Gardenwise

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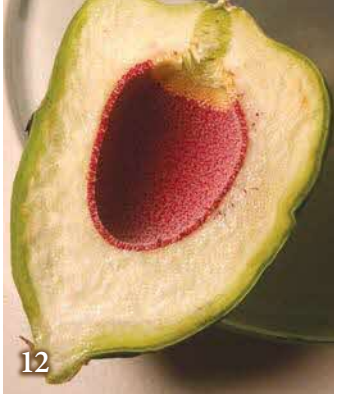

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Cover
The gold medal winner and overall champion display for the 25-sqm category by the Singapore Botanic Gardens.
(Photo credit: National Parks Board)

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Message from the Director

This year, the Gardens will hold two major international events: the Singapore Gardens Festival 2024 will be held from 6 to 10 Aug, and the 8th Global Botanic Gardens Congress 2024 from 6 to 9 Aug 2024, both at Suntec Singapore. Preparations for both events started mid-last year, and as we enter 2024, preparations have now moved up a gear.

I have highlighted the significance of the 8th Global Botanic Gardens Congress in *Gardenwise* 59 and more information about this global event is covered in this Volume on page 22–23 by Jane Tan. In this message, I would like to share some perspectives on the Singapore Garden Festival and provide some little know information about the Gardens' long-standing role in staging flower shows in Singapore.

The first SGF was staged in 2006, and since then, we have organised eight more editions of it, all to glowing reviews. Over a short period, SGF has now been consistently featured amongst the top five flower shows from among tens of shows globally. In fact, SGF is considered to have "set a standard that is almost impossible to achieve without years of development", like the Chelsea Flower Show and the Philadelphia Flower Show[1] . Compared to the two other shows, which have a much longer history—the Philadelphia Flower Show was started in 1829 and the Chelsea Flower Show in 1913—we should be proud that SGF has achieved international recognition and visibility over a much shorter period and in a society with also a much shorter history of gardening culture.

Flower shows in Western societies were said to have started in the seventeenth and eighteenth centuries when flower societies staged competitions for new varieties of flowers, which gradually evolved into shows dedicated to different flowers, fruits and vegetables, which continue today[2] . My friend, Dr Ayako Nagase also wrote about shows being organised for "cult plants" (novelty plants that are variegated and have odd forms and shapes) at the height of floriculture development in Japan during the Edo period[3]. Horticultural societies which were formed later with the growth of gardening culture, usually with elites of the societies as members, began to organise big flower shows with a larger variety of exhibitions and dedicated showgrounds. This tradition continues today, with the Royal Horticultural Society organising the Chelsea Flower Show, the Philadelphia Horticultural Society and its Philadelphia Flower Show, the Massachusetts Horticultural Society and its New England Fall Flower Show, etc.

Likewise, the Agri-Horticultural Society which started the Singapore Botanic Gardens in 1859, organised the first "Show of Flowers, Vegetables, and Fruit" in the Town Hall (present-day Victoria Memoria Hall) from 1861 to 1862. From 1871 onwards, the shows were staged in the Gardens, with a historically significant show in 1871 that was attended by King Chulalongkorn, the first Siamese King to visit Singapore. The flower shows in the Gardens continued almost yearly until 1891. An Exhibition Hall, the predecessor of the current Plant House, was also built in 1882 to stage the flower shows, which attracted exhibitors from

Johor, Penang, Melaka and Perak. From 1893 to 1900, the flower shows were held in the Town Hall and the Singapore Volunteer Artillery Drill Hall (former Beach Road Camp at the current South Beach development).

In addition to these local shows, from 1904 to 1910, the Gardens also participated in the Joint Annual Agri-Horticultural Show of the Straits Settlements and the Federated Malay States. These shows were apparently large regional events, said to be the largest of their kind in Asia, and with the Sultans of Perak, Selangor, Pahang, Johor, Negri Sembilan, Terengganu, Kedah and Brunei, and the Rajah of Kelantan as patrons of the show. The 1906 and 1910 shows were held at the Singapore Volunteer Artillery Drill Hall with the former Director, H.N. Ridley (1888–1912), as the Honorary General Secretary in 1904 and the Honorary Secretary of the Standing Committee in 1910. It was also in the 1910 show that the earliest samples of cultivated rubber grown by the Gardens were displayed for the first time, attracting much attention.

With the formation of local gardening societies, specifically the Singapore Gardening Society and Orchid Society of South-East Asia (then known as the Malayan Orchid Society), both of which were started with support from the Gardens under the directorship of R.E. Holttum (Director, 1925–1949), local shows such as Annual Flower Show and the Malayan Orchid Society Annual Show were held from 1960 onwards at the Happy World Stadium. The Gardens played significant roles in this show. For instance, H.M. Burkill (Director, 1957–1970) was Chairman of the Show Committee, and A.G. Alphonso (Deputy Commissioner of the Parks and Recreation Department, 1970–1976) was Show Manager for the Annual Flower Show in 1960. From 1970 onwards, the two shows were combined as the Singapore Horticulture Show and the Gardens staff continued to play key roles in their organisation. In the 1980s, under the Parks and Recreation Department, we also contributed to the Horticulture and Aquarium Fish Shows held in the World Trade Centre, which I remember fondly visiting as a teenager. In 1995, 1998 and 2001, the Gardens organised the Skyrise Gardens Exhibition to promote gardening in Singapore. I was fortunate enough to have first-hand experience organising the 1998 edition as the Show Manager.

Flower and garden shows in Singapore can thus be said to have started by the Gardens and we contributed to its evolution over the years. This is not surprising. In addition to our scientific mission of studying and conserving plants, keeping plants alive and displaying them for aesthetic appeal also requires the Gardens to be a centre of horticulture excellence. This knowledge also supported the Gardens' mission to promote local gardening, and flower shows are a direct means to do this. This knowledge of plants and growing plants is also why the Gardens was tasked to play a foundational role in the greening of Singapore by providing technical advice on plant growth, health and nutrition, soil science, and supplying plants for greening, including new plants for introductions in cultivation. It was said that in the 1960s, the Gardens introduced around 80% of plants cultivated in Singapore's public spaces and home gardens.

With such a long and rich association with organising flower and garden shows, the Gardens will continue to be the focal point for flower shows in Singapore. But we should well take heed of lessons from the past and careful observations of trends worldwide as we continue to evolve the Singapore Garden Festival. Clearly, even though the Festival has garnered international recognition, reputation is fragile and our international following can be fickle. The international dimension of the Festival thus requires constant efforts and actions to be sustained and cultivated. More importantly, the value propositions of the Festival and its relevance to addressing national goals must continue to be reviewed and articulated. Some of these are soft and less tangible, relating to cultivating gardening culture, fostering aesthetic appreciation, fostering national pride and identity, and others are geared towards promoting gardening and design skills, growing the local industry and growing tourism receipts. We must also be cognizant of broader environmental sustainability issues and show financing. Look out for the next editions of *Gardenwise* when we report back on Singapore Garden Festival 2024 and share our plans for Singapore Garden Festival 2026 and beyond.

Tan Puay Yok
Group Director
Singapore Botanic Gardens

[1] See Bennis, E. M. (2014). Garden Shows and Festivals as a Business Model – Case Studies and Innovative Approaches. INTERREG IVC, EU.
[2] See Elliot, B. (2001). Flower Shows in Nineteenth-Century England. Garden History, 20(2), 171-174.
[3] See Nagase, A. (2011). Japanese Floriculture Development in the Edo Period. HortResearch, 65, 1-r.

The 14th Asia Pacific Orchid Conference, Singapore

Bird's eye view of the Orchid Show.

The 14th Asia Pacific Orchid Conference (APOC), jointly organised by the National Parks Board (NParks) and the Orchid Society of Singapore (OSSEA), was held at the Singapore EXPO from 16 to 20 August 2023. This marked the first time Singapore hosted the event. The event consisted of an orchid show and a scientific conference programme, with the latter running from 16 to 19 August 2023.

The Conference was opened by then-President of Singapore, Madam Halimah Yacob and Minister for National Development & Minister-in-charge of Social Services Integration, Mr Desmond Lee. During the opening ceremony, the winners of both the Orchid Plant and Orchid Landscape Competitions were announced, and the recipients were presented the Challenge Cups and other awards by Madam Halimah, celebrating the exceptional orchids and landscape designs that stood out among the competition.

The top winners of the Orchid Show.

Minister Desmond Lee visiting NParks' Pasir Panjang Nursery Booth at the MarketPlace.
(Photo credit: National Parks Board)

The Orchid Show component of the conference comprised an orchid plant competition and an orchid landscape competition. It showcased the immense variety and beauty of orchids, attracting orchid enthusiasts and growers from various countries.

The Singapore Botanic Gardens (SBG) made a remarkable contribution to the Orchid Plant Competition by submitting an impressive 331 plant entries. In total, the competition received a staggering 676 entries across 105 categories, demonstrating the immense diversity and passion for orchids among the participants. The competition was judged on 15 August 2023, where experts meticulously evaluated each entry based on factors such as bloom quality, plant health and overall presentation. Twenty international judges were involved in the meticulous evaluation and had difficulty selecting the winners among the exceptional orchids on display.

SBG emerged as the standout winner, securing multiple prestigious awards. Of the five top awards, SBG won four, including the Grand Champion plant, Best Specimen plant and Best Hybrid. *Dendrobium nindii* x *Dendrobium* Seletar Red Dragon received the Grand Champion plant and Best Hybrid awards, as well as the Asia Pacific Orchid Conference (APOC) Perpetual Trophy for the Best Hybrid. In addition, an SBG's entry, *Grammatophyllum speciosum* var. *flava,* was recognised as the Best Specimen plant in the competition. Gardens by the Bay also achieved great success, as they were awarded the APOC show trophy for the Best Species, specifically for their stunning specimen *of Dendrobium thyrsiflorum*.

The Gardens' outstanding orchids bagged nine bronze, 10 silver, and five gold medals. These accolades attested to the exceptional quality and variety of orchids cultivated by the Gardens, solidifying our reputation as leaders in the field of orchid cultivation.

The orchid landscape competition consisted of two categories based on size: 9-square-meters (sqm) and 25-sqm. There were 15 entries for the 9-sqm plots and 10 for the 25-sqm plots. Two non-competitive plots were put up by the Orchid Society of Southeast Asia (OSSEA) and the Singapore Gardening Society (SGS), respectively.

***Dendrobium nindii* x *Dendrobium* Seletar Red Dragon received the Grand Champion plant and Best Hybrid awards.**

***Grammatophyllum speciosum* var. *flava,* winner of the Best Specimen plant award.**

Participants were given the opportunity to showcase their creativity and skill in designing captivating orchid landscapes within these designated plots. NParks provided support by supplying various plants as fillers and materials such as sand and tree branches for the setup of the orchid landscapes.

The National Orchid Garden (NOG) of SBG secured first place in the 9-sqm category, while SBG emerged first in the 25-sqm category. The former also won an additional silver medal for the exceptional landscape quality, which showcased miniature and other compact orchids delicately planted in terrariums. The landscape was covered in mosses to simulate the montane forest environment in which these cool-growing orchids grow. Some interesting orchids featured were *Paphiopedilum* and Jewel Orchids, which are native to Borneo.

SBG emerged as the gold medal winner in the 25-sqm category, including the overall champion for the 9-sqm and 25-sqm categories. The SBG displays showcased a plethora of V.I.P. orchids unique to the Gardens' collection alongside regional heritage orchids intricately curated in a native swamp forest landscape. These achievements highlighted the exceptional talent and expertise of the NOG staff in creating stunning orchid landscapes.

