

Trip Report: IPPS Singapore Symposium

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At first glance, Singapore might seem to be an odd choice to hold an International Plant Propagators' Society (IPPS) symposium. With a population density of 7,800 people per square kilometre (New Zealand has 18 per km²), one would wonder if there was any room left to grow plants. Add in the tropical climate of being located one degree off the equator and one would also wonder what would actually grow in such a climate?

But horticulturally, there is a lot happening in Singapore despite the challenges of being a city state. In 1967, the vision of a 'city in a garden' was introduced by the Government, putting greening initiatives at the forefront of future development. Almost 10% of the land area has been set aside for parks and reserves. Recent developments like Gardens by the Bay have also led to Singapore becoming a horticultural hotspot in Asia.

So, after months of planning by Eddie Welsh of Starter Plants, Philip and Janine Smith of Totara Glen Nurseries, Paul Fisher from the University of Florida, and Gardens by the Bay staff in Singapore, the IPPS Singapore Symposium was underway. In November 2019, 34 members of IPPS New Zealand joined others from Australia, Thailand and India for five days of visits, lectures and sightseeing.

The first day was an all-day field trip around Singapore. The first visit was to Hua Hng Trading Co Ltd, one of the largest general nurseries in Singapore which has an extensive selection of plants sourced from all over the world. The idea that plants were brought in from overseas and sold was of course interesting for us from New Zealand, but then I guess with so little room to grow plants in Singapore it helps to widen what is available. Plants come from Malaysia, Thailand, China and Australia with a small percentage raised on site. Hua Hng sells direct to the public as well as garden centres, landscapers and other nurseries. Being in the tropics, there were many plants on display you would not see in New Zealand, and there tended to be large numbers of each line, rather than the usual 10 or less you typically find in New Zealand retail centres. The most expensive lines were bonsai large grade specimens of casuarinas at more than SGD\$13,000 (NZ\$15,300)! It was also interesting to see potted watermelon plants for sale complete with ripening fruit (Fig. 1).

Our next visit was to Woon Leng Nursery, an orchid nursery that specialises in the production of *Phalaenopsis*. Woon Leng were the first to produce these in Singapore. They buy plants in tissue culture from Taiwan, then grow them on in climate-controlled greenhouses before being sold. Producing them this way keeps the cost down and also reduces the damage that can be done to flower spikes during transport. It is a very labour-intensive operation

employing 40 staff. The orchids are sold all around Singapore to private customers as well as for displays in public areas. They looked stunning in bloom in the nursery (Fig. 2).



Fig. 1 Potted watermelon plants for sale at Hua Hng Trading Co Ltd.



Fig. 2 *Phalaenopsis* orchids, a specialist but labour intensive crop for Woon Leng Nursery.

After lunch, we visited the Kampung Admiralty. This is a unique development which integrates housing for the elderly with a range of social and commercial services including childcare, so there is somewhere for the grandchildren to go. On the roof of the 11-story complex is a terraced community garden which provides space for people to spend time, meet up with others and also to tend the garden. At times it was hard to believe you were on the top of a building in one of the most densely populated cities on earth (Fig. 3). This development will be the prototype for similar building projects in the future and has already won several international architecture awards.

We then visited the green wall at The Heeren shopping centre just off Orchard Road (Fig. 4). The six-story high green wall was developed by Greenology and is a substrate panel system with an aluminium backing. The panels were planted and grown in a nursery before being installed on the wall. Once installed, the green walls basically look after themselves with minimal maintenance required.

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Fig. 3 Part of the rooftop garden of the Kampung Admiralty development.



Fig. 4 The six-story high green wall at The Heeren shopping centre.

The next day was spent at Gardens by the Bay where we were kindly hosted by CEO Felix Loh and his team. Opened in 2012, the gardens are one of the most popular tourist attractions in Singapore and received 12 million visitors in 2018.

For the first part of our visit there was a guided tour around the gardens and, fortunately, we were driven around the 101-hectare site. We were able to take in the 'Skyway', a 128-metre suspended walk between two of the large 'Supertrees' which are another feature of the gardens. At 22 metres high, they give visitors great views over the park and surrounds, including the magnificent Marina Bay Sands Hotel with its three columns, topped with a large platform. We also visited the 'Floral Fantasy', the latest attraction opened at Gardens by the Bay, designed to cater for those who don't have time to visit the larger conservatories but still want to see a floral display on a smaller scale. There are four separate themed areas which you walk through and then you can end your time with a 4D² ride, 'Flight of the dragonfly', through the displays.

