Wilson Botanical Garden: A Conservation Center of HSI

Carla Black, Apto. 00424-0027, Volcán, Chiriquí, Panamá
carla@volcanbaru.com

Wilson Botanical Garden is a small but important element of the larger Las Cruces Biological Station in southern Costa Rica. Wilson Garden was founded in 1962 by Robert and Catherine Wilson as a botanical garden, nursery, experimental station and as the site of their home. In 1973 it became part of the research station of the Organization for Tropical Studies (OTS) along with surrounding forest and agricultural land.

The Garden comprises 10 hectares (25 acres); Las Cruces encompasses 325 ha. (803 acres) of which 220
Scientists have published on many subjects researched at Las Cruces, though conservation biology and restoration ecology are increasingly important fields of study at the Biological Station. The development of biological corridors is a particular focus, and the Las Cruces – Guaymí Restoration Corridor is a principal project. Dr. Zak Zahawi, director of Las Cruces, has taken on the challenge of increasing land holdings to make the corridor a reality, and has made significant progress in his two years as director. This project ties in with the Osa Corridor on

Dining Hall

**The Purpose of HSI**

The purpose of HSI is to increase the enjoyment and understanding of *Heliconia* (Heliconiaceae) and related plants (members of the Cannaceae, Costaceae, Lowiaceae, Marantaceae, Musaceae, Strelitziaceae, and Zingiberaceae) of the order Zingerberales through education, research and communication. Interest in Zingiberales and information on the cultivation and botany of these plants is rapidly increasing. HSI will centralize this information and distribute it to members.

The *HELICONIA SOCIETY INTERNATIONAL*, a nonprofit corporation, was formed in 1985 because of rapidly developing interest around the world in these exotic plants and their close relatives. We are composed of dues-paying members. Our officers and all participants are volunteers. Everyone is welcome to join and participate. HSI conducts a Biennial Meeting and International Conference.

Membership dues are (in $US): Individual, $35; Family, $40; Student, $10; Contributing, $50; Corporate (Company or Institution) $100; Sustaining, $500; Libraries, $25. Membership fees constitute annual dues from 1 July through 30 June. All members receive the BULLETIN (usually published quarterly), the Membership Directory, and special announcements. Please send all inquiries regarding membership or Bulletin purchases to: Ray Baker, c/o Lyon Arboretum, 3860 Manoa Road, Honolulu, HI 96822, Phone (808) 988-0455, Fax (808) 988-0462, raymondb@hawaii.edu. Back issues of the Bulletin are $5.00 per issue.

**HSI Officers for 2008-2009**

President, Anders J. Lindstrom; Vice-presidents for Membership, Carla Black and Jan Hintze; Secretary, (not filled); Treasurer, David Lorence; Editors, Ray Baker and Victor Lee; Cultivar Registrar, Bryan Brunner; Archivist: Sandra Barnes. Board of Directors: Mark Friedrich, Raymond Jerome, David Orr, David Skinner, Chelsea Specht.

The HSI BULLETIN is the quarterly publication of the HELICONIA SOCIETY INTERNATIONAL. Editors: Raymond F. Baker, c/o Lyon Arboretum, 3860 Manoa Road, Honolulu, HI 96822 USA, 808-988-0455, 808-988-0462 (FAX), raymondb@hawaii.edu and Victor Lee, 55 Jalan Kemuning, Singapore 769777, hortvet@singnet.com.sg, 65-67598208, 65-67571231 (FAX).
litter in the clumps. Now with improved prospects for a healthy future for individual plants, and renewed efforts in record keeping, Wilson Garden can successfully rebuild its heliconia collection. A primary objective is to present Costa Rican native heliconias to visitors, and the Garden is well on its way towards meeting this goal. A sampling of native species at Wilson Botanical Garden is shown in the accompanying photos.

Learn more about the Organization for Tropical Studies and about visiting Wilson Botanical Garden at www.ots.ac.cr and click on Las Cruces at the bottom of the page. To visit the Las Cruces virtual herbarium, a work in progress, go to www.ots.ac.cr/herbarium.

Dear HSI Members,

Thank you if you already sent in your renewal! But if you haven’t,

YOUR MEMBERSHIP HAS EXPIRED!

Memberships expire at the end of June, and it is time to renew.

RENEW NOW! It will take just a moment.