Participants from 12 countries enthusiastically participated in the landscape competition, and the diverse range of participants from China, Taiwan, Japan, the USA, and Southeast Asia added an international flavour to the event, fostering cross-cultural exchange and learning. A wide range of plants were on display, including the Philippine endemic *Grammatophyllum wallisii* and the striking *Phalaenopsis* Blue Gene "311NR" (the world's first genetically engineered orchid) on display outside Japan for the first time. In addition, visitors were treated to a

The 9-square-meters entry (Left) by the National Orchid Garden and the 25-square-meters entry (Right) by the Singapore Botanic Gardens.

visual array of unique perspectives and exquisite design techniques. The team from Okinawa used cut flowers to create hanging orchid balls. At the same time, the Fairchild Tropical Botanic Garden team kept their design simple but took the opportunity to engage with visitors to share about their Million Orchid Project. The team from Taiwan put up a vibrant display comprising *Phalaenopsis* and *Paphiopedilum* to promote the upcoming World Orchid Conference and Taiwan International Orchid Show to be held in Tainan in 2025.
The diversity and creativity of the general displays were amazing. The floral archway, created by designer Harijanto Setiawan, was a breathtaking display that welcomed visitors at the entrance. SBG collaborated with three partners to present orchids in floristry pieces, namely ITE College Central, Floral Designers Society (Singapore), and Ikebana International Singapore Chapter 135, and visitors saw orchids featured in large, elegant standing floral displays as well as small, intricate jewellery pieces.

Mr Hsien Yoong How and the Singapore Mint curated the display that drew many curious eyes during the conference as it featured a

***Phalaenopsis* Blue Gene "311NR" by Awaji Green House.**

Landscape display by Okinawa Churashima Foundation.

remarkable collection of philatelic and numismatic items related to the social history of orchids in Singapore and the individuals associated with native orchids. Separately, a photo gallery with 30 photographs was presented by Nikon Singapore and the Photographic Society of Singapore to showcase the beauty and diversity of orchids through the camera lens.

The five-day Orchid Show allowed participants and attendees ample time to explore the displays, attend informative sessions, engage in networking opportunities, and spend time in the MarketPlace.

As for the scientific programme, the talks were carefully curated to reflect this year's conference theme: "Diversity, Conservation, and Culture." The scientific programme featured a balanced mix of scientific and hobbyist talks. There were 27 oral presentations, six plenary talks, and a keynote address featuring speakers from Singapore, Indonesia, Malaysia, Thailand, Vietnam, China, Japan, Taiwan, India, Sri Lanka, Australia, the USA and Ecuador.

Dr Gillian Khew, Chair of the Conference Scientific Committee, opened the conference with a welcome speech highlighting the importance of orchid diversity and trade in the Asia-Pacific region. The region comprises almost 40% of the world's orchid diversity and over 90% of global trade. These figures underscore the paramount importance of conserving the region's diversity and demonstrate its substantial role in the global orchid trade, which requires active research and conservation to remain sustainable.

The opening keynote address was given by Kenneth Er, who served as the CEO of NParks from February 2014 to May 2023. Mr Er's talk set the context and scope for the conference theme and programme as he spoke about the history and continued legacy of orchid research efforts by SBG and NParks, the importance of comprehensive surveys and long-term monitoring, the hope in the number of rediscoveries and new records (the number of extant native orchid species in Singapore has increased by 64%, from 45 to 74, since 2009), and ended with a note on the time lag in extinctions, encouraging what he called 'conservation optimism'.

The plenary talks offered a good balance of topics, ranging from orchid cultivation and physiology to systematics and conservation. Mr Novianto spoke about the breeding of *Dendrobium* section *Spatulata* in East Java, Dr Martin Motes provided a systematic overview of the genus *Vanda*, and Prof. Alex Chang presented

Mr Kenneth Er delivering the opening keynote address. *(Photo credit: National Parks Board)*

his research work on the factors that impact *Phalaenopsis* flowering and inflorescence quality. Prof. Hong Liu and Asst. Prof. Santi Watthana spoke about orchid diversity and conservation in China and Thailand, respectively, and Phil Spence treated the delegates to a sumptuous photographic exposition of his field expeditions to Papua New Guinea, focusing on species belonging to *Dendrobium* section *Latouria*.

Similarly, the topics presented during the general symposia ranged from orchid cultivation to conservation. To provide a sampling, some talks focused on the growing or breeding of *Phalaenopsis, Papilionanthe, Vanda, Paphiopedilum, Cattleya,* and various miniature orchids, the therapeutic and ethnobotanical uses of orchids, orchid show judging in Singapore and Japan, and orchid taxonomy, diversity, and conservation in Singapore, Malaysia, Thailand, Sri Lanka, China, the USA and Ecuador.

The scientific programme concluded with technical tours for the delegates to the National Orchid Garden and the Heritage Core of the Singapore Botanic Gardens.

Overall, the 14th Asia Pacific Orchid Conference was a resounding success, showcasing the beauty and diversity of orchids while recognising the exceptional efforts of orchid growers, researchers, and enthusiasts. The event served as a platform for knowledge exchange, scientific discussions and networking, community building, and artistic expression, further advancing the fields of orchid cultivation and landscape design.

Mark Choo
Whang Lay Keng
National Orchid Garden

Chua Zi Han
Pang Yoke Yue
Festivals & Shows

Gillian Khew
Molecular Biology & Micropropagation

All photos by Mark Choo, unless otherwise indicated.

Participants of the scientific conference programme. *(Photo credit: National Parks Board)*

The scientific committee of the scientific conference programme. *(Photo credit: Muhammad Taufiq bin Jumal)*

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The Singapore Botanic Gardens Seed Bank: Building Conservation Capacity

The Singapore Botanic Gardens Seed Bank was officially launched on 13 July 2019. Housed in one of the heritage buildings in the Gardens, the Seed Bank is a storage facility for tropical seeds, a laboratory for research into seed conservation, and a public gallery to educate visitors about seed banking and conservation work. The Seed Bank enhances the Gardens' role in botanical conservation, research and education. In addition, it also complements the Gardens' existing living collection of about 10,000 plant species, in which species of botanical significance and conservation concern are grown and studied.

As Singapore's first seed bank, the Gardens aims to safeguard the germplasm of endangered plant species around Southeast Asia, a biodiversity hotspot with approximately 50,000 plant species. Southeast Asia is undergoing a phase of rapid development, and primary forests are being cleared to make way for agriculture and urbanisation. At the same time, the effects of climate change are becoming more apparent, with increased events of extreme weather intensifying the threat to the existence of many plants in the wild. Loss of genetic diversity due to habitat degradation coupled with higher occurrences of extreme climate such as drought increases the possibility of plants, including *ex situ* conservation collections, being unable to adapt fast enough to the changing climatic conditions, thereby increasing the likelihood of plant extinctions. Hence, seed banks serve as a repository of genetic material where stored seeds are backup resources against catastrophic plant extinction events, for reintroduction into the wild to recover species or entire habitats, and enhance the capabilities of current conservation efforts.

The Seed Banking Process

The Singapore Botanic Gardens Seed Bank has an optimum storage capacity of around 25,000 species. The first step of seed banking for seeds of all shapes and sizes begins at the Seed Cleaning Laboratory. Fleshy seeds are first skinned and rinsed, while dry seeds are sorted and sieved to remove excess debris and dirt. This step is essential to minimise the risk of fungal rot.

Next, the cleaned seeds are transferred to the Dry Room to facilitate the reduction of moisture content. Relative humidity in the room is constantly kept

The seeds of *Antigonon leptopus* are separated from the dried fruits and floral parts.

The seeds of *Memecylon paniculatum* are extracted from its blue fleshy pulp using a sieve.

at 15%, and temperature is maintained within 25°C. Once the seeds have been dried, they will be stored in the freezer or cold room at −20°C.

In general, seeds can be grouped into two categories based on their tolerance to drying and storability. Seeds that can tolerate the conventional drying and freezing process described above are known as orthodox seeds. However, most tropical plants have non-orthodox or recalcitrant seeds that do not survive drying and freezing. For plants with non-orthodox seeds, viable genetic materials from seeds or other parts of the plants are extracted for long-term storage. These genetic materials are typically cryopreserved in liquid nitrogen at −196°C. The extraction of genetic materials from a plant, as well as the suitability of the genetic material to undergo freezing and thawing processes, differs significantly amongst species. At the moment, not much research has been conducted on the storage of non-

The Seed Processing Lab.

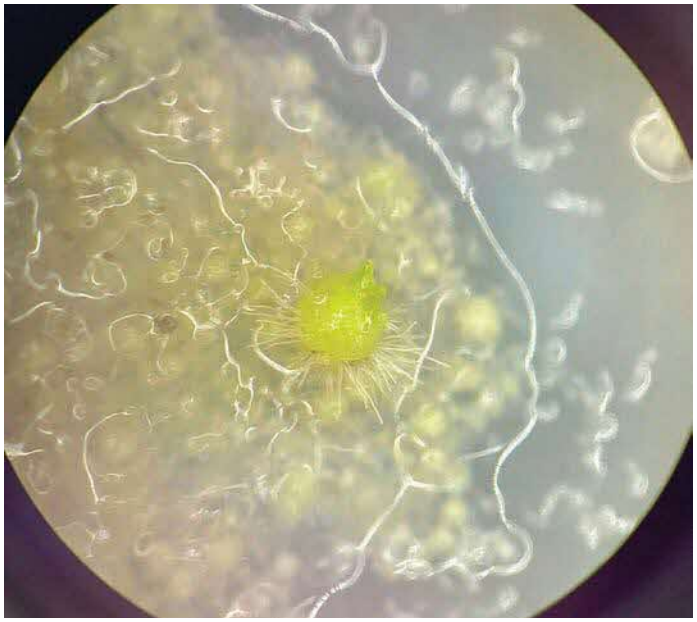
Interior of the Dry Room.

orthodox seeds of tropical plants. Hence, researchers at the Singapore Botanic Gardens Seed Bank aim to focus on building capabilities to store the germplasm of threatened tropical species in the future.

In collaboration with Dr Karin van der Walt of the Ōtari Native Botanic Garden, Wellington, New Zealand and the Micropropagation and Molecular Laboratory of the Gardens, researchers from the Seed Bank have begun looking into the storage of various *Syzygium* species. Apart from the storage of seeds under standard conditions, germplasm materials are also isolated, treated and immersed in liquid nitrogen. After some time, the preserved seeds and genetic materials would be taken out and tested for viability. In addition, the Seed Bank researchers and the National Orchid Garden are also looking into the storage capability of endangered native orchids of Singapore, *Dienia ophrydis* and *Zeuxine clandestina*.

Once stored, the seeds or genetic materials are not left there indefinitely. Regular testing is required during storage to ensure that these materials remain viable over the long term. Batches of frozen seeds are removed, first after one month and subsequently, every five years, to be tested for viability after being kept in such extreme conditions. Cut tests and tetrazolium tests will indicate the viability of the stored materials. Still, the actual test will be the germination of stored material to determine their viability to grow into maturity. These procedures are carried out in the Seed Germination Laboratory located on the second floor of the Seed Bank. Apart from research and conservation works, the Seed

Plantlets of *Syzygium polyanthum* growing in the Murashige and Skoog medium, a widely used plant tissue culture growth medium.



Seeds of *Dienia ophrydis,* an endangered native orchid of Singapore germinating in the Murashige and Skoog medium.

Embryos of *Neobalanocarpus heimii,* a tropical heavy hardwood known as *Cengal,* are isolated from the seeds.

Preparation of cryogenic tubes, respective reagents and equipment for cryopreservation testing.

Bank also plays an important role in educating the public about the importance of seed banking and *ex situ* conservation. Permanent educational display panels are put up in the public gallery area of the Seed Bank on the first and second floors. At the main entrance, visitors will discover more about the history of the heritage building, an introduction to the missions of the Seed Bank, and a general overview of the process involved in seed banking. In addition, all the labs in the Seed Bank are installed with a section of glass partitioning wall that enables visitors to view the seed banking processes live—from processing to storing and testing the seeds in our collections. Along the corridors on the second floor, visitors are introduced to the various methods of seed dispersal as well as displays of interesting seeds. Finally, stepping out into the outdoor

The Seed Germination Lab.

garden outside the Seed Bank, visitors can learn more about the different seed dispersal methods specially curated as part of the Living Collections in the Gardens.

