

Gardenwise



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One of the early directors of the Singapore Botanic Gardens, R. E. Holttum, held the view that "botany is the handmaiden to horticulture." That Holttum was also the University of Malaya's first Professor of Botany (1949-54) emphasises the importance which he placed upon

scientific discipline and botanical expertise as well as creativity and a boundless expression of art. This is what makes the teaching and application of horticulture such a challenge.

The School of Horticulture was established in the Singapore Botanic Gardens in 1972. It is the first institution in South East Asia to provide formal training in horticulture and landscape design. During the gradual transformation of Singapore into a Garden City, the School played a significant role in training horticulturists and landscape designers to service the gardening and landscaping needs of Singapore. The curriculum of the School catered for that segment of the population which was either not academically inclined or which chose a profession that required affinities and skills which were more hands-on and outdoor based. The part-time courses were accessible to students who also held jobs, and an important component of the Diploma courses was the period of practical attachment by students in relevant industries.

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A view of the Sun Rockery
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NATIONAL PARKS BOARD

the art and science of cultivating gardens. This in no way implies that botany is any less significant, for the scientific study of plants serves as the foundation for many fields of scientific endeavour, of which horticulture is but one. It does underscore the fact, however, that the field of horticulture demands

Singapore Botanic Gardens' Rain Forest

Restoration of Forest Structure

The SBG Rain Forest*, a 4-hectare remnant of Singapore's primeval forests, is not withstanding the test of time. As a forest fragment, conditions have changed – the humidity is probably lower because winds can blow through; it acts as a refuge for seed-eating animals, like plantain squirrels; and most of the natural pollinators (bees, butterflies, moths and bats) and seed dispersers (frugivorous birds) have probably

been lost. As a result, regeneration has been affected. When one of the ancient forest giants (mature trees mainly in the Dipterocarpaceae family) dies and creates a large gap in the canopy, the gap is filled by secondary forest species, like macarangs, but even after many years these secondary forest species are not replaced by canopy tree species. So, gradually the once continuous multilayered structure is breaking down. An additional problem is the climbers that smother the trees on the fringe of the gap, eventually they become so heavy that they may cause the trees to collapse, thus further enlarging the gap.

It is therefore timely that, using our scientific knowledge, we step in with a programme to restore the forest structure by planting saplings of suitable canopy tree species in the gaps. Canopy tree species are selected on the basis that they are already recorded from the SBG Rain Forest, and only seeds from Singapore trees are used so as

Two Diplomas were offered, in Horticulture (DipHort) and in Landscape Design (DipLD). While not equivalent in academic terms to polytechnic diplomas, graduates enjoy good employment prospects with landscape design firms, horticultural contractors, property developers, hotels, golf courses, tourist resorts, nurseries, plant retail centres, town councils, parks and gardens.

Over the years, the stature of Singapore as a Garden City has grown. The provision of green spaces and the liberal use of greenery in the city state have gone far in ameliorating the negative aspects of rapid urban growth. As one of the major metropolises located in the equatorial zone, Singapore is developing into a model for cities faced with similar challenges. The expertise that has been gained by horticulturists from trial and error in planning, developing and maintaining urban greenery in Singapore is being transmitted by the instructors of the School.

Today, the standard required of professional horticulturists is

much higher, and tastes, expectations and needs are more diverse, complex and difficult to meet. The School of Horticulture must and is responding to these trends by improving its training programmes.

The two basic diplomas of the School are still being offered. In addition, for those who wish to attain a higher level of qualification in the field, a bridging Advanced Diploma in Landscape Studies (AdvDipLS) is offered. This is equivalent to the first two years of the Bachelor of Landscape Architecture (BLA) programme at Lincoln University, New Zealand, and credits are transferable. Even more recently, a new full-time Diploma in Horticulture and Landscape Management (DipHLM) was jointly launched with Ngee Ann Polytechnic. Holders of this Diploma can enter public sector employ at the divisional grade equivalent to that for all other polytechnic diploma holders.

Complementing its role of providing formal education leading to professional qualifications, the

School offers a comprehensive programme in recreational gardening. Activities, courses, talks, demonstrations and workshops cater for participants from pre-schoolers to retirees. It is gratifying to note the growth in interest in gardening and in our natural environment among Singaporeans.

The School is the key player in fulfilling the Gardens' educational role. The assets brought to bear upon this task include the living and preserved reference collections and library as well as the expertise of the staff. In consequence, the School is helping to develop the future constituency of the National Parks Board. A knowledgeable public whose awareness and appreciation for all things green and growing has been aroused and abetted, is a force to power the mission of the National Parks Board – to make Singapore our Garden.

Dr Tan Wee Kiat

not to alter the genetic structure of populations in the Rain Forest.

With the help of Mdm Ohn Set, who has reared these trees to a suitable size for planting, and Mr Alan Tan, who is supervising their planting in the gaps, the programme is in full swing.

The growth of the saplings will be monitored and once the canopy is closed, understorey species that grow in shade will be planted.

Dr Ruth Kiew
Keeper, Herbarium

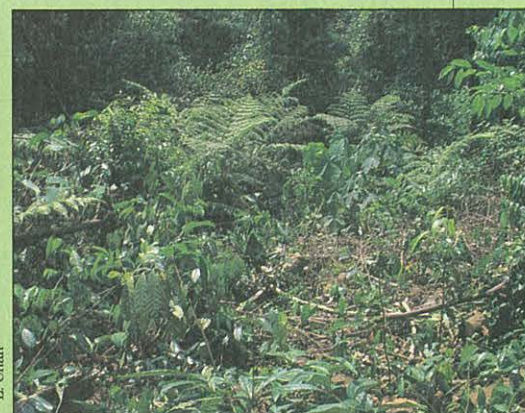
Dr Lena Chan
Assistant Director
Nature Conservation

* The SBG Rain Forest has previously been known as the "Gardens' Jungle" but this is a misnomer as "jungle" means secondary forest, which the SBG Rain Forest is not. Hence the change of name.