You can renew via our website using PayPal: www.heliconia.org, or if paying by a check drawn on a U.S. bank, or by International Money Order, send it to our Treasurer: Dr. David Lorence, National Tropical Botanical Garden, 3530 Papalina Road, Kalaheo, HI 96741 USA

If you have questions regarding your membership status, please write to: admin@heliconia.org

Sincerely,
Carla Black and Jan Hintze, Vice Presidents for Membership
Expedition to China, part 2

Markku Häkkinen, Lintulahdenaukio 8 A 3, 00500 Helsinki, Finland (markku.hakkinen@kymp.net)

Reprinted with modifications with permission from the Fruit Gardener (California Rare Fruit Growers), vol. 41, no. 2 (March & April 2009). Story and images copyrighted by the author.

In March – May 2006 I made my second expedition to China. This trip was a combination of field studies in the Guangdong and Yunnan Provinces. I already had an invitation from Dr. Wang Hong to conduct field expeditions in Yunnan. In addition, Prof. Houbin Chen from the South China Agricultural University invited me to visit in Guangzhou (previously called Canton) which is the third largest city in China with some 10 million inhabitants. I was also introduced to Prof. Xue-Jun Ge, a molecular biologist, from the South China Botanical Garden, Chinese Academy of Sciences, by INIBAP. He had conducted some DNA analyses of wild bananas and I made some field studies with him in the Guangdong and Hunan Provinces. The aim of this second expedition to China was to conduct research on wild bananas, especially in remote areas in Guangdong, Hunan, Yunnan and Hainan and to give some lectures on wild bananas to the local institutions.

Guangzhou

I left my home on Tuesday March 21st, bound to the Helsinki airport from which I flew directly to Guangzhou, where I arrived the next morning. Upon arrival I met my first host, Prof. Chen. He guided me to the South China Agricultural University campus’ hotel. The university has a huge campus in Guangzhou with some 40,000 students. After resting for a while I walked around the campus area and found a market in which vendors sold all kinds of goods but I especially paid attention to tropical fruits such as mangosteens, durians and many others, even some of which were unknown to me. I suppose that some of those ultra-tropical fruits were imported from Thailand. Even though Guangzhou is in a tropical region, its winters are too cold for those real tropical crops. On Thursday Prof. Chen introduced me to part of his university and to some of his colleagues. We agreed on the schedule for the coming days and I was invited to be a special guest at the Second International Symposium on Loquat, which was held in the South China Agricultural University on April 1-5 with some 120 participants from 10 countries.

First Field Trip

On Friday morning, we started our three day field trip with Houbin Chen, his assistant, one of his PhD students and me. We headed to Zhuhai which is a town bordering Macau some 110 km south of Guangzhou, via Dongguan, Daliang and Xiolan. During this three day mission we visited many of SCAU’s ex-situ banana collections. I even saw some of those Musa species from Borneo where Houbin Chen had collected seeds during our 2004 mission. We returned to Guangzhou on Sunday evening and I met Prof. Xue-Jun Ge from the South China Botanical Garden, Chinese Academy of Sciences. I had already been introduced to him through INIBAP but I had never met him personally. We planned with Prof. Ge our coming three days of field expeditions to the northern part of the Guangdong Province, and the adjacent Hunan Province which is where the natural border of wild Musa exists. In those utmost areas of the northern mountainous border, Musa diversity is limited due to freezing temperatures and snow during the winter months of January – March. Frost and snow normally kill all of the banana leaves but the pseudostem remains alive, from which the plant sprouts when the weather warms up in spring.

Guangzhou

On Monday, March 27th, I gave my first presentation in SCAU for students called and introduced by Prof. Chen. In the afternoon, I visited the South China Botanical Garden with Prof. Ge and saw their huge herbarium (IBSC). I also had the opportunity to study part of their huge old Musaceae herbarium collections.

Second Field Trip

On Tuesday morning we, along with Prof. Ge, started our 3-day expedition to northern Guangdong’s mountainous areas. We first proceeded to Conghua, Daling Mountain’s nature reserve area some 100 km
north of Guangzhou. There, we observed *Musa itinerans* var. *annamica*, *M. itinerans* var. *chinensis* and *M. itinerans* var. *guandongensis*. [For *Musa* photos see page 9.] We continued our trip further north through Xianhe, Maoshan, Chenjiang, Shixing, Renhua, and Lechang. Near Lechang we found one more new variety of *M. itinerans* var. *lechangensis*. This new variety seemed to be more cold tolerant as it had not suffered at all from cold, as had *M. itinerans* var. *guangdongensis* in adjacent areas. All of these new *Musa itinerans* varieties are described scientifically in the Missouri Botanical Garden’s publication *Novon* vol. 1, 2008. We made our 350 km southbound return trip to Guangzhou from Pinghsi via the Beijing – Guangzhou highway. I have to say that traffic on that two lane highway was awful as faster cars passed the lower speed trucks on both sides. The next day, at the IBSC herbarium, I arranged all of my samples, which after mounting, were distributed to many herbaria in Asia, the USA and Europe. The distributions of the specimens are indicated in my description articles.