The Seed Bank plays a unique and essential role in supporting the goals and roles of Singapore Botanic Gardens and its research, education and conservation in botany. While the majority of seed banks around the world are focused on temperate or crop plants, the Singapore Botanic Gardens Seed Bank focuses on threatened wild plant species in Southeast Asia. This complements and builds on conservation efforts around the world to conserve our natural heritage for future generations and preserve the natural world that humans live in.

Lu Yi Xuan
Ooi Zong Yu
Seed Bank

All photos by Lu Yi Xuan.

***Memecylon paniculatum* seeds undergoing germination test.**

Gallery with permanent displays illustrating various types of seed dispersal mechanisms of plants.

Ethnobotany and Diversity of Figs: An Exhibition at the Centre for Ethnobotany

There are around 850 species of figs (members of the genus *Ficus*) worldwide. Members of the mulberry family (Moraceae; which also contains the jackfruit and relatives), figs are distinguished by their unique flowering and fruiting structure known as a syconium (also the part which we commonly referred to as the 'fig'). Syconia are essentially closed bags with tiny flowers inside them. After fertilisation by specialised wasps, syconia become fruiting structures and nurseries for the next generation of pollinating wasps.

Fig plants have a diverse array of growth forms. They may be freestanding trees, epiphytes that eventually grow over ('strangle') and replace their host trees, shrubs or climbing vines.

Figs have great ecological and cultural importance across the globe. Present on all continents except Antarctica but most diverse in the tropics, figs form the ecological backbone of many tropical forests, providing habitat and food for a wide variety of wildlife. Various fig species have cultural and religious importance in many parts of the world, including the ancient Egyptian Tree of Life (*Ficus sycomorus*), the Bodhi Tree sacred to Buddhists and Hindus *(Ficus religiosa)*, spirit trees in Borneo (various strangler species) and *Ficus thonningii* in Africa.

A syconium (fig) of *Ficus pumila*, in longitudinal section. This popular ornamental climbing species is native to China and may be seen growing on buildings and walls throughout Singapore. The ostiole, through which the pollinator enters, is visible at the top. Below this, the yellow staminate (pollen-producing) flowers are visible. The red flowers are pistillate (producing seeds or wasp galls). *(Photo credit: E.M. Gardner)*

A fig (*Ficus carica*) plantation in the Meander Valley, Turkey. *(Photo credit: F. Kjellberg)*

Ficus carica, the common fig we eat, is probably native to Turkey but has been cultivated in the Middle East and Mediterranean regions for thousands of years. Unlike most other figs which are restricted to tropical and subtropical regions, the common fig can be grown in temperate regions where winter temperatures drop below freezing. Archaeologists have found evidence of fig consumption at a site in the Jordan Valley that dates to approximately 11,000 years ago. Some scientists have interpreted these remains as evidence of domestication. This could mean the common fig was domesticated well before other ancient staple crops such as wheat or rice. Today, the common fig is cultivated worldwide

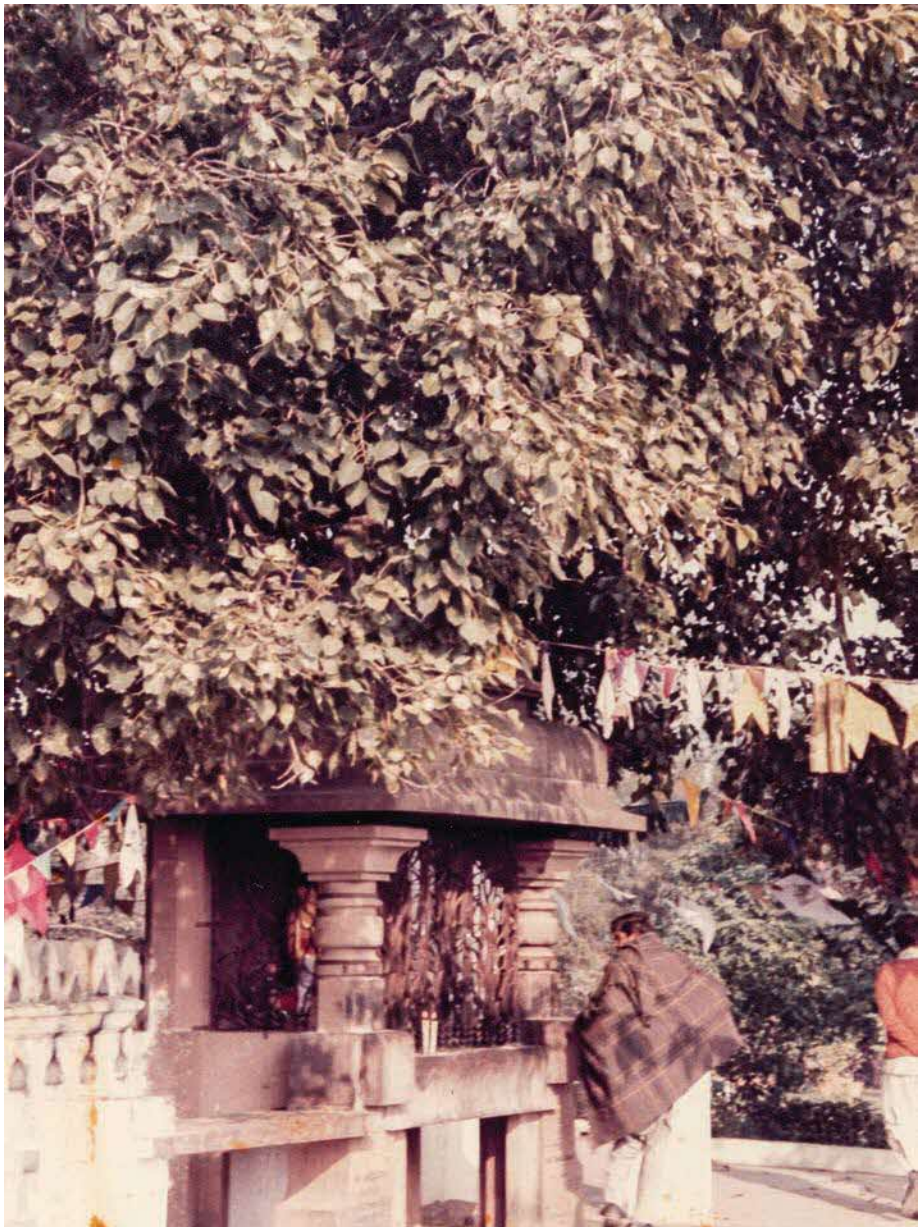
for its fruits, which can be eaten fresh, dried, or used in cooking. The global market for fresh and dried figs has been estimated at over SGD $1 billion.

The cultural importance of figs in the ancient Middle East is reflected by their prominence in the sacred texts of the region. The ninety-fifth Sura of the Qur'an is called 'The Fig tree' (التين). In the Hebrew Bible, Adam and Eve's first set of clothes was made of fig leaves. The common fig also features in the founding legend of Rome.

The importance of the fig species *Ficus religiosa* to the Hindu and Buddhist faiths is well-known. *Ficus religiosa* is widely called *pipal* in India. The *pipal* is considered the king of trees, hence it is also called *Arasamaram* in Tamil (*arasa* = king, *maram* = tree). In Hinduism, there are mentions of the *pipal* tree as a sacred tree in the *Rig Veda* (c. 1500–1000 BCE). The seals from the Indus-Saraswati civilisation (3300–1300 BCE) depict *pipal* trees with their bases either fenced up or on pedestals, possibly indicating trees of veneration. According to Buddhist tradition, Buddha (c. 586–466 BCE)

A cold-hardy selection of the common fig (*Ficus carica*) growing in Cleveland, Ohio, USA. This variety can survive temperatures as low as −20°C. *(Photo credit: E.M. Gardner)*

The Great Bodhi Tree (*Ficus religiosa*), a descendant of the tree planted in c. 250 BCE, Sri Mahabodhi Temple in Bodhgaya, India. In addition to this tree, other notable examples of Bodhi Trees are in Anuradhapura, Sri Lanka and Sarnath, India. *(Photo credit: Ken Wieland from Philadelphia, USA, via Wikimedia Commons, permission granted under the CC BY-SA 2.0 license)*



A Bodhi Tree (*Ficus religiosa*) at the Deer Park, Sarnath, India, the site where the Buddha gave his first sermon. *(Photo credit: S.K. Ganesan)*

gained enlightenment while meditating under a *Ficus religiosa* tree at Bodhgaya, Bihar, India, in around 500 BCE. *Bodhi* (Sanskrit, Pali) = awakening, hence Bodhi Tree = tree of awakening. Therefore, *Ficus religiosa* trees when associated with Buddha or Buddhism are also known as Bodhi Trees.

In Singapore, *pipal* trees are found in both Buddhist and Hindu temples. Even outside of places of worship, there is a general regard and respect for large strangling figs and banyans, and there have been instances in construction projects in Singapore where contractors have been reluctant to fell large individuals–usually *Ficus religiosa*, but often also *Ficus microcarpa* and *Ficus benjamina*. As a result, Singapore's urban landscape still retains many of its strangling figs, some of which have been designated and protected as Heritage Trees.

Ficus benjamina, known as *waringin or beringin*, is an elegant fig tree with a weeping habit. According to Professor E.J.H. Corner in the *Wayside Trees of Malaya*, this species is often planted in the vicinity of Malay royal residences. In Java, *waringin* trees are traditionally planted in the open spaces (*alun-alun*) in front of and behind royal palaces (*kraton*). Fine specimens of *waringin* trees are found in the *alun-alun* of Yogyakarta and Surakarta, Java, which are open grounds except for a pair of large fig trees planted in the centre. These were the sites where the Sultan would hold audiences. In the past, these were also where executions were carried out for capital offences.

A pair of *waringin* (*Ficus benjamina*) trees planted c. 1700s, south entrance to the Kraton, Surakarta, Central Java, Indonesia. *(Photo credit: S.K. Ganesan)*

The Great Banyan (*Ficus benghalensis*) in Acharya Jagadish Chandra Bose Indian Botanic Garden, Shibpur, Howrah, near Kolkata, India. This tree was listed in the Guinness Book of World Records in 1989 as the tree with the greatest canopy spread. It reportedly occupies an area of 1.89 ha (almost four football fields)! *(Photo credit: Aritro Mukherjee IN, via Wikimedia Commons, permission granted under the CC BY-SA 4.0 license)*

Krishna's cup (*Ficus krishnae*) with cup-shaped leaves, photographed in Sembawang Park, Singapore. *(Photo credit: S.K. Ganesan)*

A Johor Fig (*Ficus kerkhovenii*) Heritage Tree in the Singapore Botanic Gardens Rain Forest. This species is a strangling fig found in lowland forests from Peninsular Malaysia to Sumatra, Borneo and Java. It can grow to a large size with a wide crown and has minor uses as a timber tree. *(Photo credit: L. Neo)*

In Singapore, *Ficus benghalensis* (banyan) is cultivated as an ornamental in parks and gardens. This species is one of the sacred trees of India. *Ficus krishnae* (Krishna's cup) is a closely related species which was until very recently considered a variety of *Ficus benghalensis*. As its name suggests, this tree is associated with Sri Krishna, a leading protagonist in the epic poem 'Mahabharata' in Hinduism. This poem is culturally significant in Southeast Asia where it has inspired the traditional arts, including plays, sculpture, architecture and painting.

There are close to 70 different fig species planted in the Singapore Botanic Gardens. This includes large individuals which have been recognised as Heritage Trees, such as the native Johor Fig (*Ficus kerkhovenii*) found in the Gardens' Rain Forest, and a Burmese Banyan (*Ficus kurzii*) at Lawn A which is thought to be as old as the Gardens itself!

