by this method, and this, in part, led to their popularity in Victorian times in New Zealand and Australia. They were also among the early rhododendron hybrids to be bred in England. Their early flowering (late winter – early spring) never made them universally popular and thus they are now rarely seen in Northern Hemisphere gardens although are still offered by some New Zealand nurseries.

'Sir Robert Peel' was bred pre 1871 at R. Waterer's nursery and is probably a hybrid between *R. arboreum* ssp. *arboreum* (which first flowered in

England in 1825) and *R. ponticum*. A number of hybrids have resulted from this cross, and similar crosses, which many different growers tried. The range of plants resulting is sometimes collectively called Cornish Reds. Some were named, others not, but in their time they were something new and caught the imagination of



R. 'Sir Robert Peel'

gardeners, were widely distributed and known by various names, such as 'Cornish Red' and 'Altaclarensis'. Some experts consider these and others to be variants of the same cross and in the RHS Register of Rhododendrons they are included in the *R. 'Smithii'* group. In the Register, *R. 'Sir Robert Peel'* is listed separately and even though raised pre 1865 it was not included until 1958. In New Zealand and Australia it is the most common

of this group and was introduced in the mid-late 19th century.

In the *Encyclopedia of Rhododendron Hybrids* (P&K Cox) published in 1988, 'Sir Robert Peel' is described as "free flowering; rooting easily; used as an understock; somewhat resistant to root rot; stands hot, dry conditions; its popularity, though, waning because of the harsh colour of the flowers." In a later publication *Rhododendrons and Azaleas - a Colour Guide* by Kenneth Cox, it is described as a vigorous grower which can get enormous in mild gardens and that the largest cultivated rhododendrons in the UK are of this cross.

The flowers, arranged in trusses of 18-20, have their harsh colours variously described as a bluish crimson with darker spots, hot pink, rich crimson, rosy carmine, wine red, bright carmine pink and in the Rhododendron Register as "rosy scarlet with black markings on the throat".

*R. 'Altaclarensis'* is a similar large tree and was one on the first rhododendron hybrids. Its flowers are described as deep red. It was bred by J. R. Gowan in 1831 and was awarded an F.C.C. in 1865. It set the standard

for the large range of similar hybrids. It was used in many crosses as one of the parents. One, by Standard and Noble in 1847, with *R. catawbiense* (an American species) produced *R. 'Elegans'*. Long out of commercial production in the UK it was once used extensively as a root stock when grafting was the main method of rhododendron propagation. Later flowering, its blooms are described as "deep rose, well spotted – a

rather coarse colour". Often in New Zealand gardens the root stock has re-grown and over-come the scion to become the predominant plant. Thus *R. 'Elegans'* is often seen in older gardens and although often large and many trunked, does not grow as tall as *R. 'Sir Robert Peel'*, with which it is often confused.



*R. 'Sir Robert Peel'* photographed in King Edward Park, Hawera



Pukekura Park Friends under an old *R. 'Sir Robert Peel'* planted in the 1890s on the Hatchery Lawn, Pukekura Park.

# CHOOSING VIREYA RHODODENDRONS FOR YOUR GARDEN

THEY ARE THE 'BIRDS OF PARADISE' AMONG THE RHODODENDRON FLOCK

Lynn Bublitz

My first introduction to vireya rhododendrons occurred as the headlights of the Pukeiti truck lit up a row of them in wooden pots at the end of the drive at Euan Perrott's nursery. Pink, orange, yellow and red - they were stunning. We were going there to collect plants and of course to see both Euan and Sylvie. Euan was among the first to recognize the potential of vireyas as garden plants and imported a number of plants and seeds from Australia. Young plants, including a number of vireyas propagated from the original imported material, were loaded onto the truck and transported to Pukeiti, forming the basis of what is now a world renowned collection.

Euan and Sylvie later donated the propagation glasshouse to Pukeiti, where many varieties were grown and made available to members. Many were named and registered by Graham Smith. Among them were 'Gilded Sunrise', 'Flamenco Dancer' and 'Simbu Sunset' which still are today among the most popular vireyas for the garden.