**Loquat symposium**

South China Agricultural University had arranged the Second International Symposium on Loquat to which I was invited as a special guest. The symposium took place on April 1 – 5 at SCAU’s campus. However, the fifth day was reserved for field trips. I was invited to give a banana presentation to the participants after the finishing ceremony, as an extra program on the fourth day. The loquat (*Eriobotrya japonica*) is a fruit tree indigenous to southeastern China. In recent years there have been in China some field studies of loquats and these studies found new loquat species from the Guangdong province viz. *Eriobotrya fragrans*, *E. cavaleriei*, *E. deflexa*, *E. kwangsiensi* in addition to the commonly known *E. japonica*. However, in cultivation they are using many of those cultivars which are bred from *E. japonica*. According to the presentations in the symposium, China still stands out as the main producer of loquats. The area for production is more than 120,000 ha (296,526 acres), producing 400,000 tons of fruit. Loquats are grown in 20 out of 32 provinces, covering nearly all of the provinces which range below latitude 35°N. The fruiting season is from December to July. The main research, germplasm resources and cultivar improvement are emphasized in SCAU and some other fruit institutes in China.

**To Yunnan**

As we did not participate in the Loquat field trips with Houbin Chen, we started our mission to Yunnan. We flew from Guangzhou to Mangshi via Kunming. To my surprise, we saw at the Kunming airport all of the main tropical fruits for sale such as mangosteens, durians, etc. As Kunming is located in a sub-tropical area, those tropical fruits were most probably imported from Thailand. We met Dr. Wang Hong and his student upon arrival at the Mangshi airport. We stayed overnight in Mangshi. The next morning we started our long journey to the Tongbiguan nature reserve and the small Burmese border town called Labang. Our drive there lasted almost the whole day along small roads via Mangxuan, Jiugcheng, Yingjiang and Taiping. As the mountain chains stretch from the southwest to the northeast, we had to pass many mountains. Our drive climbs up some 2 km, then goes down 1 km and up again. The road is very narrow and serpentine, built along steep slopes. In many places we could see down slope several hundred meters and there were not any retaining fences. At times, it was very scary. In addition, soon after leaving Mangshi the weather cooled down to some 12 – 15 degrees Celsius due to the high elevation. There was one incident worth mentioning. When we stopped for lunch
in a small village, only noodle soup was available. In the village we saw some old ladies whose feet were bound as young girls. Their feet were some 10 cm in length and they had to use a special steel supports in their legs. I had heard of those bound feet in China, but I had never seen them before. After enduring freezing temperatures for the whole day at higher elevations, we arrived in the late afternoon in Labang where the lower elevation was extremely hot, around 38 degrees Celsius. The town itself was a small town on the border with a mixture of Chinese and Burmese people of which many held dual citizenship. We were booked in a hotel, which was located right on the border so we could even jump to the Burmese side, over a fence and small ditch.

Very close to our hotel was a border crossing station with heavy traffic going both ways. Photographing in the border station was prohibited but otherwise we could take photographs in the border area freely.

The fruits that were offered in that town were just normal bananas, citruses, apples, etc. The next morning we started to study the Tongbiguan nature reserve area along the Burmese border at elevations between 290 and 1600 meters. It was very interesting in to observe such a rich wild banana diversity growing in layers, at elevations up to 1600 meters. The first bananas were near 300 meters altitude with rich populations of Musa balbisiana. Those were followed by Musa acuminata var. chimensis up to some 200 meters higher. After that came a population of Musa itinerans var. itinerans another 200 meters up. After 1 km there were mixed populations of Musa nagensium var. hongii and Musa chunii. In my long career and after 12 expeditions on wild bananas in SE Asia I had never seen anything like this. It was like a dream for a banana researcher. I later on described all of those observed Musa species in Missouri Botanical Gardens’s Novon publication in volumes 17(4) 2007, 18(1) and 18(3) 2008. Musa chunii is described in the Chinese publication called “Journal of Systematics and Evolution”, freely available on line at: http://www.plantsystematics.com/qikan/manage/wenzhang/jse08020.pdf. Although bananas only constituted roughly 10% of the plants in the Tongbiguan nature reserve area, I did not notice any other plants with edible fruit growing there.