Many fig species have ornamental and horticultural value, such as the Mistletoe fig (*Ficus deltoidea*), an epiphyte or small shrub with attractive egg-shaped to elliptic leaves with prominent veins. Other species such as the common red-stem fig (*Ficus variegata*) have many traditional uses.

Burmese Banyan (*Ficus kurzii*). (Top) Close-up of mature syconia; (Bottom) A mature tree along Swan Lake in the Singapore Botanic Gardens.
(Photo credits: S.K. Ganesan)

Ficus deltoidea **is often used as a ground cover, and various varieties are cultivated as pot plants in temperate regions. It is planted at many locations in the Singapore Botanic Gardens, including in the Healing Garden, Jacob Ballas Children's Garden and Eco-Garden.** *(Photo credits: X.Y. Ng)*

Ficus variegata **is a large tree which can grow up to 40 m tall, often with buttresses. It is common in secondary forests in Singapore and can be seen near the Visitor Centre at Nassim Gate in the Singapore Botanic Gardens. The fibrous bark has been used to make bark cloth, while the wood has minor uses as timber and has been used in Indonesia to make knife sheaths. The sap was formerly used in the batik-making process and has also been used as a coating over wounds. The young shoot-tips and young fruits have reportedly been eaten in Java.** *(Photo credits: (Left) X.Y. Ng; (Right) L. Neo)*

If you are interested in learning more about the ecological and cultural importance of figs, with a focus on the species native to Singapore and Southeast Asia, there is an ongoing exhibition on this topic at the Centre for Ethnobotany. The exhibition runs until September 2024. The Centre for Ethnobotany is open daily from 9 am to 6 pm, except for the last Wednesday of every month. Admission is free, so do stop by on your next visit to the Gardens.

Elliot Gardner
Case Western Reserve University, USA

S.K. Ganesan
Louise Neo
Herbarium & Centre for Ethnobotany

Capturing Nature: An Exhibition at the Botanical Art Gallery

The exhibition *Capturing Nature* was held at the Botanical Art Gallery between 29 September 2023 and 31 March 2024.

The exhibition spanned two rooms on level one of the Botanical Art Gallery, featuring artefacts mainly from Europe, but also India, Japan, New Zealand and Southeast Asia, dating from 1748 to the present. It was the most comprehensive exhibition of nature prints, most of which have rarely been exhibited before, and shown for the first time to Singapore audiences. Most of the artefacts were loaned from Matthew Zucker, a rare art book dealer, publisher and collector from Berkshires, Massachusetts, and Pia Östlund, a Swedish printmaker and artist based in London. They were complemented with artefacts from the Singapore Botanic Gardens collections.

Nature Printing is the practice of taking impressions directly or indirectly from the surface of natural objects such as leaves, flowers, ferns, seaweed, snakeskin, and more, to produce an image on paper. It is often considered a precursor to photography. Nature printing was popular with botanists in the 18th century to aid in their study of useful and medicinal plants. By printing directly from specimens, they were able to represent plants in an affordable way and to great effect.

In the 19th century, the desire for life-like scientific images in combination with technological innovations led to developments in nature printing. Significant advances occurred between 1842 and 1868, at the kaiserlich-königliche Hof- und Staatsdruckerei zu Wien [Imperial-Royal Court and State Printing Office in Vienna]. Their nature prints still trick the

The entrance hall of the Botanical Art Gallery decorated with leaf prints made by members of the Botanical Art Society (Singapore) during the *Capturing Nature* exhibition opening weekend, using leaves collected and pressed by staff of the Herbarium of the Singapore Botanic Gardens (SING).

eye with exceptional detail and life-like appearance.

The exhibition was co-curated by Singapore Botanic Gardens, National Parks Board (Michele Rodda and Martina Yeo) and by the *Capturing Nature* initiative which includes Matthew Zucker (Berkshires, Massachusetts, USA) and Pia Östlund (London, UK).

Michele Rodda
Martina Yeo
Herbarium & Botanical Art Gallery

All photos by Michele Rodda unless otherwise stated.

Members of the public were guided by volunteers from the Botanical Art Society (Singapore) in making small leaf prints of either postcard or bookmark size during the opening weekend (30 September–1 October 2023).

This room features artefacts made using direct printing techniques. With direct printing, the surface of a fresh or dried plant or other natural object is covered with ink and pressed onto paper, leaving a beautifully detailed impression. The pressure can be applied by hand or by using a hand-operated press. The paper is sometimes moistened to obtain clearer results. This process is limited by the fragility of the original specimen. No two prints are the same. The record of such printing on paper in Europe dates back as early as about 1228. In 1508, Leonardo da Vinci described this nature printing method.

One of the highlights of the exhibition includes the book *Botanica in Originali seu Herbarium Vivum* [Original Botanicals or a Living Herbal], dating from 1757–64 and produced by Johann Hieronymus Kniphof, who was a professor of medicine at the University of Erfurt and one the most prolific nature printers of the 18th century. He collaborated with printer-publisher Johann Michael Funcke, and later Johann Gottfried Trampe, on mass-produced books illustrated by nature printing. They used fresh or dried specimens, which were inked in black, printed, and often hand-coloured. Collection of Matthew Zucker. *(Photo credit: Martin Slivka)*

This room includes artefacts created with indirect nature printing techniques. Unlike direct nature printing where actual inked specimens are printed directly, indirect printing allows the production of many copies of the same image. In indirect printing, the impression is first transferred onto a printing plate, block, or lithographic stone. When inked and printed, this secondary printing surface provides consistency of the imprint (but not necessarily in the colouring). Relief, intaglio, lithographic, and photographic nature printing belong to this group of printing methods.

This print of *Rosa pendulina*, or Alpine Rose, was published in *Faust: Polygraphisch-illustrirte Zeitschrift für Kunst, Wissenschaft, Industrie und geselliges Leben,* volume II, no. 24 in 1855. It was printed and published by Alois Auer von Welsbach using the *Naturselbstdruck* process which he developed. The process relied on electrotyping, a new method of making exact replicas by electrodepositing copper-ions. A first impression of the plant was taken in lead. Since the lead plate was too soft to print from, it was electrotyped twice. The first copper electrotype shows the plant in relief, while the final copper electrotype shows it in intaglio and can be used for printing. Plates were usually printed in sepia, mimicking herbarium specimens, but sometimes also printed in colour, such as in this example. Collection of Matthew Zucker.

The 8th Global Botanic Gardens Congress, 6–9 August 2024, Singapore

The Global Botanic Gardens Congress (GBGC) is the only international congress dedicated to botanic gardens. It is held every three or four years for the worldwide botanic garden community to come together to exchange knowledge and experiences. The Congress includes internationally renowned plenary speakers and sessions covering topics relevant to botanic gardens, such as policy, education, governance, conservation and research.

The Royal Botanic Gardens Victoria hosted the 7th Congress in Melbourne, Australia from 25–29 September 2022 after it was postponed twice due to the COVID-19 pandemic. The event attracted 500 delegates from 36 countries. In July 2021, the Singapore Botanic Gardens (SBG) won the bid to co-organise the 8th Congress with the Botanic Gardens Conservation International (BGCI). This significant upcoming event will be held in Singapore and Southeast Asia for the first time. The 8th GBGC will be held from the 6 to 9 August 2024 at the Suntec Singapore Convention and Exhibition Centre. It will co-locate with the Singapore Garden Festival (SGF) at the same venue to enhance content, optimise resources and promote cross-events participation. The 8th GBGC programme will revolve around the theme, *Botanic Gardens - People and Plants for a Sustainable Future*, with a target of over 160 plenary and parallel sessions.

The 8th Congress will feature:

- Plenary lectures from experts and thought leaders from within and outside the botanic gardens sphere.
- Parallel presentation sessions include topics ranging from Green and Sustainable Cities, Plant Diversity and Conservation, Engaging Communities, and The Gardens for the Future.
- Thematic workshops.
- Scientific posters presentation.
- Curated field trips/ tours (Pre- and post-conference).
- Special events such as the Opening ceremony and Congress dinner.

The Shaw Foundation Symphony Stage, Singapore Botanic Gardens. *(Photo credit: Singapore Botanic Gardens)*

The **Call for Abstracts** is currently open for submission until 31 March 2024. Interested participants can visit the 8th GBGC website (Call For Abstracts | 8th Global Botanic Gardens Congress) for submission and more details.

For **Conference registration** that commences in February 2024 or to find out **more about the 8th GBGC**, please scan the QR code provided on the next page.

Jane Tan
Events & Exhibitions

Keynote Speaker

Hwang Yu-Ning

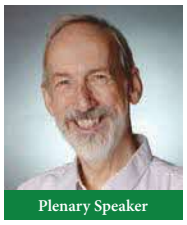
Chief Executive Officer, National Parks Board, Singapore

Plenary Speaker

Professor Tan Puay Yok

Director, Singapore Botanic Gardens, National Parks Board, Singapore

Professor, Department of Architecture, National University of Singapore



Plenary Speaker

Professor Stephen Blackmore CBE FRSE RSB FLS

Chairman, Botanic Gardens Conservation International, UK

Plenary Speaker

Professor Hai Ren

Director and Professor, South China Botanical Garden, Chinese Academy of Sciences

Plenary Speaker

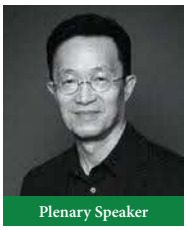
Dr Sandra Knapp OBE FRS FLS

Merit Researcher, Natural History Museum, UK

Plenary Speaker

Amy Padolf

Director of Education, Fairchild Tropical Botanic Garden, USA



Plenary Speaker

Leonard Ng

Country Market Director, APAC, Henning Larsen, Singapore

Plenary speakers for the 8th GBGC in Singapore.

8th Global Botanic Gardens Congress

Botanic Gardens – People and Plants for a Sustainable Future

6th – 9th August 2024,
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The Congress will feature engaging presentations by global thought leaders, technical presentations, panel discussions, poster sessions, thematic workshops, and technical tours. We aim to explore innovative approaches for botanic gardens to fulfil their missions in research, conservation, education and outreach.

HELD IN CONJUNCTION

Taking place from 3rd to 11th August 2024, the biennial Singapore Garden Festival (SGF) brings together top award-winning landscape and garden designers, florists and horticulturalists from around the world. Singapore's strategic location makes the Festival an ideal platform to showcase horticultural products and services from various regions. The unique convergence of GBGC and SGF provides an unrivalled opportunity to learn, network and forge connections with like-minded individuals, across the horticultural and research arenas, to share the latest ideas in garden design & gardening paraphernalia.

SINGAPORE GARDEN FESTIVAL 2024

FOR MORE INFORMATION:

The Trees of New Guinea



(Left) Lowland rainforest, Biak, Papua Province, Indonesia; (Centre) Mid-montane forest, Huon Peninsula, Papua New Guinea; (Right) Subalpine shrubbery, Dom Valley, Mt Jaya, Central Papua Province, Indonesia.

As a tropical botanist, I have been visiting New Guinea regularly since the 1990s. Sitting at the eastern end of Southeast Asia and just 150 km north of Australia, New Guinea is one of the least explored tropical wilderness areas on the planet. Geologically, the island formed from the collision of the Australian and Pacific tectonic plates, crumpling and compressing the land into a complex topography of steep folded valleys with a dramatic central range rising to 4884 metres, still with a few small, shrinking equatorial glaciers at the peak. Biologically, the island lies to the east of Wallace's Line, and has a unique fauna with marsupials (including tree kangaroos), birds of paradise and many parrot species, but lacks groups found to the west of the Line, such as primates, deer and woodpeckers.

There are still many gaps in our knowledge of the island's plants, with many areas biologically unexplored. Understanding and conserving the forests of New Guinea is important if we are to retain the carbon stored in New Guinea's trees and mitigate climate change. A recent checklist has placed the number of plant species at 13,634, with an additional 3,000–4,000 species still undescribed, making New Guinea the most floristically diverse island in the world.