We then explored both the 'Flower Dome' and the 'Cloud Forest' conservatories and marvelled at the displays inside both. The Flower Dome has nine gardens, ranging from the stunning baobab trees from Africa through to an Australia garden and an olive grove with centuries-old trees growing. At the centre is the 'Flower Field' display which is changed on a regular basis. At the time of our visit, there was a Christmas themed display of poinsettias on show – I never knew how many different types there are, and it certainly looked magical for Christmas (Fig. 5).



Fig. 5 A spectacular display of poinsettia in the Flower Dome.

The Cloud Forest conservatory features a 35-metre-tall 'mountain.' You take a lift to the top and then walk down via a series of elevated walkways and internal stairs. The inside of the mountain also has things to see and do, including a show of crystals and interactive displays. At the top of the mountain is a display of carnivorous plants (complete with Lego versions!) and as you wander down you get to fully appreciate the complexity of the plantings and what it must take to keep them looking good (Fig. 6).



Fig. 6 The 'mountain' inside the Cloud Forest conservatory.

² The fourth dimension in this case being smell.

After lunch, it was the start of the lecture program and we were all grateful it was held in an air-conditioned room. Felix Loh, CEO of Gardens by the Bay, welcomed everyone and spoke fondly of his time studying in New Zealand at Massey University. He then spoke about the challenges of maintaining Singapore's reputation as a garden city and how Gardens by the Bay helps with this. Philip Smith on behalf of the IPPS New Zealand Region presented Felix with an IPPS plaque.

Dr Puay Yok Tan from the National University of Singapore spoke about the motivations, benefits and challenges of greening Singapore. There have been remarkable results from the greening over the last five decades and he quoted the founding Prime Minister of Singapore Mr Lee Kuan Yew saying, "Greening is the most cost effective project I have launched". Dr Puay Yok Tan spoke of the environmental, social and cultural benefits that greening has brought but also of some of the challenges ahead, especially the loss of secondary forests in Singapore.

Chris Dalzell, originally from South Africa, but now with Gardens by the Bay wowed us with beautiful photos of many South African plants suitable for the tropics. He spoke of the diverse and unique flora of South Africa which makes up 9% of the world's plant species. He also spoke of the threats to them, including the ability for people to collect unlimited amounts of plants from the wild for traditional medicine.

Following dinner hosted by Felix and his team, we enjoyed the light and sound show under the Supertrees – an amazing experience and not to be missed as a part of a visit to Gardens by the Bay.

Next day began with a visit to the Singapore Botanic Gardens. Celebrating its 160th year, the 82-hectare attraction is the only tropical garden to be designated a UNESCO World Heritage Site. The gardens began as a public park developed by the Singapore Agri-Horticultural Society and, in the late 1800s, played an important role in research into rubber production. In recent times, the garden has also played an important role in the development of Singapore as a garden city. In 2009, another 18 hectares was added to the gardens and this has been developed into several different attractions.

During our visit, we saw the double coconut (*Lodoicea maldivica*) an impressive palm that blew us away with its giant fronds (Fig. 7). The curtain of roots from the curtain ivy (*Cissus verticillata*) was also impressive, as were some of the bonsai on display. An area of tropical rainforest older than the gardens themselves also gave an insight into what Singapore looked like prior to human settlement.

We were also able to explore the National Orchid Garden which contains an impressive collection, well presented in a garden situation, and consisting of more than 1000 species and 2000 hybrids. Part of the collection is the VIP collection where orchids have been named for famous visitors to the gardens, including Princess Diana and Nelson Mandela. It was surprising to see on display orchids named after two former Governor Generals of New Zealand, Sir Anand Satyanand and Sir Jerry Mateparae.



Fig. 7 The double coconut (*Lodoicea maldivica*).

We left the gardens just as the heavens opened to head back to Gardens by the Bay and an afternoon of presentations. Thomas Seow spoke about the three main areas of research and development at the Gardens: orchids including the breeding program; flower trials and production including controlling flowering and longevity; and sustainability which is becoming an important aspect of how the Gardens operate.