On April 8th, while I was figuring and fixing all of the collected samples, Wang Hong took Houbin Chen back to Mangshi as he had to go back to the university. On the next morning, we continued on our way to Ruili via Longhuan. As we were close to the border area, where drug smuggling is rather common, there were many road check points along the way. We faced the first of them on the way to Ruili. The army officers were wondering how I managed to get to the area without their knowledge. It took the officers nearly one hour to check my background. At the following several check points, I just showed my passport and we could proceed on our journey immediately. On the way from Mangshi we took small roads and passed all of those check points. In those mountainous areas there were many fields along steep slopes. What I noticed in those high land areas was that the main crop was wheat. It was just at harvest time for the wheat and I saw a very interesting method used to dehull the seeds. The farmers spread their wheat everywhere on the concrete covered road and let the wheels of vehicles passing by mill the seeds and then let the wind separate the husk from the grain. It was a very common method used in those rural areas to dehull
wheat, although the method is not sanitary, because the wheat is also exposed to pollution from the emissions of the passing motor vehicles and the animal powered traffic. From Lapang we headed to Ruili via Yingjiang and Longhuan. On the way from Yingjiang to Longhuan on a small Da Yingjiang river bank in Duangguan we observed one unknown Musa species. We collected suckers which were transplanted for further study at XTBG’s ex situ collection. The new species was described based on living plants grown in the XTBG’s nursery in 2007 and was named Musa zaifui. Musa acuminata and the species in the Musa section Rhodochlamys are genetically very close to each other and I considered this new species to be a relict intermediate between those two but having more features from the section Rhodochlamys. The description was published in the Nordic Journal of Botany vol. 26 (1&2), 2008. In Ruili, a border town to Burma, we studied along the border up to Nongdao in the west but we could not find anything special. There were too many settlements in flat areas that were in the way.

On Monday April 10th we planned to go south along the border. We managed to go via Longling to Mengnuo where we heard that the bridge in front of us had collapsed, so we had to turn back and choose another way. We stayed over night in Mengnuo from which we drove on the following day via Baoshan to Qinliang. The only things worth mentioning about that leg of the trip were the small roads covered by small stones and small towns along the way. All of the towns seemed to have a market in their centers that was difficult to get through due to the crowds of people and water buffalos with wagons. The following day we continued our trip southwards. The road followed a river in the valley down to Manlian near the town of Pu’er. We still proceeded on our trip to late evening, to a small town called Dajing. The river bank along the way had very nice scenery but no special plants to be mentioned. Only in some places we could still see the primary forests where the slopes were too steep for any kind of logging.

TianZi

Thursday was our last day in this field expedition. Wang Hong and his student were eager to get back to the garden as they had already started their mission two weeks before we met them at Mangshi, so we drove back to Jinghong and TianZi. I stayed there, as I had promised Dr. Josef and Minguo Margraf that I would stay for a while as their guest during this trip to China. The TianZi Biodiversity Centre (http://www.natureproducts.net/) was founded in 2004. It is a Chinese registered organization, politically based within the Ministry of Science and Technology. Several independent sections of the organization share the common goal of biodiversity conservation and development. There are some ten Thai style wooden buildings on the property, some of which are fairly large. Many of the buildings accommodate German PhD students and researchers who are conducting their studies in Yunnan. I could not ascertain the total number of people who work at TianZi, as they have so many projects going on in the countryside. However, there are some 15 assistants who work on the property, in the gardens and in the office. The garden is close to a rubber tree plantation, and was itself formerly a rubber tree plantation so the soil is consequently poor. The plants are irrigated with water from the river. There are a number of different species of snakes, frogs, birds, and small mammals in the area. As I had been there before, everything was familiar to me (see Fruit Gardener vol. 41:1) with the exception that meanwhile they had built for me a brand new lodge for my research purposes. During that time, there were several German PhD and master degree students with whom Josef and Minguo Margraf were working. We visited several nature reserve areas around Jinghong. In the forests we met many local people along the paths during our excursions, who were collecting edible materials, such as mushrooms, wild fruits, edible roots etc. They also collect banana buds for themselves or for selling in the market. During my stay there until April 18th, there were many visitors. So there was not much time for me to conduct any additional research.

Xishuangbanna Tropical Botanical Garden

On Tuesday April 18th in the morning Wang Hong picked me up and took me to the XTBG. The distance from TianZi to XTBG is some 85 km but due to heavy traffic and small road it takes some three hours to drive there.