Ali Ibrahim

Intact canopy of fine dipterocarp crowns of *Shorea gratissima*



L. Chan

Gap caused by tree fall

Fragrant Orchids at the National Orchid Garden

A question I am often asked is: Are orchids scented? Many people tend to think that orchids are not fragrant. But in fact, it is believed that as many as 75% of all orchids are scented. That is, they emit detectable chemical compounds and some of them are extremely fragrant.

Scent is a mechanism that some orchids use to attract their pollinators. Unlike animals, most

plants (except for some primitive ones) are unable to move sexual cells from one individual to another. Instead, they rely on agents such as wind, insects, birds or other animals as pollinators.

The pollinators are often attracted to the plants by floral colours, shape and fragrances. Of these attractants, fragrances are some of the most reliable and specific. The only attractant that is useful at night is fragrance.

Insects are the most important pollinators of orchids. Because of the nature of their compound eyes, insects have great difficulty in seeing the colours of orchid flowers from any great distance, yet insects often have preference for flowers of specific colours. It is believed that when an insect approaches a flower attracted by a specific fragrance, it ultimately gets close enough to be guided visually to a successful landing.

Human nose can only detect some of the complex odoriferous compounds released by orchids and other flowers; what smells good to the pollinators may not necessarily appear so to us. Individuals interpret scents differently, and very often will describe a given fragrance variously.

In terms of function, fragrant compounds can be classified into three categories. First, these compounds are a food source for the pollinators; they are usually associated with nectar, a blend of highly nutritious water-soluble sugars which is eagerly sought by birds, bees, butterflies and moths. Secondly, some fragrant compounds are sexual attractants. These compounds are highly complex and often pollinator-specific. The fragrance is often interrelated with shape, colour, and movement of accessory features of the flowers. Lastly, some of these compounds act as a general attractant.

All floral parts from sepals and petals, calluses and basal spurs, to petioles are known to be able to produce fragrances. Fragrances are produced in specialized glands called "osmophores." Osmophores can be distributed all over a flower as a general attractant or they can be confined to certain regions of the

flower to which pollinators are attracted, causing them to inevitably remove or deposit pollinia in the process.

Fragrance production consumes energy. In order to use the least energy to achieve the maximum effect, the timing of scent production often coincides with the time of visitation of the pollinators. For example, bee-pollinated flowers are fragrant early in the day when bees are most active. The timing of fragrance production is so specific that most bee-pollinated orchids are not fragrant after the morning and are less scented on cloudy days.

Because orchid-pollinator interaction is so specific, orchids that are pollinated by a specific group of pollinators often possess some common characteristics. For example, bee-pollinated orchids are (to most humans) pleasantly scented and have bright colours of orchid purple, violet, blue, yellow and green. Other characteristics of the flowers also help to guide the pollinators to a perfect landing. For example, orchids that are pollinated by bees often have a prominent lip with coloured nectar lines and osmophores at the base of the lip. Birds rely more on their superior vision to locate the flowers than insects. It is therefore not surprising that bird-pollinated orchids are often brightly coloured, but not fragrant.

Orchids pollinated by butterflies are generally similar to bee-pollinated orchids, except that butterflies can perceive some shades of red. Visual cues are probably more important than fragrance, but many flowers pollinated by butterflies are also fragrant.

Moth-pollinated orchids on the other hand, produce scents at night when their pollinators are most active. They also have plenty of nectar and are generally white or light green in colour. Examples can be found in the genera *Angraecum* and *Brassavola*. Most of these orchids have a prominent lip to allow moths to locate and land when they follow the scent to the flowers.

Here I would like to introduce you to some of the fragrant orchids that are displayed at our National Orchid Garden located in the Singapore Botanic Gardens.

T. W. Yam

*Aerides lawrenceae*

Aerides lawrenceae – this showy native of the Philippines bears long inflorescences that display as many as 100 flowers each. The waxy flowers are about 3.6 cm tall and across. They give out a delightful rosy-floral scent. Other members of the genus are also pleasantly fragrant.

T. W. Yam

*Angraecum sesquipedale*

Angraecum sesquipedale – among the *Angraecum* species, this is one of the most beautiful and extraordinary. A native of Madagascar, an inflorescence of the species can carry up to 6 flowers. The star-shaped flowers are fleshy and waxy. Each white flower measures 13 to 15 cm across, with a 30 to 35 cm-long spur. Charles Darwin predicted that because of the long spur, the flower must be pollinated by a moth with an equally long proboscis. His judgement was proven to be true when the plant was discovered to be pollinated by a hawk-moth *Xanthopan morgani praedicta*. The flowers are scentless during the day. With the onset of darkness, they exude an attractive and powerful scent until the following morning. The scent is a 'fresh-floral' and some say it has a smell of honey.

T. W. Yam

*Brassavola nodosa*

Brassavola nodosa – this moth-pollinated species can be found from Mexico to Colombia, on the Pacific coast and islands. All *Brassavola* species are remarkably similar in their flower structure. The flower position is typically horizontal or slightly hanging which aids moths feeding on the nectar. The prominent lip not only provides a landing platform for the pollinator, but in some cases also functions as a visual attraction cue and in positioning the insect for proper deposition of the pollinia. The spade-shaped lip tapers toward the column and eventually wraps completely around it forming a perfect guide to the nectary and column. The flowers produce a heavy fragrance and have abundant nectar hidden deep in a cavity of the ovary.

Scent of the flowers is quite strong, sweet and slightly "medicinal." It is released beginning shortly after sunset, reaching maximum strength around midnight, and fading quickly after sunrise.