It was at Perrott's, too, that David and Pauline Brown's love affair with vireyas was kindled, leading later to the establishment of their commercial nursery.

Naturally some of these wonderful vireyas found their way into my garden, including a species *R. macgregoriae*, cutting-grown from a

mature plant, the seeds of which had been collected by Felix Jury in Papua New Guinea in the 1950s. He was the first New Zealand horticulturalist to collect material from this wonderful group of tropical rhododendrons in the wild. Other New Zealand collectors, including Graham Smith, Keith Adams,

have been produced. The Australians were among the first to raise vireya hybrids and hundreds have since been raised in New Zealand. The most popular of the vireyas for gardens are invariably the hybrids.

The species is often difficult to grow, for while all are from tropical regions they occupy a range of habitats. Some are epiphytes, particularly those in the warmer coastal regions, others are colonizers growing on exposed and cleared banks at higher altitudes, some are found growing in moss in swamps, and some in mountainous regions even experiencing minor frosts. Thus in cultivation providing a habitat with a single set of environmental conditions will not suit the species as a whole, as a range of conditions is required to grow the many varieties well. Many, too, are straggly growers and have long scantily leafed branches terminally bearing a crown of brightly coloured flowers and are thus not regarded as good garden plants.

Only a few species such as *R. macgregoriae*, *R. tuba* and *R. jasminaflora* have proven to be good garden plants. Despite this the range of species is attractive to growers because they exhibit a variety of morphological characters, having different

leaf form, flower shapes, and a variety of bright colours. Some are scented. A number flower intermittently throughout the year, while the peak of the flowering season for others is the late autumn, through winter and into spring. This range of physical



*R. 'Saxon Glow'* at Eden Garden

Os Blumhardt and David Binney have brought in other species from New Guinea and Borneo, many of which, along with others generously donated from overseas gardens, have provided raw material for hybridization efforts from which many good garden plants



*R. macgregoriae*



*R.* 'Red Mountain'



*R.* 'Popcorn'



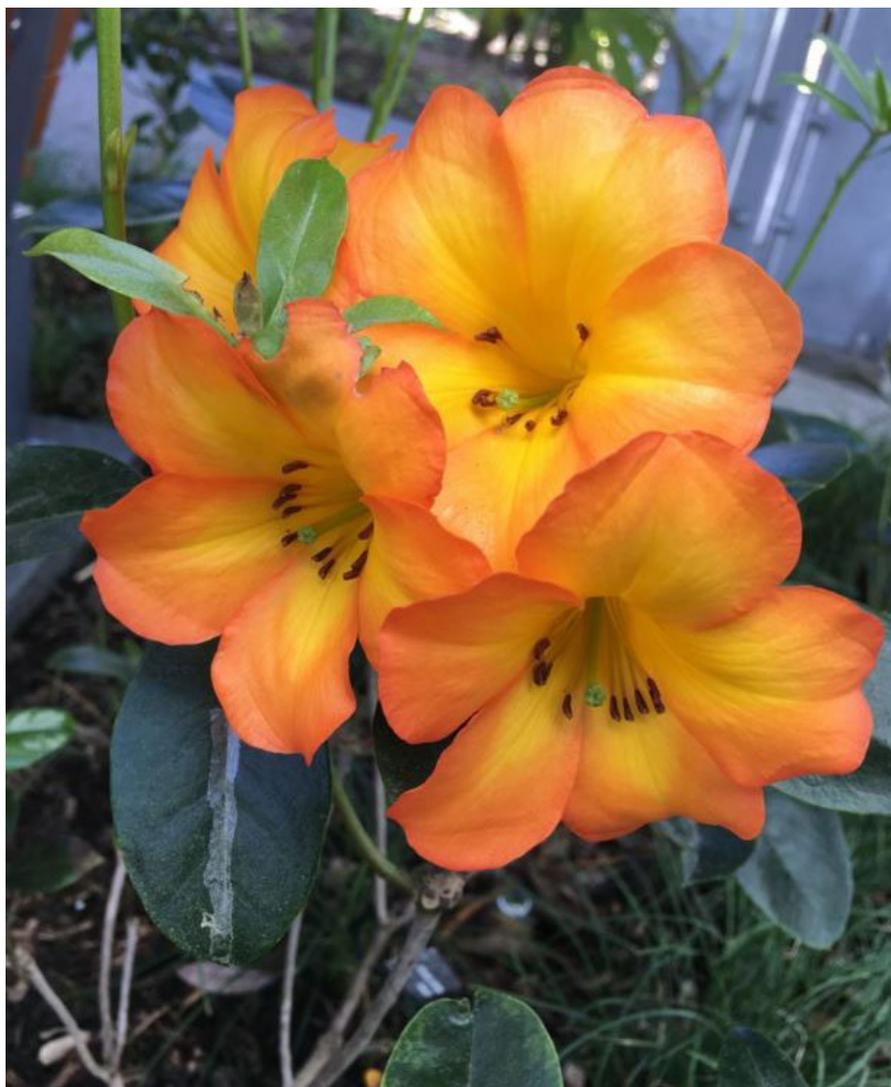
*R.* 'Pendance'