This time I was accommodated in XTBG’s dormitory which they have for visiting scholars, PhD and master students. I have already described the XTBG in my travelogue part 1, but here are some additional details. The Xishuangbanna Tropical Botanic Garden, Chinese Academy of Sciences (http://en.xtbg.ac.cn/) was established in 1959. The garden is located in Menglon Town of Mengla County, Xishuangbanna Dai autonomous Prefecture of Yunnan Province. It lies at 21°56’ North latitude, and 101°15’ East longitude, with an average elevation of 550 m, an annual average temperature of 21.7°C, and rainfall of 1500 mm. The garden is surrounded by the Luosuo River, a branch of the Mekong River. During the past five decades of development, the garden has become an integrated base for research on tropical botany, forest ecology, plant germplasm preservation, and public science education. Production techniques and problems are also studied at the garden. The garden is maintained by a staff of some 200 people, who regularly fertilize and irrigate the plants, as needed. With an area of 900 ha (2,224 acres), XTBG is the largest botanical garden in China and has the richest plant collection in the country. XTBG has about 10,000 species of tropical plants grown in the XTBG’s nursery in 2007 and was named Musa zaifui. Musa acuminata and the species in the Musa section Rhodochlamys are genetically very close to each other and I considered this new species to be a relict intermediate between those two but having more features from the section Rhodochlamys. The description was published in the Nordic Journal of Botany vol. 26 (1&2), 2008. In Ruili, a border town to Burma, we studied along the border up to Nongdao in the west but we could not find anything special. There were too many settlements in flat areas that were in the way.

On Monday April 10th we planned to go south along the border. We managed to go via Longling to Mengnuo where we heard that the bridge in front of us had collapsed, so we had to turn back and choose another way. We stayed over night in Mengnuo from which we drove on the following day via Baoshan to Qinliang. The only things worth mentioning about that leg of the trip were the small roads covered by small stones and small towns along the way. All of the towns seemed to have a market in their centers that was difficult to get through due to the crowds of people and water buffalos with wagons. The following day we continued our trip southwards. The road followed a river in the valley down to Manlian near the town of Pu’er. We still proceeded on our trip to late evening, to a small town called Dajing. The river bank along the way had very nice scenery but no special plants to be mentioned. Only in some places we could still see the primary forests where the slopes were too steep for any kind of logging.

TianZi

Thursday was our last day in this field expedition. Wang Hong and his student were eager to get back to the garden as they had already started their mission two weeks before we met them at Mangshi, so we drove back to Jinghong and TianZi. I stayed there, as I had promised Dr. Josef and Minguo Margraf that I would stay for a while as their guest during this trip to China. The TianZi Biodiversity Centre (http://www.natureproducts.net/) was founded in 2004. It is a Chinese registered organization, politically based within the Ministry of Science and Technology. Several independent sections of the organization share the common goal of biodiversity conservation and development. There are some ten Thai style wooden buildings on the property, some of which are fairly large. Many of the
and subtropical plants from China and from abroad flourishing in its 35 collections, such as the banana collection, with some 200 cultivars and wild species. In addition there are numerous beautiful and rare plants from tropical rain forests from all over the tropics. Most of the plants in the garden were planted after the garden was established, and most are labeled. As the garden is in a tropical setting, there are no greenhouses. The garden has some 600,000 visitors annually, and most visitors are from China. Cars may be driven in the garden only from the gate to the parking lot. Most of the roads and walkways in the garden are paved. Short tours are conducted on foot, but there are electric vehicles that are used for longer tours.

During April 19 – 26th I, along with Wang Hong and his assistant, made several daily expeditions to areas surrounding XTBG, looking for new banana species/varieties. During those trips we found two unknown Musa balbisiana varieties and one unknown Musa species which still are in queue, waiting for description. We also found several Ensete glaucum populations, some wild and some cultivated. People are using the stem cooked for either human or animal consumption. On one of those expeditions to the forest, we faced a huge king cobra about 3 meters long that did not slither away like snakes normally do but it remained in a defending position. Wang Hong and his student started to harass it by throwing stones and with long wooden stick from forest. When the snake started attacking us, we all ran away some 20 meters and when the snake turned away the two of them started again. This cat and mouse game lasted some 15 to 20 minutes until the snake turned away the two of them started again. This cat and mouse game lasted some 15 to 20 minutes until the snake hid in a hole. I have to say that it was quite an aggressive snake. I had seen several king cobras in the Red Cross snake farm in Bangkok, so I could easily recognize it. On Wednesday April 26th, I gave my presentation to some of XTBG’s staff and students. See at: http://en.xtbg.ac.cn/n126c46.aspx.