Recently, I have written, edited and published *The Trees of New Guinea*, a guide to the 700 genera of trees found on the island (Utteridge & Jennings 2021), together with colleagues from the Royal Botanic Gardens, Kew, where I was based prior to coming to Singapore Botanic Gardens in 2023.

We estimate about 5000 tree species occur in New Guinea, with many unique plants on the island. Endemism, the number of unique species found only in one location, is very high for New Guinea, with as many as 68% of the plant species endemic to the island. For example, of the 170 native rhododendron species, 169 are restricted to New Guinea. The most diverse tree group is the coffee family, the Rubiaceae. The family is one of the largest in the world with 13,500 species and has 500 species occurring as trees in New Guinea, including important timber trees and subalpine species with large blue and yellow flowers. The tallest trees on New Guinea are the endemic Kauri and Klinki pine, members of one of the oldest extant plant families and was once forming forests during the 'Age of Dinosaurs'. Klinki pines are usually recorded up to 60 metres high, with some specimens reaching 89 metres, placing them with some of the tallest trees in the world.

New Guinea has many 'crop wild relatives' – important gene pools for cultivated plants. The eastern end of the Indonesian archipelago is the source of two important spices that have long defined the history of the region – nutmeg (*Myristica fragrans*) and cloves (*Syzygium aromaticum*; the genus *Syzygium* in the Myrtle family – one of the key research groups at SBG). Both groups have evolved numerous species in New Guinea, with approximately 100 species of nutmegs and at least 175 species of clove relatives; they are important members of the ecosystem providing flowers and fruits for animal pollinators and dispersers. Although strictly not a tree in the anatomical sense, the Giant Arfak banana (*Musa ingens*), another New Guinea endemic, is the largest member of the banana family with individuals reaching 30 m tall; the island is a major centre of diversity for bananas with a 7000-year history of cultivation.

The island is still densely forested, home to some of the best-preserved ecosystems on the planet and a globally recognised centre of biological diversity. The complex topography, remote location and lack of infrastructure have meant that logging, agriculture and urbanisation haven't ravaged New Guinea as seen in other areas in the Asia-Pacific. However, several areas of the island, especially the flatter, more accessible parts in the south, are now being converted to oil palm plantations. Approximately 30% of all the world's trees are threatened, and identifying

(Left) The Giant Arfak banana, (*Musa ingens*); (Top centre) *Myristica* sp.; (Bottom centre) *Neonauclea lanceolata;* (Top right) *Rhododendron christii;* (Bottom right) *Syzygium versteegii. *(Source: (Left) Tim Utteridge)*

and scientifically naming New Guinea's trees is the first step in formulating conservation action plans. We hope that *Trees of New Guinea* will bring to attention and highlight the magnificent forests of this remarkable island.

Timothy Utteridge
Herbarium

All photos by Tim Utteridge, unless otherwise indicated.

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Misty Arfak Mountains, Bird's Head Peninsula, Indonesia.

(Source: Tim Utteridge)

Dr Tim Utteridge is an English botanist who joined the Singapore Botanic Gardens in November 2023 as the Director of Research and Conservation. Before the move to Singapore, Tim was a tropical botanist and head of the Asia Team at the Royal Botanic Gardens, Kew, UK for over 25 years. Although his research focuses on the taxonomy and systematics of various woody plant families in Southeast Asia, especially members of the tropical Primulaceae, and the floristics and conservation of New Guinea and Borneo, Tim is also known as one of the best tropical botanists with wide-ranging plant identification knowledge. He is a co-author of *A Guide to the Alpine and Subalpine Flora of Mount Jaya* (published in 2006), *Field Guide to the Plants of East Sabah* (published in 2010), *The Kew Tropical Plant Families Identification Handbook* (published in 2014), *Trees of New Guinea* (published in 2021), and *The Herbarium Handbook* (published in 2023). The Gardens warmly welcomes Tim to the SBG family, and we wish him exciting and productive years ahead in Singapore!

Editorial
Gardenwise

Remembering Davi – "Amma" of the Herbarium (7 Apr 1958–22 Oct 2023)

Davi at her workstation in Botany Center in 2018. *(Photo credit: Herbarium Archives)*

In Tamil, *Amma* means mother, and Davi was a motherly figure in the Herbarium of the Singapore Botanic Gardens (SING). She was last seen at her workstation on Wednesday, the third week of October 2023. By the time the week ended, we had to grapple with the overwhelmingly sad news that we would no longer hear her cheerful voice in the morning and see her ever again.

Suganthara Davi d/o Krishnan, or Davi as we fondly called her, started her journey with SING at 22 as a general worker under the daily-rated employee scheme on 1 February 1980. Davi's sole responsibility in the herbarium was to mount dried herbarium specimens either collected by Gardens' botanists from fieldwork in Singapore and around the region or materials received as duplicates from other herbaria abroad. Davi's tenure was finally converted to a permanent Botanical Research Branch staff member in July 2007. Although she reached the compulsory retirement age of 62 on 6 April 2020, Davi chose to continue working under the re-employment scheme until her passing. Through her 43 years of service, tens of thousands of specimens were skillfully mounted and incorporated into the collections.

Through years of experience, Davi became an exceptionally skilled herbarium specimen mounter, serving a critical role in botanical research. Specimen mounting requires specific skills to fit and mount dried plant parts and associated labels so that characters important for plant identification are visible. One needs to have a good eye and some knowledge of what researchers are after, but also be very skilled with the hands as the materials are fragile, and mounting techniques that include glueing and stitching. Davi had both and was always trying to perfect her skills. She was open to new methods and approaches to improve mounting quality and long-term protection of critical parts, such as flowers and fruits. Bulky and spiny specimens or specimens with stinging hairs are the toughest to handle and process, but she knew from experience not to touch them with her bare hands and still managed to pin them down on the mounting board with her neat stitches. Large fruits are also challenging to mount, but Davi was known for her perfect netting technique, which could secure even a durian fruit!

Davi was the last remaining mounter in SING for the past 17 years since all our older staff members had retired, and there has been no new replacement since 2006. Can you imagine that almost every sheet in the herbarium that has been accessioned since then (about 4000 sheets on average per year), passed through her nimble hands to become a valuable specimen and an art form in its own right? Davi has always been generous in sharing her vast knowledge and coached our staff, interns and volunteers in the art of mounting herbarium specimens. She was our gatekeeper to test whether interns could continue with mounting or were unsuitable. We could all tell she loved her job, which was still on her mind even in her final days.

Besides being a superb mounter, Davi was also the 'mama' of our Herbarium. She was always friendly and caring towards everyone, dispensing her boundless love and hugs freely. Davi's signature masala tea, or spiced tea with milk and sweetened with sugar, is often featured at most Research & Conservation Branch celebrations in the herbarium. Davi will be sorely missed, and we are only slowly adjusting to life in the herbarium without her.

Serena Lee
Jana Leong-Škorničková
Herbarium

Davi sitting at the stairway of the old herbarium building in the early 1990s where the current City Developments Limited (CDL) gallery stands. *(Photo credit: Ali Ibrahim)*

Davi and herbarium colleagues at the Eco-Garden in 2003. The herbarium was then relocated temporarily to a nearby Ministry of Education's Gymnasium. *(Photo credit: Hassan Ibrahim)*

Davi having fun with Juriah Sabudin (Left) and Rohana Mhd Shari (Right) at the NParks Active Day in 2005. *(Photo credit: Serena Lee)*

Davi showering love and affection on "herbarium mascot" Hedi Leong in 2009. *(Photo credit: Jana Leong-Škorničková)*

Tributes to Davi

Dr Nura Abdul Karim *(Deputy Director of Library, Training & External Relations/ Singapore Botanic Gardens)*

As I stroll past and gaze through the vast window in the library looking into the mounting room, a sense of melancholy envelopes me, for Davi's morning smiles and friendly waves will no longer greet me. She was a woman with a magnanimous heart who will be forever remembered as a caring, sweet friend! My association with Davi dates back to my early days as an Assistant Researcher in the herbarium from 1990 to 1996. In those times, our team of eight were more than colleagues; we were a closely-knit family.

Davi devoted her career through her youth, marriage, and motherhood to the job of a mounter until her untimely demise. I remember our conversations about her family when she openly shared the challenges of meeting their growing needs and ensuring her children had a proper education. She was always proud of her children – Santhiran, Rajeswari and Kannan!

Davi was deeply committed to her mounting tasks with meticulousness and quality. Amidst her declining health, Davi persisted, driven by the belief that the Herbarium services depended on timely specimen mounting and shelving. In the early 2000s, she undertook the challenge of learning conversational English, overcoming a language barrier of her youth. Adapting to new technology and some administrative policies occasionally perplexed Davi, but her willingness to seek guidance from colleagues, including myself, reflected her resilience. She loved sharing whatever little she had with everyone. Her gifts of homemade murukkus were a delight for my Hari Raya celebrations, and in return, my mother's marble cake became a goody during her Deepavali celebrations. Alas, this heartwarming exchange between us will now only remain a poignant memory. You will be greatly missed, Davi. May you rest in eternal peace!

Davi with herbarium colleagues in the 1990s. (Top row from left) Davi, Sariah Zailani and Nura Abdul Karim; (Bottom row from left) Rohana Mhd Shari and Rutiah Sukarman. *(Photo credit: Rehan Yusof)*

Davi with the CEO of NParks, Mr Kenneth Er, in 2016 to receive her 35 years of service award. *(Photo credit: National Parks Board Archives)*

Ms Bazilah Ibrahim *(Senior Manager, Herbarium/ Singapore Botanic Gardens)*

Davi was synonymous with the herbarium. Walking into the office every morning, it has become a habit to gaze at Davi's workstation immediately after the main entrance, even today. Till her last days, going to work in the herbarium was a way for Davi to seek solace. No task is too big or too complicated for her. I can almost hear her saying her usual lines of, "Saya datang sini kerja, kasi habis; tak payah kacau orang lain." [I come here to work, finish it; no need to get involved in other people's matters]. Wise words, indeed. It's never easy to part with such a presence, and at times, it becomes surreal till realisation hits you that… Davi is not coming back. Davi loved everyone in the herbarium, treated us like her family, and cared for us as her own. She is very much missed. Her warmth will forever be etched in our memories.

Mr Lim Weihao *(Senior Officer, Herbarium/ Singapore Botanic Gardens)*

When I first started working in the Herbarium, Davi was one of the first few staff members I met and warmly welcomed me. I address her as "mother" as she never fails to watch out for me, ensuring I have enough food for lunch and comfortable in the new work environment. Davi always came by my desk and checked on me whenever I was stressed or busy at work. Even though it was just a simple gesture, knowing she cared comforted me. Davi was fantastic at sewing and mounting herbarium specimens. I miss saying good morning to her every day when I enter the office. I miss peeking over her shoulder to see what plant she is mounting every time I walk past her workstation. I miss hanging out with her to chit-chat about various topics. And I will definitely miss her walking over to my desk and saying, "Hello, my son!".

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Growing edible flowers in the Tropics (Part 1)

Flowering plants are cultivated in parks and gardens for various purposes. Most importantly, their attractive blooms add colour to the evergreen landscape in the tropics. Plants that produce nectar-rich flowers are favoured in cultivation to attract pollinators, such as butterflies, bees and birds. Some plants are grown for their edible flowers.

In Singapore, edible temperate flowers are used as colourful food ingredients that are either produced locally in climatic-controlled indoor farms or imported from overseas. They are added to salads or used as garnishing to decorate desserts and confections. However, we should also consider exploring tropical plants that produce edible flowers, which will be easier and more rewarding to grow locally. Some of the species introduced in this article are popular with local gardeners. If you're adventurous, you can also try growing less commonly seen plants with edible flowers too!

Growing plants with edible flowers in community gardens or public edible gardens serves an educational purpose. It can bring about social integration, as food is a social leveller that brings various ethnic groups together. They can be a conversation starter to create a unique gastronomic experience. Remember to share your harvest, but do refrain from harvesting plant parts without asking for permission. It is recommended to grow your own edible plants as you will know what goes into their cultivation.