Mei Leng Lim spoke on the orchid program at the Gardens which includes managing them in displays, trialling for flower longevity and breeding new hybrids. Breeding focuses on creating hybrids between highland and lowland species but also those with better colours, more flowers and compact habits.

Carly Anderson spoke on growing spectacular hanging baskets. A display of 100 baskets is planned for the Flower Dome in September and, since established baskets are difficult and costly to freight, they are being grown in-house. Carly ran through some of the considerations for baskets, from what substrate to use to plant material and managing pests and diseases.

Dex Chen spoke about sustainability at the Gardens, including making better use of resources and minimising waste. One example was sending old Christmas trees (real ones) to Singapore Zoo where they are used in enclosures as a tool to keep the animals amused.

Dr Sladana Bec then presented on disease diagnosis in plants, including the interaction between the host, pathogen and environment in diagnosing diseases, and differences between fungal, bacterial and viral infections. It was also good to have a refresher course on the differences between signs and symptoms of disease and to be reminded that not all symptoms are caused by disease. This was followed by a hands-on workshop where various options were used for diagnosing diseases.

The final day of the symposium began with more presentations. Dr Nura Abdul Karim spoke about Lee Kuan Yew's original vision of a city in a garden and how this has been achieved.

Dermot Molloy from the Royal Botanic Gardens Melbourne spoke on the development of Oman Botanic Garden, an exciting development underway in the Middle East. These gardens will cover 423 hectares and be one of the largest in the world. They will also house almost all of Oman's flora, from deserts to monsoon forests. Dermot spoke about some of the unique plants found in Oman and of the challenges in setting up an on-site nursery at the botanic gardens.

Fellow Australian David Hancock, from Western Australia, spoke on developing a nursery for a wetland revegetation project in Oman. The oil fields there produce large quantities of water which is separated out but still contaminated with residues. Previous practice has been to pump this back underground, but an engineering solution was sought to develop a wetland to treat the water. 250 hectares was required to be planted in four species, so a dedicated nursery needed to be established. This presented numerous challenges which David and his team had to overcome to ensure successful delivery of the project. One of the takeaway points David made was that good horticultural skills and experience can make the difference between success and failure in a project of this type.

Paul Fisher, University of Florida, then spoke on phosphorus and the in's and out's of how it affects plant growth, including what deficiencies look like and its use in nurseries compared to plants growing in the landscape.

I then spoke on roses in New Zealand and featured some of the more prominent breeders and their creations.

Eddie Welsh brought the presentations to a close by speaking on the 'Spirit of IPPS' and why he thinks it has been so successful around the world.

The afternoon saw more visits, first up to Khoo Teck Puat Hospital. No one from the group needed to see a doctor, rather we were there to see this 'green hospital'. As many were to remark during our time there, it did not feel like we were in a hospital at all. The site has extensive plantings, including a large area between two of the buildings landscaped like a park, complete with water features.



Fig. 8 The rooftop garden at Khoo Teck Puat Hospital.

One of the buildings features a roof top garden where vegetables and fruiting plants are grown with the produce given to volunteers and staff. There was also a medicinal garden with plants that "heal, thrill and kill", coloured coded of course according to those potential outcomes (Fig. 8).

Then onto Changi Airport to visit Jewel Changi. This is a nature-themed entertainment and shopping complex located between three of the passenger terminals. Starting at the top, there are numerous activities to do including a maze, slides and a glass-floored walkway out over the edge. The centre is dominated by a large waterfall cascading from the roof, surrounded by plantings of thousands of trees and shrubs making it feel like a tropical rainforest (Fig. 9). We were treated to a light and sound show complete with falling fake snow. This certainly makes visiting an airport an enjoyable experience. Take note Auckland, this is how it can be done.

With that, the rest of the tour boarded the bus back to the hotel while I went and checked in for my flight home to New Zealand. Five days went by very quickly but visiting Singapore was a fantastic experience, even if the heat made things hard going at times (thank goodness for air conditioning and a hotel swimming pool).

Acknowledgements

A big thank you must go to all of those who hosted us on visits in Singapore; you all made us feel very welcome and nothing was ever a problem.

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Fig. 9 The waterfall and plantings at Jewel Changi, Changi Airport