On the next morning I left XTBG with Wang Hong who escorted me back to TianZi where I spent my last night in Yunnan. They had arranged a nice evening party at which I met many foreigners and local people.

Back to Guangzhou

On April 27th, I flew from Jinghong to Guangzhou via Kunming. Upon arrival I met Prof. Ge who took me again to SCAU’s campus hotel. I spent the following day in the South China Botanical Garden, studying its collections. I agreed to go with Ge to revisit the areas which we studied earlier in northern Guangdong and Hunan Province to see if we could find anything new. So we spent the following three days in the field and returned back to Guangzhou on the first of May. We could not find anything new during this mission. As we had planned to make a field expedition to Hainan Island, we agreed to carry out the mission on May 5 to 12th and booked our flight tickets. However, I started to feel very sick in the afternoon. In the morning I called Houbin Chen and asked what to do. Soon after, he sent Prof. Guibing Hu, whom I had already met earlier. Prof. Hu took me to the campus clinic, where I was diagnosed as having a flu. I was given two huge injections of anti-virus medicine in both of my buttocks three times per day for three days. As my condition became even worse, I again called Houbin Chen and asked for help. As Prof. Ge also holds a professorship at Sun-Yat University he took me on the morning of May 5th to their huge university hospital in Guangzhou. My flu turned out to be instead, a bad case of pneumonia, for which I spent the following ten days in the hospital, getting antibiotics infused into my veins, although I was reluctantly permitted to spend my nights back at SCAU’s campus hotel. As a result of my illness we cancelled the Hainan mission, which took place later in 2007.

Home bound

On the 15th of May, I was escorted to the airport by Houbin Chen and I flew from Guangzhou to Helsinki. I arrived home in the evening.

I had already booked flight tickets to an upcoming TAG symposium in Douala, Cameroon, Africa but my lung specialist in Finland absolutely denied my travel and told me that I was still too weak for that trip.

A travelogue of my third expedition to China in 2007 will follow in a future HSI Bulletin.

Etymology

The new Musa species, Musa chunii is named in honor of Chinese academician and botanist Chun Woon-Young; M. zaifui is named in honor of Prof. Xu Zaifu, the third director of the Xishuangbanna Tropical Botanical Garden and M. nagensium var hongii is named in honor of curator Wang Hong, my counterpart, from the Xishuangbanna Tropical Botanical Garden Herbarium, for their contributions to the botany of China and to the XTBG garden.

Acknowledgement

I would like to give my warmest thanks to my friend Emory Walton who made this article possible by correcting numerous misspellings and providing other valuable comments during its writing.
M. nagesium var. hongii (various stages),
female bud (left) and fruit bunch (right)

M. balbisiana

M. balbisiana

M. chunii, male bud

M. ornata

M. yunnanensis

M. velutina

M. coccinea, nearly mature fruits

M. itinerans var. guangdongensis, female flowers (above), fruit bunch (right)

Opposite page: Markku Häkkinen receives the H.H. Bloomer Award of the Linnean Society of London from Dr. John Edmondson as "... one of the world’s leading authorities on the taxonomy of Musa. He is currently a visiting researcher at the Natural History Museum, University of Helsinki, a visiting scholar at the Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences and, through the Biodiversity Taxonomic Advisory Group, a Musa specialist adviser for many institutions all over the world. ... He has personally collected many ex-situ collections from Borneo, China and Malaysia, and has donated his University wild Musa collection of 50 taxa to the ITC Gene Bank in Louvain, Belgium for the benefit of the international community."
Heliconias as Cut Flowers

Jan Hintze, Director, Jungle Plant & Flower Service, Darwin, Australia
hintze@ozemail.com.au

Most of the members of the Society are collectors of information - they travel the world collecting and surveying plants, taking photos and seed and botanical specimens for scientific study, classification and providing ecological maps. This, to the non-scientific type, is the most fascinating part of taxonomic studies, and of course the memoirs of the collectors of the eighteenth and nineteenth centuries provide us with material to make us thankful for aeroplanes, roads with motor vehicles and digital cameras.

However, I would like to share with you all some of the complexities of using plants from the Zingiberales as cut flowers. We who are involved in the commercial side are those who ‘value add’ to the work of the collectors, and I guess we need to show appreciation for the work done, and the goodies brought back from mountain tops and river valleys for the delectation of the florist and the landscaper. Although I would appreciate it if a few more horticultural notes such as soil type, light level, and climate were included in the field notes, since this would give us growers a head start on cultivation in foreign lands.