Egyptian Star Cluster

The Egyptian Star Cluster (*Pentas lanceolata*) is a flowering pot plant that is widely sold in local nurseries for its colourful red, pink and white flowers. Individual flowers can be harvested and used to decorate desserts and confections.

This plant should be grown in a sunny spot in a container with moisture-retentive and well-draining soil. You should avoid cultivating it in heavy clay soils commonly encountered in local outdoor gardens. Egyptian Star Cluster can be started from seeds or stem cuttings. To extend the plant's life, remember to harvest flowers or deadhead the plant regularly to encourage a bushier growth habit.

Marigold

The French Marigold (*Tagetes patula*) and Mexican Marigold (*Tagetes lucida*) produce flowers with an agreeable flavour. Their edible florets can be added to desserts and beverages. The flowers contain carotenoids that have been shown in scientific studies to reduce the risk of developing age-related macular degeneration, which is the leading cause of vision impairment. In addition, the narrow leaves of Mexican Marigold can be used as a substitute for French Tarragon (*Artemisia dracunculus*) as a culinary herb.

The French Marigold can be started from seeds, while the Mexican Marigold can be purchased locally in Singapore as a potted plant in nurseries. Both plants can be propagated via stem cuttings and are excellent candidates for container growing using a moisture-retentive and well-draining soil mix.

French Marigold (Left) and Mexican Marigold (Right).

Globe Amaranth

Globe Amaranth (*Gomphrena globosa*) is a popular pot plant, especially during the Lunar New Year celebration, in which the cultivar with vibrant purplish-pink flowers is considered to be auspicious. Otherwise, various cultivars of the species are known, and the spherical-shaped inflorescences also come in pink, orange and white. The vivid colour of the inflorescences retains well even when dried and is known to be strung up to make a *lei or* garland.

The dried inflorescence of the purple-coloured cultivar is used in various branches of traditional medicine and is also utilised to brew tea. Several dried inflorescences are infused in hot water, and the water-soluble pigment betacyanins will leach from the plant tissue and turn the tea red.

Like most other flowering herbaceous annual plants, Globe Amaranth requires a location with moist, well-draining soil and direct sunlight. New plants are started from seeds.

Roselle

Roselle (*Hibiscus sabdariffa*) is a popular edible shrub widely grown locally and in many tropical regions. The commonly used part of the plant is the fleshy calyces harvested after the flowers have faded. Many cultivars are known and vary in the size and colour of the calyces they produce.

Harvested calyces can be brewed fresh or dried, yielding its signature deep red infusion. Due to the organic acids found within the calyces, the deep red beverage, which is rich in antioxidants, has a sour taste. With sugar added, it can be enjoyed as a chilled drink called 'tropical Ribena®' or turned into desserts such as jellies.

Roselle can be grown from seeds or stem cuttings. It grows best under direct sunlight, in well-draining growing media. It does not tolerate waterlogging conditions, and it is recommended to cultivate the plant in a raised bed or a flower pot.

Ixora

Ixora is a ubiquitous flowering shrub in Singapore. Available in a wide range of cultivars presenting myriad floral colours, inflorescence sizes and plant growth habits, this plant has contributed significantly to Singapore's greening journey by creating a tapestry of colours in an evergreen tropical landscape.

Some of us may have a fond childhood memory of growing up around *Ixora;* do you recall enjoying the sweet nectar found in freshly bloomed *Ixora* flowers? I remember plucking a flower and will either suck nectar directly from the broken end of the floral tube or pull out the style of the flower and savour on droplets of nectar that can be found on it. Ixora flowers can be used as food decoration or dipped in batter and fried to make tempura.

This shrub is best planted in sunny spots outdoors. They prefer a location with well-draining soil, as waterlogged conditions can lead to nutrient deficiencies. Plants should be pruned regularly to encourage a bushier growth habit and fertilised to promote flowering.

Torch Ginger

Torch Ginger (*Etlingera elatior*) is a large, herbaceous and rhizomatous plant requiring a semi-shaded outdoor garden to thrive. Its pseudostem can generally grow up to three metres tall. You should consider growing Torch Ginger in moist and well-draining soil for good growth. Plants are propagated via division, and it takes several years before they begin to flower.

Several cultivars based on inflorescence colours are known, and the cultivar with pink inflorescences is widely used in cooking. Inflorescences of Torch Ginger generally emerge from the ground. Only immature inflorescences are harvested for consumption. In Singapore and Peninsular Malaysia, thinly shredded pieces of immature inflorescence are added to cuisines such as the Chinese fruit rojak and Penang laksa to give them the signature aromatic flavour.

Torch Ginger. A young inflorescence (Left); A mature inflorescence (Right).

Butterfly Ginger

Butterfly Ginger (*Hedychium coronarium*) is a shrub that grows up to about 1.5 m tall, depending on the prevailing light conditions. In general, it thrives well in a semi-shaded location. This species is also tolerant of wet soil conditions and hence can be planted near the edge of a water body. Like many gingers, it is propagated via division.

Several cultivars with varying floral colours are grown locally. The highly scented flowers of Butterfly Ginger make it suitable for planting within a fragrant garden. Opened flowers and flower buds of Butterfly Ginger can be consumed and usually stir-fried.

Banana

Banana plants produce inflorescences that mature in two distinct stages. Female flowers are produced in the first stage, leading to the formation of banana fruits. The second stage consists of male flowers, which do not lead to fruit production.

The so-called 'male flower bud' used in cooking is the section made up of unopened bracts enclosing numerous male flowers within. To prepare it, the mature bracts are removed individually to reveal rows of male flowers, which are taken out separately. The stiff style and associated central floral structures are then removed. The tender 'heart' of the banana 'bud' that remains after successive removal of the bracts is then ready for consumption. They are usually cut up, cooked or added raw to salads. The mature bracts that you peeled off earlier can be used as serving boats for a more sustainable presentation during parties.

Edible bananas are propagated vegetatively via division and planting of suckers. Plants thrive in fertile, moist, well-draining soil under direct or filtered sunlight. As they require ample growing space, it is best to grow banana plants in an outdoor garden space.

Papaya

Papaya (*Carica papaya*) is another fruit-bearing plant widely grown in many tropical regions. Growers desire hermaphrodite plants as one plant is needed to ensure an endless supply of fruits in a garden with limited space. However, an occasional male tree may appear when one raises the plant from seed.

Rather than viewing the male tree as an undesirable plant that is not worth growing in the garden, consider keeping it and harvesting its flowers for consumption. The male flowers are usually boiled in water with a pinch of salt added to remove their bitterness before stir-frying or adding them to soups.

Papaya plants usually start from seed and require a sunny spot to thrive. They also need to be fertilised regularly to promote growth. Do note that papayas need a well-drained planting site as they are sensitive to waterlogging.

Edible *Sesbania* species in cultivation. The red-flowered (Left) and white-flowered (Centre) varieties of *Sesbania grandiflora*; The yellow-flowered (Right) *Sesbania javanica*.

Sesbania

Two species of *Sesbania* are grown for their edible flowers. The Vegetable Hummingbird (*Sesbania grandiflora*) grows into a small tree with two known floral varieties, white and red. In Thai markets, unopened flower buds of the white variety were sold as vegetables, typically for stir-fried. In contrast, the red-flowered variety is mainly grown for ornamental purposes, as the flower buds look unappealing when cooked. Leaves of this species are also eaten as a vegetable.

The other species, *Sesbania javanica*, grows into a lanky shrub and produces hanging clusters of small, yellow flowers. The flower buds of this species can be consumed either raw or cooked. The flowers contain carotenoids and are used as a natural yellow food dye to colour various desserts. Both species are started from seeds and must be grown in a sunny location. They exhibit good tolerance to waterlogging. The Vegetable Hummingbird plant can be pruned occasionally to manage its size and to promote a bushier growth habit. At the same time, a frame is required to support *Sesbania javanica*, as mature individuals tend to fall over as they grow taller.

Wilson Wong
Jurong Lake Gardens
Horticulture & Community

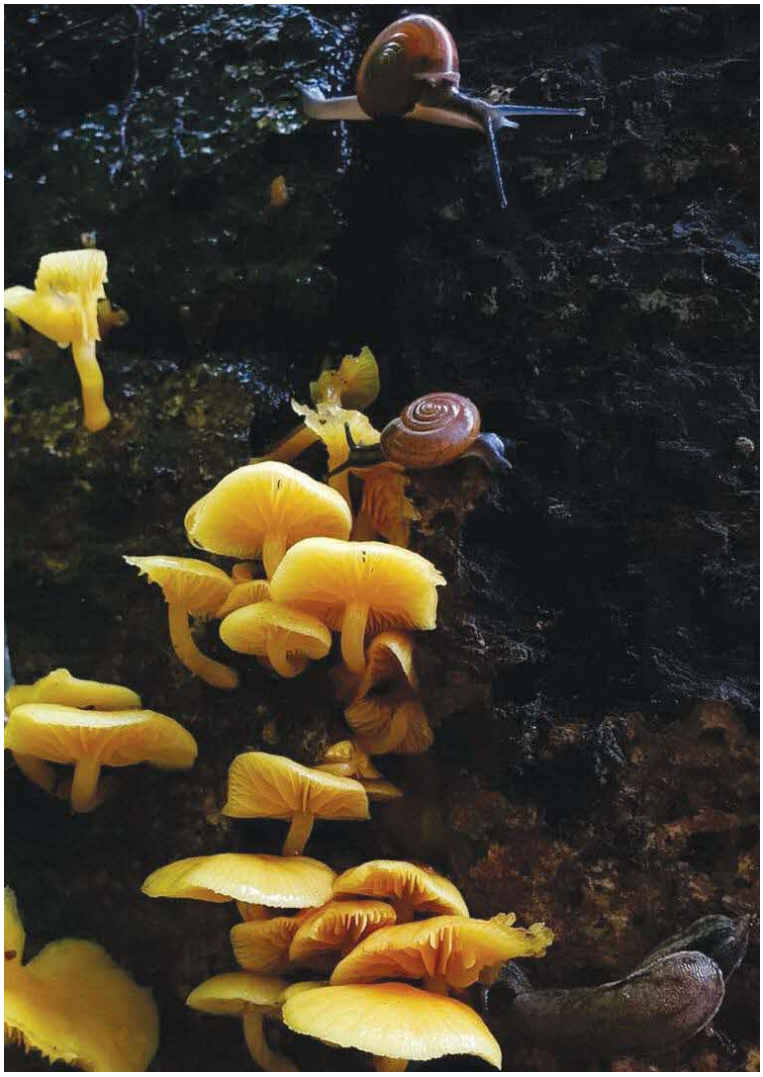
All photos by Wilson Wong.

Fungi-Animal interactions

Fungi play an essential role in the intricate web of life. In our early years of formal education, we have learned that fungi are the decomposers of wood, without which fallen trees may take years to break down, releasing nutrients back to earth. In this article, I would like to take you through the other various aspects of fungi in the natural world around us. In the study of macrofungi, interactions between creatures and fungi were observed and documented in the field! Most of these images were taken by macro photographers and naturalists in Singapore, Peninsular Malaysia and Borneo. Most identifications of the fungi were based solely on photos. While Yap Ee Hean identified most insects unless otherwise indicated, Lim Weihao for molluscs, and Melvyn Yeo for spiders.

As a food source

Snails and slugs are the most familiar creatures because they can be encountered easily when a flush of fresh fungi emerges. They are generally not shy and will continue to munch away despite probably seeing you at the periphery of their vision. These creatures that consume part of the fungi evidently also help with the dispersal of fungal spores or generative parts and help promote their spread. Others caught in the act of foraging fungi include caterpillars, spiders and ants.