T. W. Yam

*Catasetum pileatum*

Catasetum pileatum – *Catasetum* is one of the few orchid genera which has separate male and female, instead of bisexual, flowers. The male inflorescence, which is more showy, is pendulous and bears many flowers. The most common

variety has waxy-white flowers with a fleshy, heart-shaped lip; another variety is an attractive light apple-green. *Catasetums* have a very effective mechanism of pollination carried out by bees. Two to three days after opening, the male flowers produce a musky smell (caraway scent) which attracts male bees. The bees fly towards the flowers and touch their two antennae on the column. Extremely sensitive to touch, the antennae trigger the ejection of the pollinia onto the body of the bees. The pollinia, which are stuck securely by the sticky viscidium, are deposited on to the stigma of the female flower.

This is the national flower of Venezuela, but is also found in Colombia, Trinidad and Brazil.

T. W. Yam

*Caularthron bicornutum*

Caularthron bicornutum – a South American species which adapts well to Singapore, flowering almost throughout the year. The inflorescence bears 10 to 20 flowers but only a few open at a time. The spectacular white flowers are 6 cm in diameter and are very fragrant. The strong and unusual scent resembles that of a mixture of fruits and candies. It is found in Venezuela, the southern Caribbean Islands and the Amazon.

T. W. Yam

*Coelogyne zurowetzii*

Coelogyne zurowetzii – this is a native of Borneo. The petals and sepals of this handsome species are a bright apple green with dark maroon markings on the lip. The flowers have a very pleasant "spicy-floral" and fresh fruity scent.



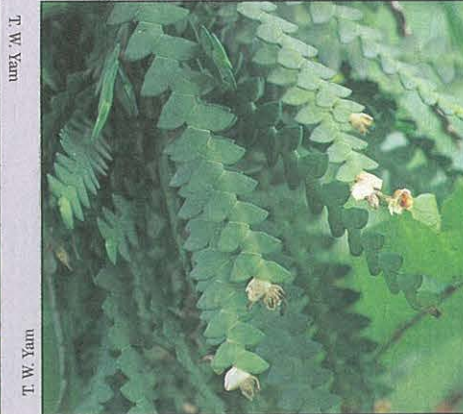
Cymbidium ensifolium

Cymbidium ensifolium – this species has been cultivated for thousands of years in China. It can also be found in India, Indochina, Peninsular Malaysia, Borneo, Japan, the Philippines, Taiwan and Papua New Guinea. Also known as “lan fa,” it is often featured in oriental paintings and potteries. The fragrant flowers vary from greenish-white to greenish-yellow with brown stripes. Without doubt, this is one of the most pleasant smelling of orchids, with a refreshing sweet, floral fragrance. Many oriental cymbidiums are grown more for their fragrance than more for their other charms.



Dendrobium anosmum

Dendrobium anosmum – flowers of this fragrant species are borne on the leafless stem of the deciduous plant. Each flower measures 8 to 10 cm across. The petals and sepals are pink to orchid purple, and are complemented by the broad lip which has a dark purple throat. The flowers have a very strong characteristic fragrance, a herbaceous, sweet fruity-floral (strawberry-like) scent. The species can be found in India, Peninsular Malaysia, Indochina, Indonesia, the Philippines and Papua New Guinea.



Dendrobium leonis

Dendrobium leonis – this interesting species has thick, fleshy and laterally flattened leaves. The yellowish-green flowers are borne near the apex of the stems. The flowers measure 1.5 cm across, and have an extremely sweet vanilla fragrance which can be detected from a distance. It is a common lowland species that is native to China, Indochina, Peninsular Malaysia, Singapore, Indonesia and Borneo.



Encyclia tampense

Encyclia tampense – a nice plant of *Encyclia tampense* with its many little flowers looks much like a swarm of bees and, interestingly enough, the fragrance is much like honey. With flowers varying from bronze to clear greens, the compact species gives an interesting botanical effect as well as an appealing aroma.



Gongora quinquenervis

Gongora quinquenervis – the peculiar-looking flowers of this South American species hang on pendulous, 50 to 80 cm-long inflorescences. The slender sepals and petals are brown with yellow bands. In contrast, the curious fleshy lip is creamy-yellow in colour. The flowers have an attractive, intense terpene-like floral scent. This species can be found in tropical South America from Mexico to Bolivia, and Trinidad.



Oncidium lanceanum

Oncidium lanceanum – this attractive native of South America is a very popular plant for the tropical lowlands. The 30 cm-long inflorescence bears some 12 flowers each of 6 cm across. Individual flowers are very showy; the sepals and petals have a yellow background which is heavily spotted with purple-brown dots. A violet-purple lip contrasts beautifully against this. The flowers emit a slight tea-rose aroma.



Phalaenopsis violacea

Phalaenopsis violacea – This variable species has many varieties, but basically, there are two major forms: the Borneo-type and the Peninsular Malaysia-type. The former is more uniform in its shape, size and basic colour; individual flowers are about 4 cm across; the sepals and petals are white except for the inner half of the lateral sepals and lip which are magenta-purple.

Plant Records Keeping~an Unnecessary Luxury or a Luxurious Necessity?