*R. tuba*



*R.* 'Flamenco Dancer'



R. 'Simbu Sunset'

characteristics is a magnet for hybridisers wishing to develop good garden plants in a range of colours and forms - hundreds have been raised and many are available through the trade. Growing them well though - even the hybrids - is challenging. Despite this they are gaining in popularity, particularly in the north of the country, as the trend towards tropical gardens becomes fashionable. They add the vibrancy of bright tropical colour to the tapestry of luxuriant green.

While many hybrids exhibit a vigour which makes them easier to grow than many of the species, they are still 'tropical' plants and need special care. They are frost tender, dislike windy places despite needing good airflow, need excellent drainage but damp soil, and require plenty of light. High shade and passing sunlight suit them well - but if grown under intense shade they will not flower.

They should be shallowly planted in a light textured soil to ensure the provision of air around their roots and good drainage. Many make good pot plants and being epiphytic, a number, particularly those with smaller leaves, grow well in hanging baskets. The potting soil mixture recommended for most species by the Royal Botanic Garden Edinburgh is open, well aerated, and free draining to allow no water-logging and plenty of oxygen flow to the roots. It has a pH of 5.5 and provides essential elements including calcium. Its composition is: 60 litres of medium grade potting bark (2.5-3cm), 40 litres of fine grain propagation bark, (0.5-1cm), 80gm of magnesium limestone, and 40gm of fritted trace elements. (Fritted = not water soluble). Alternative mixtures recommended have one third each of fine bark, pumice and leaf mould. Regular light applications of a foliar

feed containing trace elements is recommended, but high doses of fertilizers should be avoided. Light pruning should be undertaken after flowering to form good plant structure, tips of non-flowering branches can be pinched out and spent flowers should be removed before seed heads are formed. Like all rhododendrons vireyas are subject to some pests and diseases, thrips and mildew especially. Good growing conditions help to address these problems.

Having been told that the few of Euan's early varieties that I had been lucky enough to be given liked good drainage, I planted some of them in ponga stumps, and to give protection placed them at the edge of the native bush surrounding the garden. That was one of my many mistakes. The downhill soil creep buried too deeply the roots of those planted directly in the soil, while the bush provided too heavy a shade causing the plants to become etiolated. They did not flower. Some in the more open areas did not enjoy the colder wet winter months nor the competition of other plants, and their leaves developed black patches and defoliated. The selection I grew were not best suited for the local climate.

That early attraction, born in the unforgettable show in the headlights, therefore waned. But for many other gardeners, beguiled by brightly tropical-coloured flowers, it hasn't. There are many fine collections to be seen particularly in the warmer parts of the country, and growers who provide special care and attention, particularly protection from frosts, are well rewarded. Selecting the right plant for the conditions is as important for vireyas as for any other plant.