***Macrochlamys resplendens* (snail) and *Parmarion* sp. (slug) on *Gymnopilus* sp. (fungi), Singapore.** *(Photo credit: Serena Lee)*

Close-up of *Macrochlamys resplendens* (snail) on *Lentinus sajor-caju* (fungi), Singapore. *(Photo credit: Gary Yap)*

***Macrochlamys resplendens* (snail) on *Collybia* sp. (fungi), Singapore.** *(Photo credit: Yee Yan Ling)*

***Hemiplecta humphreysiana* (snail) on *Perenniporia fraxinea* (fungi), Singapore.** *(Photo credit: Valery Lee)*

Micro-moth caterpillar on *Crinipellis brunneipurpurea* (fungi), Singapore. *(Photo credit: Yee Yan Ling)*

Jacobsonin*a* sp. (cockroach) and *Crematogaster* sp. (ants) on *Spongispora temasekensis* (fungi), Singapore. *(Photo credit: Yap Ee Hean)*

An unidentified calyptrate Dipteran fly on *Mutinus bambusinus* (fungi), Singapore. *(Photo credit: Serena Lee)*

Unidentified drosophilid flies on *Auricularia* sp. (fungi), Sabah, Borneo. *(Photo credit: Joseph Pallante)*

Unidentified drosophilid flies on *Phallus* sp. (fungi), Peninsular Malaysia. *(Photo credit: Joseph Pallante)*

The attractive *Erucius* sp. (Monkey Hopper) and unidentified drosophilid flies on *Phallus* sp. (fungi), Peninsular Malaysia. *(Photo credit: Joseph Pallante)*

Likely muscid or sarcophagid flies on *Lysurus mokusin* (fungi), Singapore. *(Photo credit: Yip Cheng Wai)*

***Chasenella* sp. (harvestmen) with *Lactarius* sp. (fungi), Singapore.** *(Photo credit: Melvyn Yeo)*

As shelter

Termite farmers (*Macrotermes carbonarius*) have an extraordinary relationship with the *Termitomyces* fungi (see *Gardenwise* 53, page 32) as they cultivate the fungus within their mounds! In addition, several beetles have parts of their life cycle living within the long-lived Polypores. An example is the Pleasing fungus beetle, seen emerging from bubble-like galls of the fungus.

***Macrotermes carbonarius* (termite; identified by Foo Maosheng) living in association with *Termitomyces termitomycoides* (fungi), Singapore. (Left) Fungal fruiting body attached to termite comb; (Centre) Termite comb; (Right) Worker termites and soldiers in a flurry after comb was extracted.** *(Photo credits: Serena Lee)*

***Aulacocheilus doriae* (Pleasing fungus beetle) seen inside a gall made in *Earliella scabrosa* (fungi), Singapore.** *(Photo credits: Clarice Xue)*

Zombified insects!

Various zombie fungi and their ant hosts, Malaysia. *(Photo credits: Joseph Pallante)*

While in the rainforest, and if you are keen to get on all fours, carefully combing through beneath leaves and twigs of shrubs will be a very rewarding exercise! If you are lucky, you will most likely get to see "zombie" insects becoming part of the lifecycle of a group of parasitic fungi. Identifying parasitic fungi is impossible based on photos and the asexual phase. Interestingly enough, these fungi are very host-specific, so sometimes, if we can identify the host, we can identify the fungi. Presented here are our observations gathered from the field for your wonderment. Did you also know that the well-loved and highly prized cordyceps (冬蟲夏草, or translated to as "winter worm, summer grass") you can purchase from the Traditional Chinese Medicine (TCM) Hall are actually caterpillars infected by parasitic fungi, and not as marketed as "grasses" that look like caterpillars?

Serena Lee
Herbarium

Ropalidia stigma **(wasp; identified by Zestin Soh) infected with** ***Ophiocordyceps*** **sp., Singapore.** *(Photo credit: Jerome Koh)*

Durian flowers galore at the Bandstand!

Durio kutejensis

The Gardens has recently experienced notable temperature fluctuations over the preceding months, a phenomenon that has invariably catalysed prolific flowering in select plant species throughout the grounds, offering a captivating visual display.

Notably, adjacent to the iconic Bandstand, also marked as Lawn O, a redolence reminiscent of over-ripened mangoes pervades the air, invoking a sensorial encounter as one walks past a contiguous grove of understory trees, systematically cultivated approximately a decade ago. Amongst the grove, a towering specimen of about 5 m in height, boasting dense spreading branches adorned with an abundance of large lustrous green leaves, emerges as the primary source of the fragrance. However, more spectacular than its sweet scent is the sight of large numbers of huge golden clusters of flower buds with hints of crimson at the opened tips bursting forth from every inch of its trunk and branches. Peeking through gaps in the curtains of leaves, the sight of the large open flowers of fiery crimson dotting every cluster of golden buds would leave one spellbound!

The tree in question is one of the few wild relatives of the King of Fruits, *Durian* (*Durio zibethinus*), planted on this lawn. Scientifically identified as *Durio kutejensis* and commonly known in Malaysia and Indonesia as *Durian Pulu, Durian Merah, Pakan, Kuluk* or Lai, it is a primary rainforest sub-story fruit tree from Borneo. The generic epithet *Durio* is derived from the Malay *duri*, meaning thorns, referencing the prickly fruit. Its species name, *kutejensis,* is derived from Kutai, an area in East Kalimantan, Borneo. The native range of the genus *Durio* is from Sri Lanka to New Guinea, with about 30 species. *Durio* belongs to Malvaceae, the Hibiscus family, and was formerly in Bombacaceae.

Durian Pulu is an attractive small- to medium-sized tree reaching 30–40 m tall. It has a broad crown with lots of branching. Like most other Durios, this species is cauliflorous, producing flowers and fruits from the main stem or older branches. It has alternately arranged leaves, which are elliptical-oblong, measuring about 20–33cm long and 6–12cm wide, with obtuse bases and mucronate tips, i.e. with leaves ending in small sharp points. The leaves exhibit the typical leaf of *Durio zibethinus,* with the upper surface being green and smooth, and the lower surface being pale silvery-golden. The cause of this colouration is due to the golden, scaly star-shaped hairs on the underside of the leaves, petioles and floral calyces. The flowers are stunning, over 60 mm in diameter, fiery crimson when opened and presented in cymes on the branches and emit a mango-like resinous scent when fresh. The red flowers do not last very long and will begin to emit an unpleasant musky smell when they wither.

The *Durio kutejensis* tree located opposite the Bandstand gazebo with splashes of red peeking through the curtain of leaves.

***Durio kutejensis* exhibits its stunning cauliflorus flowers, typical of understorey trees. These flowers grow in shade and are protected from heavy tropical downpours and excessive heat.**

A close-up view of a stunning cluster of bright crimson flowers of *Durio kutejensis* with its reflexed petals and numerous stamens (male part) encircling a single central stigma (female part).

Giant honeybees, birds and bats reportedly pollinate this species. These beautiful large flowers, after pollination, will develop into fruits that look very much like the commercial durians we enjoy eating in Singapore. There are subtle differences between this wild durian and the true Durian fruits. The fruits of *D. kutejensis* have slightly soft curved spines and darker yellow to orange flesh with a mild sweet taste and creamy texture. They are also less overpowering in taste and smell than the true Durian, *D. zibethinus.*

The *Durian Pulu* is cultivated for its fruits in villages in Borneo. It is also grown as an ornamental because of its spectacularly stunning clusters of red flowers with golden calyces. The natural habitat of this species is threatened by forest degradation due to logging and shifting agriculture. In Indonesia, there is evidence of genetic erosion within populations. Consequently, the tree was classified as 'Vulnerable' in the IUCN Red List of Threatened Species in 2009. In its natural growing range, this tree is seen at elevations up to 1,300 m in moist tropics. It thrives on clay-rich soils in the wild, and the tree usually commences flowering and fruiting when over five meters tall.

Besides edible fruits, the wood of the *Durian Pulu* is relatively durable. It is used by villagers in interior or light constructions and for making cheaper furniture, veneer, plywood and packing cases. Propagation of the *Durian Pulu* is by seed.

The beautiful pyramidal tree of a young *Durio griffithii* growing happily near the road up the Bandstand Hill.

Close-up of a *Durio griffithii* flower at its peak exuding a very mild, sweet scent.

Durio griffithii

Just next to the *Durio kutejensis* tree is another medium-sized wild durian tree with low branches littered with small bursts of powderpuff-like flowers along the branches. The scientific name of this wild durian is *Durio griffithii*. This species is a native of Singapore, occurring in Sumatra, Malay Peninsula and Borneo. It is a tree that grows well in the wet tropical biome. The species epithet is in honour of William Griffith (1810–1845), the British East India Company surgeon and an explorer-naturalist of the eastern Himalayas, Tenasserim and Malacca. *Durio griffithii* is commonly known as *Durian Burong* (Bird's Durian), *Durian Tupai* (Squirrel's Durian) or Griffith's Durian.

Durian Burong is a ramiflorous species that produces flowers and fruits along woody branches. The Gardens' *Durian Burong* is a medium-sized tree around 5–6 m in height. The leaves are arranged alternately, oval-shaped, papery to thin leathery, 7–22 cm by 2.5–9 cm in size. Its leaves are dark green, glabrous and glossy above and coriaceous with silvery-greyish fine hairs on its underside. It has brown coppery scales on leaf stalks and main veins. Its powderpuff-like flowers are almost inconspicuous compared to the flowers of *D. kutejensis* and *D. zibethinus*. The flowers are small and pretty, about 2–2.5 cm in diameter. They occur singly or in clusters of a few flowers in the leaf axils or twigs behind the leaves. The freshly opened flowers are a lovely greenish-white to yellowish-white and, as they age, turn orangish and then light brown after anthesis. The flower petals are 5–6 linear to linear spathulate, glabrous with numerous stamens. The flowers are very mildly scented and seem to attract lots of bees. Another striking feature of this tree would be its small, spiky, bright red fruits when ripe. The fruits are ellipsoid-obovoid, pointed at both ends, measuring about 6 cm long and 2 cm wide, and splitting into 2–3 locules while still attached to the tree when ripened. The fruit is covered with sharp pyramidal glabrous spines. The seeds are ovoid to 3 cm long, and the aril is thin, orange or red, covering only the basal part of the seeds. This wild durian is endangered in Singapore.

Various stages of the small and elegant flowers of *Durio griffithii,* that changes colour as they age, from whitish-green to yellow to deep yellow and finally brown.

In its natural habitat, the *Durian Burong* can be found widespread on various soil types such as sandy soil, sandstone and even limestone in primary rainforest, open country, and flat land to ridges and hillslopes and hilltops to 915 m. The wood is used as timber but is not very durable and not highly sought after.

The next time you stroll up the Bandstand hill, keep a look out for the small grove of wild durians; you might be lucky to catch the tree species mentioned in their fruiting stage and delight at the sight of squirrels and other creatures feasting on the fruits. Durian enthusiasts and nature lovers can revel in this unique opportunity to witness the exquisite beauty and ecological significance of these wild durians flourishing in the heart of the Gardens.

Nura Abdul Karim
Library, Training & External Relations

All photos by Nura Abdul Karim.

A homecoming for the Burkills

On 6 September 2023, the Singapore Botanic Gardens was honoured to host some very special guests – Linda and Peter Burkill, the descendants of past Gardens' Directors, Humphrey Morrison Burkill and Isaac Henry Burkill.

Linda and Peter grew up in the Gardens during their father H.M. Burkill's directorship (1957–1969), and they were the last of the Directors' families to live on site. Much has changed in the Gardens since then, so their homecoming visit started with a visit to the Botany Centre and Heritage Museum. There, Linda, Peter, and their spouses, Ross and Sue, met with staff and were given an overview of the Gardens' past and present, including our journey towards recognition as a UNESCO World Heritage Site. This was followed by tours of the Gardens' latest developments: Tyersall Learning Forest, Gallop Extension (including the Botanical Art Gallery) and the Tropical Montane Orchidetum at the National Orchid Garden.