We live in an age in which the capability to access, interpret and use information through information technology plays an increasingly important role in the way organisations manage their operations and businesses. Yet keeping and managing information does not come cheaply, and neither is it a straightforward exercise. The collection, storing, monitoring, extracting and dissemination of information draw on the resources of organisations to provide funds and manpower to manage databases. Keeping information is also not a random exercise, for there is simply too much information out there to be collected at will. Maintaining the right set of information requires prioritisation, foresight and in depth understanding of the workings of the organisation, to know and be able to predict as much as possible, the information that the organisation will require to operate and strategise. For reasons of insufficient resources and the lack of trained staff, it is therefore not surprising that keeping and managing information have often been put aside as a "good to have but

can wait" luxury, at the expense of other more urgent tasks. Botanic gardens are not spared, for they are so often plagued by the lack of funds and administrative interest. It is ironic then that, while most botanic gardens understand that maintaining proper plant records information on both the living and preserved collections, is a necessity that underpins many of the functions of the gardens, they do not have the means to implement it. Of foremost importance among such functions must be the uses of the living collection as a resource for the research, education and conservation efforts of botanic gardens, and in the use of landscapes to express the aesthetic and spiritual values of plants. Plant records management plays a key supporting role in this function.

Computerised plant records management in the Singapore Botanic Gardens is a new area of work in our operations. Nevertheless, the setting up of a new unit to look into this area and the purchase of BG-BASE for the management of plant records information demonstrate the institutional commitment towards this area of work.

What then, does plant records encompass and how can plant records information be used? Plant records information maintained in the Gardens can be broadly categorised into three groups: inventory information, accession information, and taxonomic information.

Inventory information includes information on current and past locations of a plant, date of planting and transplanting, date and reason of removal, etc. The computerisation of the inventory of the Gardens' living collection has almost been completed. It now allows Gardens' staff to produce the inventory in different orders, for example, by alphabetical order, location, date received, date planted, family, etc., as well as statistics on, for example, the number of species in any taxonomic group represented in the living collection, with ease and speed.

Accession information refers to information that comes with the

plant at the time of accessioning the plant and is essentially historical in nature. It includes information such as the date the plant is received, the name of the plant, the plant material received, the quantity of plant received, the source of the plant, information pertaining to the habitat and locality of a plant received if it is collected directly from the wild, etc.

Taxonomic information includes information on the plant family, synonyms, authorities for the scientific name, natural distribution, etc., and is maintained in the names file of BG-BASE. Under the names file, plant lists of special interest and use to the Gardens are also kept, such as the list of plants under CITES, list of native plants of Singapore, conservation status of our native plants, etc.

When such lists are fully captured in the file, they can be used for cross-referencing with other plant lists to provide more information on the Gardens' living collection. It is possible, for example, to determine the proportion of the living collection that is native, the list of plants in the living collection that are of conservation importance, the list of plants represented in the living collection that are subjected to CITES' regulations, the list of plants introduced in a year, species diversity data and planting intensity data in the different zones of the Gardens, and many more permutations. Such information allows a better understanding of the composition of the living collection. For instance, this information allows better management of the living collection according to a documented collection management policy, by allowing us to zoom in on our "cores" and perhaps phasing out the less important plant groups.

By having proper documentation of plants collected directly from the wild, it is also possible for the Gardens to play a more active conservation role by re-introducing plants of conservation importance, when populations of such plants in their original habitats are threatened. Because of inherent genetic variation within plant species, the re-introduction of plants of the same species, but of a different source, may lead to genetic erosion of the plant population in the

Wanderings in the Great Forests of Borneo

In early February 1998, the Herbarium organised an expedition to Sabah, Malaysia, with a team from the Herbarium (Ruth Kiew and Joseph Lai), Horticulture (Alvin Tan) and Nature Conservation (Cheryl Chia). The aim of the expedition was four fold. Firstly, we wanted to collect plants from areas that were botanically unknown to enrich our herbarium collection and contribute to scientific knowledge. Secondly, we wanted to test various collecting and handling methods for bringing wild forest plants back to the Gardens for horticultural purposes. Thirdly, we wanted to visit critical habitats to assess their conservation status and fourthly, to provide field training for our staff.

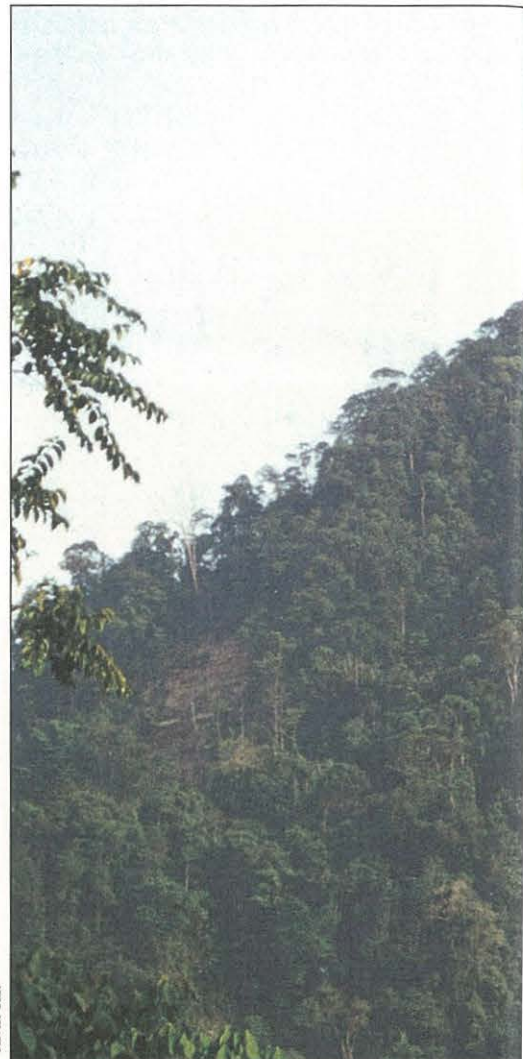
The area we chose to meet these aims was the limestone hills in the Sungai Pinangah area of western Sabah, which had not previously been explored botanically and because limestone is a critical conservation habitat in the region. We were only able to succeed in this endeavour, which involved penetrating deep into the forests along logging tracks and setting up camp in a remote area, by the unstinting support and collaboration of the Forest Research Centre of the Sabah Forestry Department and the Agricultural Park at Tenom, who provided vehicles, camping equipment and their very experienced staff. Of course, we shared all the specimens we collected with the two collaborating institutions.