Which are the hardiest of the vireyas, the most popular and which are recommended? Asked this in a survey of twelve Auckland gardeners, no clear favourites emerged. One said, "I really like them all, especially those flowering this time of the year (early winter) bless their sturdy little hearts." Forty-nine different varieties were listed as favourites including two species *R. tuba* and *R. javanicum*. The most popular of four of the gardeners were 'Aravir', 'Aleksandr', and 'Gilded Sunrise' followed by

'Just Peachy', 'Kisses' and 'Rio Rita' which were chosen by three, while 'Angelique', 'Tropic Glow', 'Greer's Pink', 'Guinevere', *R. tuba*, and 'Marshall Pierce Madison' were chosen by two.

In New Plymouth vireyas which grow well in the garden include *R. macgregoriae*, 'Simbu Sunset', 'Pendance', 'Rob's Favourite' and 'Kisses'. When asked to name the favourites of buyers, the nurseryman David Brown said "whatever was available at the time of purchase - the flower colour the major factor of choice". At Pukeiti Wendy Askew who looks after the nursery includes among her favourites; *R. macgregoriae* and *R. laetum*, and the hybrids 'Golden Charm', 'Haloed Gold' and a very old hybrid, in fact one of the first to be marketed - 'Ne Plus Ultra'.

The name given this plant is a Latin phrase meaning 'no more beyond', such was the appearance of this early vireya hybrid. Produced in 1892 in the nursery of J. Veitch and Sons by hybridizing two species known at that time as *R. brookeanum* var. *gracile* (now *R. javanicum* ssp. *gracile*) and *R. lobbii* (*R. longiflorum*). Both of these species, along with three others, were introduced from SE Asia in the 1840s for the Veitch nursery by Thomas Lobb. These, and two others formed the basis of over 500 named hybrids, all tender, needing the protection of glasshouses and particular care. Of these, only seven remain in cultivation: 'Ne Plus Ultra', 'Clorinda', 'Triumphans', 'Princess Alexandra', 'Princess Royal', 'Pink Delight' and 'Souvenir de J.H. Mangles'.

In 1892 'Ne Plus Ultra' was listed for sale, but it was not until 1958 that it was registered. It was at this time that there was the budding of new interest in vireyas, particularly in Australia, USA and New Zealand. There are now 315 named vireya species (with still more being discovered) and of those, 60 have been used for hybridization producing over 1000 named varieties. Not all, of course, are available through the trade in New Zealand but there are still a number offered for sale giving a good selection from which to choose.

No matter which catches your eye make sure that you provide the appropriate growing conditions.



*R.* 'Rob's Favourite'



*R.* 'Kisses'



Heritage Park



R. 'Sir Edmund Hillary'

# HERITAGE PARK A VISIT ON THE LAST DAY OF SEPTEMBER Lynn Bublitz



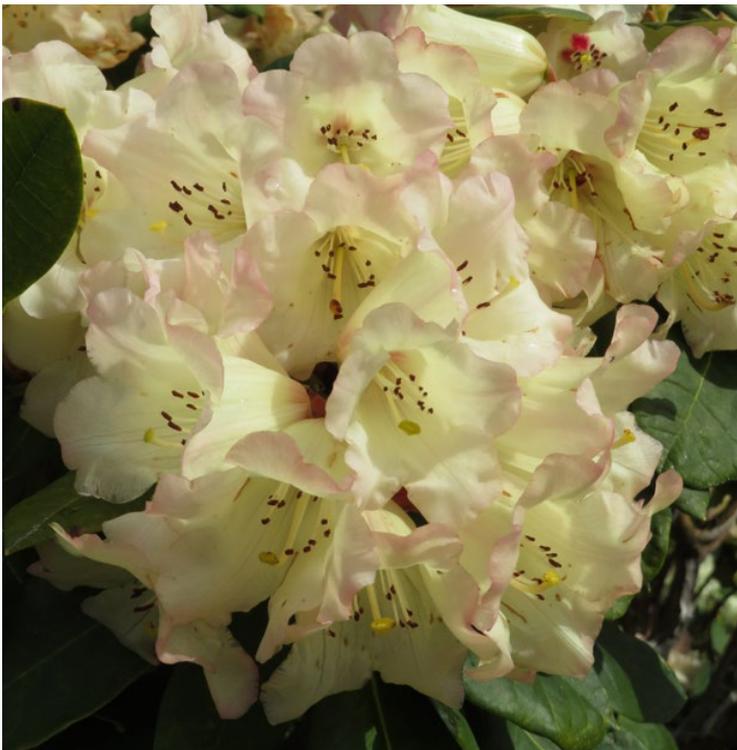
R. 'Yellow Moon'