Surprisingly to some people, cut flowers are a fairly valuable part of the horticultural industry world-wide, and although I have no data on the value of heliconias and gingers individually, the industry is worth billions of dollars world-wide and over all genera.

The industry is also valuable as a cash income for third-world primary producers selling in the local markets, and where there is sufficient infrastructure an export industry can develop.

People buy flowers because they are beautiful, often as a social requirement for births, deaths and marriages, and a status symbol of wealth and success. Flowers are also considered adjuncts to meditation and symbols of peace and appreciation. Quite a burden for these simple sexual organs to carry.

Which flowers people choose is a matter of availability and personal taste - tropical dwellers generally can’t have roses, and if they are lucky, heliconias and gingers will be available, and there is a variety to fill all requirements. In countries where a wide variety is available, heliconias and gingers, because of their unusual shapes and styles, often attract people who like to be different.

Setting up a flower farm involves a lot of factors, not the least being acceptance of hard work and unreliable weather, etc. which are the lot of all farmers. A night temperature of 10°C is a minimum, and would preferably not be less than 18°C. Day temperatures can be up to 35-38°C. You only need a relatively small area of land, since heliconias are high producers per square metre per annum, but good soil and plenty of available water are essential. These flowers also have the benefit of producing flowers every week of the year, thus spreading the cash flow and the risk of weather based or marketing disasters over the full year.

Choosing what to grow is difficult, since there are so many species and natural hybrids to choose from. Other factors such as seasonality, vase life and packability enter into the equation, as well as suitability to your environment, and obviously, your own likes and dislikes—why grow something you don’t think is beautiful—others probably won’t like it either.

It is better to select a limited range, falling into several categories - *H. psittacorum* in several basic colours—pink, red and orange; claw type heliconias, again in several colours and sizes, and of course the striking pendants *H. chartacea, H.collinsiana* and *H. rostrata*.

With gingers you need to be more selective, since only a few have an adequate shelf or vase life to allow for transportation to distant markets. For local consumption one can be a bit more flexible since transportation time is only a day or two. We grow *Alpinia purpurata, Etlingera elatior, Costus scaber* and *Costus woodsonii*, and *Zingiber spectabile*. Curcumans are also spectacular, although very seasonal, but are useful as a complete change of style.

The processes of growing are relatively simple in that both heliconias and most gingers grow fairly vigorously, and mostly in full sun. Capital investment in infrastructure is minimized since shade houses are not required. An irrigation system to provide water in areas where rainfall is unreliable is essential. Production levels are contingent on water and nutrition, so provision of adequate fertilizer is also essential. Generally speaking plants are put out in rows, running north-south, to evenly spread exposure to sunlight and for ease of harvesting.

Harvesting is fairly labour intensive, and all un-
wanted material must be left in the field to recycle into the soil. Flowers should be cut at the base of the cane and unwanted leaves and stem should be trimmed and dropped, and only the saleable portion of the stem brought into the packing area.

Post harvest treatment is merely making sure that the flowers are cooled from the field heat, and rehydrated by placing them under a sprinkler for 30 minutes or immersing them in water for a shorter period. This extends the vase life, as does holding the flowers in the dark until ready to pack. Maintaining a temperature of about 20ºC will also help extend longevity.

Packing should be done into suitably sized boxes, layered with clean paper, which can be dampened to maintain a level of humidity inside the box. Flowers should be packed tightly, without crushing, to prevent movement inside the box, which causes rub marks, bruising and other damage.

The end result of all of this, assuming you get your growing techniques right, and your marketing well integrated with production, and there are no cyclones nor airline strikes, etc., is quite a good reward for the grower, which gives me an excuse (and the funding) to follow the footsteps of the collectors to at least observe these beautiful darlings in their own homes - the rapidly disappearing jungles of tropical America.

---

**Culinary Applications of Torch Ginger, *Etlingera elatior***

_Alina Niemi_

Find award-winning vegetarian and vegan recipes at my blog:  
[http://amostveganinparadise.wordpress.com](http://amostveganinparadise.wordpress.com)

During a recent trip, I visited a village in the state of Perak, in northwest peninsular Malaysia. Our guide, Bapak Aziz Manaf, who recently attended Herbal Asia 2009, pointed out various herbs used by locals for medicinal and culinary purposes. He stopped at a small stand of torch ginger flowers and pointed to a bloom, explaining that the young flower buds were used in cooking.

"Cooking?" I repeated, making sure I heard him correctly. "You eat them?"