The first unexpected finding was that the limestone in the Sungai Pinangah area is unique for Sabah. It is not the usual tower-like hill, but instead is a sheer cliff that is exposed at intervals along the side of a long ridge. This made access difficult, but a local guide steered us to a sheer crevice which we were able to scramble up.

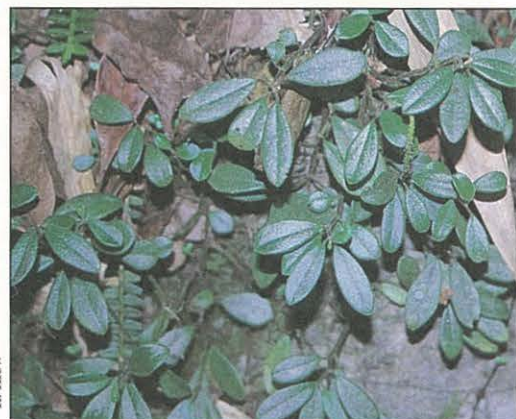
Although the surrounding forest had been logged and was riddled with logging tracks, many gigantic trees still remained and the understorey was less disturbed. Once up on the cliff top, we were impressed by the abundance of the striking aroid *Alocasia cuprea*, which came in two colours, completely green or with a candy pink hue. An exciting find was a humble little peperomia, a species new to science, that carpeted one or two exposed limestone boulders.

Another day we visited a low limestone cliff that being close to a stream supported a lush growth of gingers, ferns, aroids and begonias. It was here that we found three species of begonias, all of them new to science and each in their own way attractive plants for horticulture. Perhaps most spectacular is the ground-hugging begonia with corrugate leaves and a dense covering of magenta hairs. Another begonia has remarkable leaves, which gives the plant the local name of *pokok layang-layang* (swallow plant), because they resemble flying swallows. The third begonia has dainty white flowers.

We were also fascinated by the swarms of wild bananas that had sprung up along the sides of logging tracks. At first we thought there were four different types - *Musa borneensis*, a tall robust banana with a large golden globose "jantung" (the heart-shaped bunch of male flowers); a similar one but with a pinkish globose *jantung*; *Musa textilis*, a more slender banana with an elliptic carmen *jantung*, extremely elegant with the neat black edging to the bracts giving the *jantung* the appearance of a pineapple; and a fourth banana with an elliptic yellow *jantung*. On examination of the flowers, it became clear that this was a hybrid swarm between *M. borneensis* and *M. textilis*, the first record of



The sheer limestone cliffs above Sungai Pinangah



A new species of *Peperomia* from limestone

hybridisation between these two species.

As the cliff faces proved a formidable obstacle to climb and explore, we visited a diversity of other habitats - Batu Saap, which is a sandstone hill with a rocky exposed



Alvin Tan

Ruth Kiew collecting a *Cyrtandra*



R. Kiew

A new begonia species from the foot of the limestone cliff

summit, and the heath forest at Nabawan. This latter presented a complete contrast to the high rain forest as it has an open canopy with the feathery crowns, an abundance of orchids and pitcher plants and a deep moss layer blanketing the ground. It was here that we collected

the neat glossy fern, *Humata repens*, a low climber on fallen logs.

Ruth Kiew
Keeper, Herbarium

continued on Pg 10

collecting live plants

Going through the thick forest collecting herbs is an experience every horticulturalist dreams of. Spotting fascinating herbs needs much alertness, especially in this thick forest where the ground is covered with dry leaves making it quite difficult to spot the rare and smaller species. Some, like aroids, tend to hide under the bigger plants for shade, while others like to camouflage themselves among the thick foliage so one has to be observant to notice their presence.

When collecting plants from their natural habitat, one needs patience and the knowledge of how to carefully handle the fragile plants. When collection is completed at the end of the day, the essential part of the mission comes, namely the cleaning and packing of the plants collected. Each plant is carefully taken out from the collecting bag and soaked in water. Dead leaves and soil debris are removed and the plant is wrapped in damp sphagnum moss or in tissue paper and packed into zip-lock bags. Each one must be carefully labelled. This method enables the plants to stay fresh and survive the bumps and bouncing in the back of the 4-wheel drive on the journey back. This trip was rewarded by the wide range of plants, gingers, ferns, aroids and seeds of some trees, that were brought back safely to the nursery.

Alvin Tan
Assistant Research Officer
Horticulture

moss biodiversity

Mosses contribute significantly to the biodiversity and beauty of the forest. They are found on a wide range of substrates, such as rocks, dead wood, leaves, the soil surface and the bark of trees and lianas. In the heath forest, mosses were found in abundance possibly due to the high water table. In fact, *Sphagnum* and *Leucobryum scalare* formed a thick luscious carpet on the forest floor. These mosses act like sponges retaining a large volume of water, which maintains a stable environment for the ecosystem.

The abundance of mosses declines in less favorable habitats so they can also function as indicators of certain ecological conditions. *Racomitrium* collected on rocks next to a stream may be useful for monitoring levels of water pollution.

Altogether, a total of 58 samples were collected from habitats ranging from limestone and sandstone to disturbed primary and secondary forest to heath forest. Moss expert Dr Benito Tan, Associate Curator of the Herbarium, kindly identified them to 31 species in 13 families.