R. burmanicum



*R. farinosum*



*R. 'Beauty of Ben Moi'*



*R. 'Susan'*

# THE TRUMPETS CALL



# Pukeiti Tour of English Gardens *May 2020*

Commencing **late April through to late May** this special tour is designed to explore the very finest of Southern England including special gardens in North Wales, East Anglia, the Cotswolds, South West and South East, finishing up with the Chelsea Flower Show in London. As an appetiser two nights will be spent in Singapore visiting the spectacular Bay Gardens and the Botanic and Orchid Gardens in this iconic city, on the way over.

## The itinerary includes:

- Hyde Hall, **Beth Chatto Gardens**, Raveningham Hall and East Ruston Old Vicarage in East Anglia.
- Chatsworth, **Bodnant**, Maenan Hall and Plas Brondanw in Central England and North Wales.
- **Hidcote Manor**, Kiftgate Court, Hampton Court Castle, Stockton Bury, **Highgrove Royal Estate**, Miserden Park, The Laskett and Old Rectory Thrupton in the Cotswolds and Gloucestershire.
- Hestercombe, Knightshayes Court, **Rosemoor**, Castle Hill, Killerton, The Garden House and Wildside Garden in Devon.
- **Eden Garden**, Tregrehan, Caerhays Castle, Trewithen in Cornwall, with an option to Scilly Isles or St Michaels Mount.
- Abbotsbury, **Exbury**, Hillier Arboretum along the South Coast.
- Leonardslee, Nymans, Sissinghurst, **Great Dixter**, Wakehurst Place and Borde Hill in South East.
- Great Comp, Wisley, Kew and **Savill Gardens** near London, with **Chelsea Flower Show** to finish.



## Tour Arrangements

The UK tour includes share twin/double accommodation with dinner, bed and breakfast, garden entries, coach travel. Early visit to Sissinghurst, evening visit with tour and dinner at Wisley, guided tours to Hestercombe, Caerhays, Rosemoor and Kew. Chelsea show ticket. Brightwater Tour Manager.

Also included is Auckland-Singapore-London economy return airfares, transfer and entrance fee to Bay Gardens and airport transfer to and from the city, share twin/double accommodation.

Tour cost based on 25 persons is **NZ\$11,680** based on exchange rate as of 12th August 2019.

Single room supplement NZ\$2150 in the UK.

The final cost will be determined by participant numbers, exchange rates nearer the departure dates and any reasonable increases in tariffs that might be applied by contractors.

Actual dates will be confirmed when bookings are made with the airlines and flight times determined, but would be **25 or 26 nights**.

**NZRA Members are welcome to join this tour.**

## Be Quick, remaining tour numbers limited

Further details can be obtained from the Pukeiti Secretary, PO Box 1066, New Plymouth, 4340 or email [pukeiti@pukeiti.com](mailto:pukeiti@pukeiti.com)

Enjoy Spring in great English Gardens



**Pukeiti**

Pukeiti Rhododendron Trust Inc.

### PUKEITI RHODODENDRON TRUST INC.

[www.trc.govt.nz/gardens/pukeiti/](http://www.trc.govt.nz/gardens/pukeiti/pukeiti-rhododendron-trust/)  
[pukeiti-rhododendron-trust/](http://pukeiti-rhododendron-trust/)

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**Members' Committee Chairperson** Heather Robson

## New Members Welcome

Subscription \$35 per household.



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