While our guests delighted in the Gardens' newest attractions, the highlight of the trip was one of its oldest features. The Director's House (now called Burkill Hall) was built in 1868, and it has housed all the Gardens' earliest Directors until H.M. Burkill. Today, it has been refurbished to hold events such as VIP orchid namings and private weddings.

Gardens staff and our guests at the verandah of Burkill Hall, overlooking the National Orchid Garden. (From left to right: Dennis Lim, Whang Lay Keng, Dr Jana Leong-Škorničková, Dr Tan Puay Yok, Sue Burkill, Peter Burkill, Linda Upfill, Ross Upfill, Dr Thereis Choo).

Neither Linda nor Peter had visited their former home in the decades since they'd left Singapore, and the experience of once again walking through its rooms and halls was eagerly anticipated. In between snapping photographs and reacquainting themselves with familiar sights, Linda and Peter regaled staff with snippets of the memories that the place evoked—a favourite tree, the dog's resting area, their father's workspace. It was such a privilege to hear these first-hand stories from the building's last residents, and later, when we capped off the Burkills' homecoming trip with a lunch at Halia restaurant, everyone agreed that the day's visit had been meaningful for both guests and staff alike.

Thereis Choo
Living Collections & Facilities Management

All photos by Edmund Chia.

Dr Tan Puay Yok sharing the Gardens' latest developments at the Heritage Museum.

Linda and Peter Burkill with the portrait of their father, H.M. Burkill, that hangs in Burkill Hall.

KEY VISITORS TO THE GARDENS
July–December 2023

Sultan of Oman His Majesty Haitham Bin Tarik (Centre) of the Sultanate of Oman, with the orchid *Dendrobium* H.M. Sultan Haitham Bin Tarik named in his honour on 14 December 2023 on the occasion of his visit to the National Orchid Garden. Sultan Haitham was accompanied by Dr Mohamad Maliki Bin Osman (Left), Minister in the Prime Minister's Office, Second Minister for Education and Second Minister for Foreign Affairs, Singapore, and Dr Yap Him Hoo (Right), Deputy CEO of National Parks Board, Singapore. *(Photo credits: National Parks Board)*

Her Excellency Anneke **Adema**
Ambassador of the Kingdom of the Netherlands to Singapore

Dr Abdulrahman **Alkhorayef**
Riyadh Municipal Government, Saudi Arabia

His Excellency Sheikh Mohammad Bin Abdulrahman Bin Jassim **Al Thani**
Prime Minister and Minister of Foreign Affairs of the State of Qatar

Dr William **Baker**
Royal Botanic Gardens, Kew, UK

Mr Peter and Mrs Sue **Burkill**
Peter Burkill is a descendant of H.M. Burkill, former Director of the Singapore Botanic Gardens (1957–1969)

Mr **Cai** Zhuoyu
South China Botanical Garden, People's Republic of China

Prof. **Cheong** Koon Hean
Non-Resident Ambassador of Singapore to Finland

His Excellency Allaster **Cox** and spouse
Australian High Commissioner to Singapore

Mr Kenneth **Er**
Former CEO of National Parks Board, Singapore (2014–2023)

Dr Hajo **Esser**
Botanische Staatssammlung München, Germany

Dr Lynn **Gillespie**
Canadian Museum of Nature, Canada

Ms Nomalungelo **Gina**
Deputy Minister of Trade, Industry and Competition, Republic of South Africa

His Majesty Sultan **Haitham** Bin Tarik
Sultan and Prime Minister of the Sultanate of Oman

Dr Andrew **Henderson**
New York Botanical Garden, USA

Mr **Heng** Swee Keat
Deputy Prime Minister and Coordinating Minister for Economic Policies, Singapore

Mr Julian **Hill** MP
Chair of the Australia-Singapore Parliamentary Friendship Network, Australia

Mr Kizo **Hisamoto**
Mayor of Kobe City, Hyogo Prefecture, Japan

Mr **Hoo** Pui Kiat
University of Malaya, Malaysia

Dr Mark **Hughes**
Royal Botanic Garden, Edinburgh, UK

Mr Saidkhahhor **Kholkhujaev**
Mayor of Chilonzor district, Republic of Uzbekistan

Dr **Koh** Poh Koon
Senior Minister of State, Ministry of Sustainability and the Environment, and Ministry of Manpower, Singapore

Mr Desmond **Lee**
Minister for National Development & Minister-in-Charge of Social Services Integration, Singapore

Dr Geoffrey **Levin**
Canadian Museum of Nature, Canada

Dr Stuart **Lindsay**
Royal Botanic Garden, Edinburgh, UK

Her Excellency Madiepetsane Charlotte **Lobe**
South African High Commissioner to Singapore

Mr Buti **Manamela**
Deputy Minister of Higher Education, Science and Technology, Republic of South Africa

Mr Philly **Mapulane**
Deputy Minister of Communications and Digital Technologies, Republic of South Africa

His Excellency Paul **Mashatile**
Deputy President of the Republic of South Africa

Ms Candith **Mashego-Dlamini**
Deputy Minister of International Relations and Cooperation, Republic of South Africa

Mr Bruce **Maslin** AM
The Western Australian Herbarium, Perth, Western Australia, Australia

Dr Felix F. **Merklinger**
Sukkulenten-Sammlung Zürich, Switzerland

Dr **Mohamad Maliki** Bin Osman
Minister in the Prime Minister's Office, Second Minister for Education and Second Minister for Foreign Affairs, Singapore

Mr **Mohamed Abdullah** Alhabshee
Spouse of the 8th President of the Republic of Singapore

Ms Sindiswa **Mququ**
Chief Director (Central, South and South East Asia), Department of International Relations and Cooperation, Republic of South Africa

His Serene Highness Prince **Philipp** von und zu Liechtenstein

Dr Axel **Poulsen**
Royal Botanic Garden, Edinburgh, UK

Dr **Saw** Leng Guan
Forest Research Institute of Malaysia, Malaysia

Mr K **Shanmugam**
Minister for Home Affairs and Minister for Law, Singapore

Ms Makhotso Magdeline **Sotyu**
Deputy Minister of Environment, Forestry and Fisheries, Republic of South Africa

Dr Nopparut **Toolmal**
Thai Traditional Medicine Research Institute, Thailand

Mr Ross and Mrs Linda **Upfill**
Linda Burkill is a descendant of H.M. Burkill, former Director of the Singapore Botanic Gardens (1957–1969)

Ms Emilie Rost **van Tonningen**
Agricultural Policy Advisor, Embassy of the Kingdom of the Netherlands in Singapore

Prof. Dr Peter **van Welzen**,
Naturalis Biodiversity Center, The Netherlands

His Excellency Antti **Vänskä**
Ambassador of Finland to Singapore

Dr Emily **Warschefsky**
Missouri Botanical Garden, USA

Dr Santi **Watthana**
Suranaree University of Technology, Thailand

Hon. Reece **Whitby**
Western Australian Minister for Energy, Environment and Climate Action, Australia

Mr George **Yeo** Yong-Boon
Former Minister for Foreign Affairs (2004–2011), Singapore

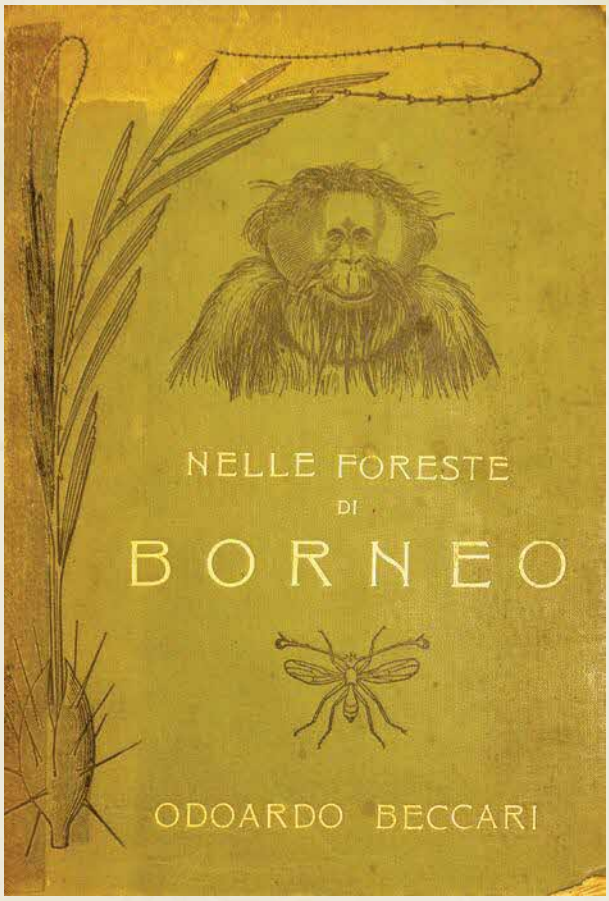
Mr Botir **Zakhidov**
Mayor of Shaykhontokhur, Republic of Uzbekistan

Beccari's travel diary to Borneo

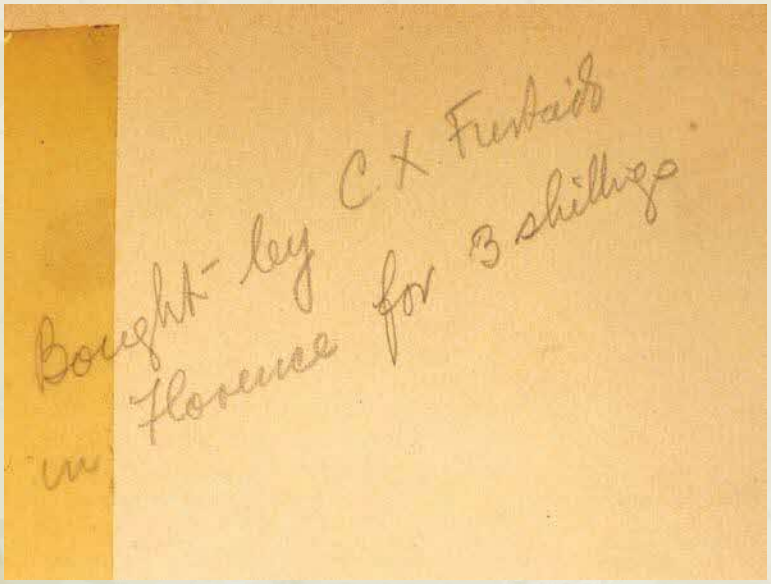
Odoardo Beccari (1843–1920), a renowned Italian botanist, achieved prominence as an expert in Malesian flora with a special interest in palms. He carried out extensive fieldwork in the region. Over the span of three expeditions between 1865 and 1878, he collected a remarkable 16,000 botanical specimens. This collection was among the largest of Malesian plants of his time and continues to be of high scientific importance today.

In addition to his extensive scientific publications, Odoardo Beccari is notably recognised for his travel diary to Borneo. The widely known English edition, *Wanderings in the Great Forests of Borneo,* was published in 1904, preceded by an Italian edition in 1902, *Nelle Foreste di Borneo,* which was limited to 250 copies and is now very rare. Both editions are present in the Singapore Botanic Gardens' Library.

The Gardens' Italian version was acquired by Caetano Xavier dos Remedios Furtado (1897–1980), an Indian botanist with over 40 years of service in Singapore. Just like Beccari, Furtado was also a palm specialist. During 1933 and 1934, Furtado embarked on a journey to Berlin, London, Vienna, Florence and Paris to examine herbarium specimens. He chanced upon the book in Florence and purchased it for 3 shillings (less than S$20 today). Furtado also visited the Bogor Botanical Garden, where he extensively studied the living palm collection, many of which had been named by Beccari. He collected herbarium specimens of several palms at Bogor, now deposited at the Gardens' herbarium.



Front cover of the Singapore Botanic Gardens' Library copy of the *Nelle Foreste di Borneo.*



Pencilled note on the title page stating, "Bought by C.X. Furtado in Florence for 3 shillings".

Michele Rodda
Herbarium & Botanical Art Gallery