Cheryl Chia
Research Officer
Nature Conservation



Joseph Lai pressing plants to make herbarium specimens



Alvin Tan processing live plants



Alocasia cuprea

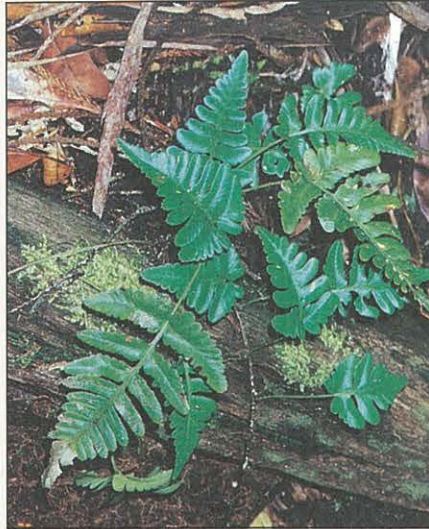


A ground-hugging begonia, a new species



Alvin Tan

A natural hybrid banana between *Musa borneensis* and *M. textilis*



Alvin Tan

Humata repens from heath forest



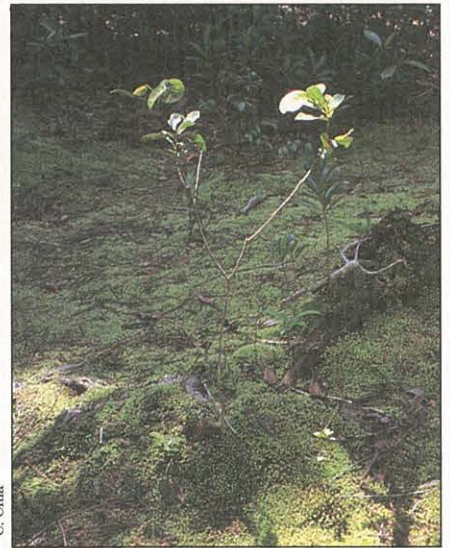
R. Kiew

The swallow begonia



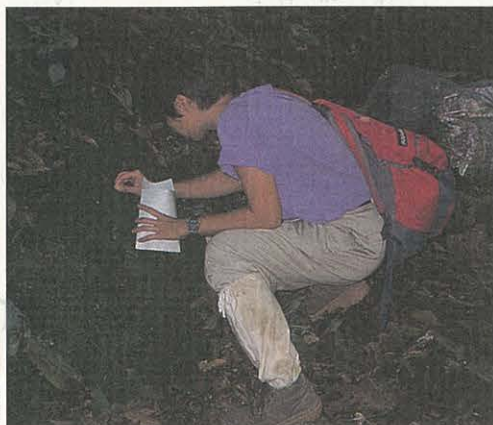
C. Chia

Racopilum grows near streams



C. Chia

Leucobryum forms a thick carpet in heath forest



J. Lai

Cheryl Chia collecting mosses

The Sun Rockery in the Singapore Botanic Gardens is tucked in Lawn O between the Formal Garden and the *Vanda* Miss Joaquim plot in the Tanglin Core of the Gardens. It was completed in early 1994 and is home to approximately 70 species of plants.

Unusual Plants at the Sun Rockery

A fascinating plant is the Blackboy (*Xanthorrhoea pressii*). This hails from the Australian continent and planted for the first time in the Gardens about four years ago. At a glance, young members of this plant appear quite nondescript as they resemble clumps of grass. Older members develop a thick trunk that may eventually reach several metres tall. The plant is especially striking when it flowers. The vertical and cylindrical flower spike can grow to more than 2.5 m long and is covered by thousands of faintly scented tiny white flowers. These individual flowers open sequentially with those facing east opening first and it can take several days before all the flowers in an inflorescence open. In its native home, this is one of the typical "bush" plant that not only survives a fire but may be stimulated to flower.

An awesome sub-tropical African tree is the Baobab (*Adansonia digitata*) standing at the fringe of the Rockery. This is one of the largest and longest-lived trees in the world sharing the likes of Sequoias. It can grow to 25 m tall, and is unique with a massive trunk that can reach 10 m in diameter. Baobabs are found in the savannahs of Africa, Madagascar and northwest Australia. In fact, it is one of the

most useful trees in Africa known for its edible fruit pulp and seeds which are also a source of oil. Early explorers called this the vegetable dinosaur because when this tree becomes leafless, it looks like a prehistoric fossil. In its natural habitat, it sheds all its leaves during the dry season but here in the Gardens, it does not defoliate fully. This slow-growing tree in the Rockery is now approximately 10 m tall and will no doubt, be a magnificent specimen in the years to come.

Another equally bizarre tree is the South American *Chorisia speciosa* (Floss-Silk tree). This rises above the agaves and is fully covered with stout thorns.

One comely plant with rosettes of handsome, succulent sword-shaped leaves that attract attention is *Agave* sp. (Century plant). This succulent is best characterised by its flowering which culminates in the death of an individual plant. After a number of years, perhaps one or more decades (but definitely not a century), when enough food is made and stored in the leaves, the stem bud suddenly starts growing rapidly, producing an inflorescence, after which the plant gradually becomes exhausted and dies. Another unique feature of this plant is that it also bears small bulbils that are actually miniature plants, on the inflorescence. These are a source of new plants. In its native home many agaves are sources of fibre, food and drink.

This Rockery would have been incomplete if plants from the Cactus family are not included. However, not all the cacti are suitable for this part of the world. One attractive cactus that baffles many a visitor is the Rose cactus (*Pereskia bleo*) as it does not fit into the standard cactus mould. This is one of two genera of cacti that comprise shrubby-looking plants with distinct leaves. Rose cactus grows well in most soils. It is a free-flowering plant with absolutely stunning flowers that resembles roses. The deep orange flowers open after eleven in the morning and close at dusk. On rainy days, it shuts even earlier. Each flower lasts for a couple of days.

The next time you visit the Gardens, do look out for the Sun Rockery and view all these interesting plants.

Andrea Kee
Research Officer,
Plant Introduction



Agave spp., Century plants



A flower of *Pereskia bleo*

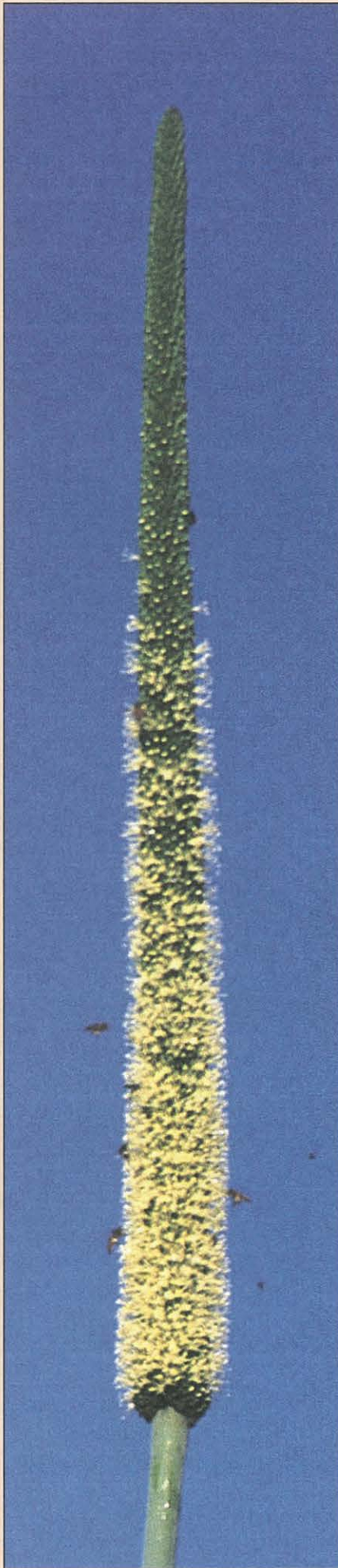


A. Kee

A young *Xanthorrhoea pressii*



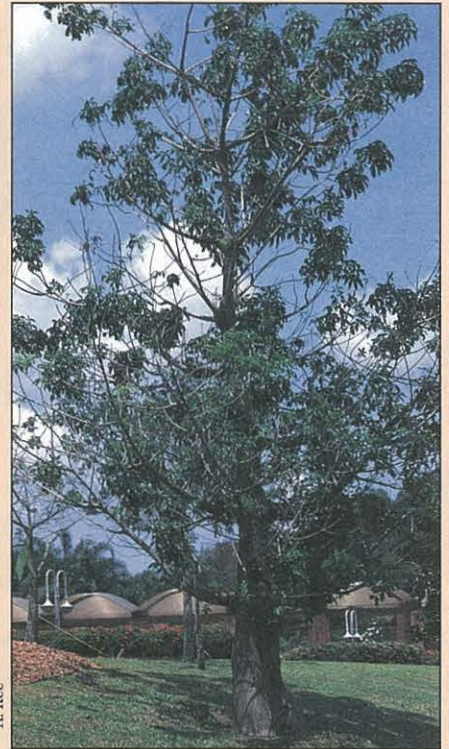
Pereskia bleo, a leafy cactus



A. Kee

The flower spike of *Xanthorrhoea pressii*

Adansonia digitata, a tree-wonder from subsaharan Africa



A. Kee



A. Kee

The bizarre *Chorisia speciosa*, a tree fully covered with thorns

Horticulture in Singapore Honoured

Dr Tan Wee Kiat, Chief Executive Officer, National Parks Board, Commissioner of Parks and Recreation, Singapore and the Executive Director, Singapore Botanic Gardens was

awarded the prestigious Gold Veitch Memorial Medal in February

1998. He is the first person in Asia to be so honoured.

This annual award is presented by the Royal Horticultural Society of Britain for exemplary contributions towards the advancement and improvement of the science and practice of horticulture.

This award to Dr Tan from the Royal Horticultural Society is not only a tribute to the individual, but is also in recognition of the quality and stature that have been attained by the Singapore Botanic Gardens, the National Orchid Garden and the Garden City of Singapore.

Dr Tan joined the Parks and Recreation Department in 1983 as Assistant Commissioner after seven years as the Assistant Director, Marie Selby Botanic Gardens in Florida, and Director of the Orchid Identification Centre under the auspices of the American Orchid Society. In 1980 he became Director of the Museum of Botany and the Arts, Marie Selby.



Dr Tan Wee Kiat receiving the award from Sir Simon Hornby, President of the RHS at the Annual General Meeting of the Royal Horticultural Society, Chelsea on 17 February 1998.

Gardening in Britain is a tradition that goes back many centuries and is now Britain's most popular pastime. Excellence in horticulture, landscaping and nursery maintenance has always been appreciated and recognised by the British. It was this tradition that led to the founding of the Royal Horticultural Society in 1804, now the world's leading horticultural organisation.

He was appointed Director of the Singapore Botanic Gardens in 1989 and has been the Executive Director since 1990. In 1996 he assumed the position of Chief Executive Officer, National Parks Board and Commissioner of Parks and Recreation, tasked with the responsibilities of developing the premier Garden City, conserving the nature areas of Singapore and guiding the Botanic Gardens into a new era.

Under his leadership a major grant to put in place an ambitious Master-plan for the re-development of the Botanic Gardens was obtained. Phase I of the re-development programme is near completion. The National Orchid Garden was opened and saw its first millionth visitor after 15 months of operation. A Plant Resource Centre with a specialised nursery became operational. Two historic buildings in the Gardens have been restored. A Symphony Stage was built and has become a major outdoor venue for musical performances. New theme gardens including the Economic Garden and lake at the north end of the Gardens were developed. A new complex that will house a Visitors' Centre and the National Parks Board's Headquarters is nearly ready.

Less visible but no less important achievements are Dr Tan's contributions as an orchid expert and leader in the field. He is an editor of the *Malayan Orchid Review* and sits on numerous international committees including the IUCN orchid conservation group, Asia Pacific Orchid Conference and the World Orchid Conference. He is also the driving force behind the orchid research and breeding programme centred at the Botanic Gardens. This supports the displays at the National Orchid Garden and is a major source of new hybrids for the commercial cut-flower industry in Singapore.

Dr Tan plays an active role in developing and maintaining ties with related institutions globally, promoting the Garden City and facilitating a free exchange of ideas and plant materials for the common good of the science of horticulture and botany.

That Singapore horticulture has received recognition from the horticultural institution of a nation renowned for centuries for its gardening prowess is indeed gratifying. It is both a stimulus and an encouragement to the staff, as well as a challenge to all of us responsible for managing and promoting the science, art and practice of all facets of horticulture, to achieve even greater heights.

Editors

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The Peninsular Malaysia-type is more variable; flowers measure about 5 cm across; their colour range from pure white to dark rosy-purple with green tips. Both forms of this species are graced with a sweet fragrance. Flowers of the Borneo variety emit a "rosy-floral" scent. The Peninsular Malaysia variety displays an additional blend of cinnamic note.



Rhyncholaelia digbyana

Rhyncholaelia digbyana – this South American species is characterised by the unusually large lip that is deeply fringed at its border. Individual flowers range from 15 to 20 cm across and are light green in colour. The extensive fringes of the lip of the species may function in directing visual attention to the flower center where the column is located. The flowers produce a "rosy-floral" note that resembles those of lily of the valley and cyclamen. It is a native of Mexico and Belize.



Rhynchostylis gigantea

Rhynchostylis gigantea – the inflorescence of this showy species is pendulous and resembles the tail of a fox, hence the plant is also known as the "Fox tail" orchid. Flowers of this species are rather variable in colour, ranging from pure white, to light pink speckled with purple or deep purple specks. Individual flowers are 2.5 to 3 cm across. The flowers have a strong fresh-floral fragrance. It is distributed in South China, Indochina, Burma, Thailand, Peninsular Malaysia and Borneo.



Vanda tessellata

Vanda tessellata – the fragrant flowers of this species are borne on a short inflorescence. Each flower measures some 6 cm across. There are many colour varieties of the species, ranging from off-white to yellow, to the common yellow with intense brown tessellations. The most common variety (shown here) has an intense "aromatic-floral" scent. This delightful species can be found in Sri Lanka, India and Burma.



Vanda dearei

Vanda dearei – this Bornean species has a short inflorescence which carries 2 to 5 flowers, 6 to 7 cm in diameter. The lemon-yellow flowers emit a pleasant fragrance in the morning. Most progenies of *Vanda dearei* are fragrant. An example is *Ascocenda* Kwa Geok Choo (*Ascocenda* Amelita Ramos x *Vanda* Harvest Time), named after the wife of the Senior Minister of Singapore.

The above are just some examples of the fragrant orchids that you can find in the National Orchid Garden. I hope you will spend some time exploring the fragrances of orchids. There are many more waiting to be discovered. Happy sniffing!

Dr Yam Tim Wing
Senior Research Officer
Orchidology

Licualas

Licualas belong to a large genus of ornate fan palms with about 108 species. They are very small to moderate size plants which are mostly inhabitants of the forest undergrowth and when young are shade-lovers. Licualas are distributed from India to New Guinea with a solitary species in north-eastern Australia. Their greatest diversity is in Peninsular Malaysia, Borneo and New Guinea. As a group, licualas are generally tropical in their requirements. Leaves of some species are used for thatching and making sleeping mats and other household articles and also used for wrapping food.

Many species are highly decorative with manageable dimensions but generally they are slow growing. Pith and stem apices are edible. A large number with tremendous horticultural potential await introduction to cultivation.



Licuala cordata flourishing in the Singapore Botanic Gardens

Ohn Set

New & Exciting

One of them is *Licuala cordata*, native to Sarawak where it grows in shady forests. Very little is known about the plant. It grows to about 2m tall and presents a neat, compact appearance. The slender

stem is short and the petioles are spiny along the margins. The stiff leaf blades are an attractive bright green. Each is orbicular to fan-shaped, prominently cordate at the base with wavy lobed margins.

This species is a rare and precious palm much sought after by enthusiasts. It is very similar to *Licuala orbicularis* in having an undivided rounded leaf but it differs in having a cordate base to the leaf.

Ohn Set
Research Officer
Plant Introduction

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affected area. Records that include the original collection data, will help ensure the proper re-introduction of plants.

Instead of conducting tedious field surveys each time the Gardens publishes its checklist of cultivated plants, an up-to-date BG-BASE is able to generate the required information with ease and speed. The Royal Horticultural Society has in fact used this feature of BG-BASE to publish its "RHS Plant Finder," now available in a CD-ROM, as well

as to launch its "Wisley Plant Catalogue" on World Wide Web.

The quality of the data stored within BG-BASE depends on the information that is put into it, and how consistently the database is updated to reflect the continual changes in the living collection. Given time and resources, the quality of the database can be achieved through persistent efforts. But what determines the value of the database must undoubtedly be the level of application that is derived from it. An

under-used and out-dated database will quickly degenerate into an unnecessary luxury. The challenge then, for the plant records staff, is to not only maintain an accurate and updated database, but also to integrate BG-BASE into the operations of the Gardens, and with the cooperation and assistance of the Gardens' staff, make it into a valuable shared resource of the Gardens.

Tan Puay Yok
Plant Records Manager