"Yes. In fact, you'll have some for lunch, in the herbal rice my wife is making."

That was a surprise. I recognized the flower, aptly named for a central cone shape, surrounded by splayed outer bracts, resembling a floral torch on a stem. We use them often in tropical flower arrangements in Hawai`i, since their waxy, show-stopping appearance easily lasts for more than a week.

Also known as Philippine wax flower, torch lily, wild ginger, porcelain rose, _bunga kantan, bunga siantan_ (Malaysian), 'awapuhi ko'o ko'o (Hawaiian), 'awaphuhi, opuhi (Tahitian), eka, opuhi, pua vao (Marquesan), bongkot (Balinese), kaalaa (Thai), _bunga kecombrang, honje_ (Indonesian), _dork khiing_ (Laotian), _boca de dragon_ (Spanish), _xiang bao jiaing_ (Chinese), _rose de porcelaine_ (French), it belongs to the Zingiberaceae family. Throughout the years it has had numerous botanical synonyms, including _Nicolaia elatior, N. speciosa, Phaeomeria magnifica, P. speciosa, Alpinia elatior, A. magnifica, _and_ _Elettaria sp._ In the 1980s, Rosemary Margaret Smith of the Royal Botanic Gardens Edinburgh determined this plant belonged to *Etlingera*.

Believed to be native to Indonesia, Malaysia, and southern Thailand, it is grown extensively throughout Southeast Asia and the Indo-Pacific region in tropical areas. Leaf stalks and inflorescences rise separately from the underground rhizome, growing to 20 feet (6 meters) and 40 inches (1 meter), respectively. Torch gingers have an open-clumping (short-running) growth habit and like full sun or light shade and rich, well-drained soil, with protection from strong winds. Showy
inflorescences come in red, pink, or the rare white varieties and bloom year round. They are perennials in warm and tropical U.S. Zones 10-11, hardy to 32° F (0° Celsius) and need to be in greenhouse conditions or brought indoors in colder climates. Propagation is by rooted stalks divided from the mother plant, or from seeds.

The immature bud is used for culinary purposes in Southeast Asian cuisine, in parts of Indonesia, China, Malaysia, and Thailand. Tender inner bract tips are sliced or chopped and added to dishes or used as a condiment. Sour fish and noodle soup, Asam Laksa, a dish from the Peranakan or Nyonya culture (the result of Chinese merchants and laborers marrying Malaysian and Singaporean women), and Nasi Ulam, herbal rice, both rely on the distinctive flavor and aroma of the torch ginger buds. The flavor has been described as citrusy, bitter, pungent, and aromatic. I find it to be spicy, sweet, and waxy, tasting just like it smells.

While torch ginger buds are the newcomers to the global pantry, other members of the ginger family are more famous culinary stars. Green cardamom (Elettaria cardamomum), black cardamom (Amomum subulatum), turmeric (Curcuma longa [syn.: C. domestica]), Japanese myoga (Zingiber mioga), the galangals (Alpinia galanga, A. officinarum, Kaempferia galanga, Boesenbergia rotunda [syn.: B. pandurata]), and commonplace household root ginger (Zingiber officinale) are also used in cooking.

Following are two recipes, including the herbal rice we had for lunch, using torch ginger buds, with reasonable substitutions if you are unable to obtain some of the rarer Southeast Asian ingredients. While you will not get authentic flavor if too many of the components are replaced, you will still be able to appreciate the subtle complexity of the ginger flowers and the pretty color they add to dishes.

Most, if not all of the ingredients in the following recipes can be found in an Asian market. While the recipes appear complicated, they mainly call for chopping and mixing ingredients. The extra flavor imparted by the kerisik (toasted, ground coconut) is unique and well worth the extra few minutes it takes to make.

<table>
<thead>
<tr>
<th>Nasi Ulam (Malaysian Herbal Rice)</th>
<th>Nasi Ulam (with substitutions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 cups cooked jasmine rice from 2 cups (14 ounces or 400 grams) raw rice</td>
<td>6 cups cooked jasmine rice from 2 cups (14 ounces or 400 grams) raw rice</td>
</tr>
<tr>
<td>3 TBS kerisik *</td>
<td>3 TBS kerisik*</td>
</tr>
<tr>
<td>6 shallots, thinly sliced</td>
<td>6 shallots, thinly sliced</td>
</tr>
<tr>
<td>1/2-inch piece of turmeric, peeled and finely chopped</td>
<td>1 tsp dried turmeric</td>
</tr>
<tr>
<td>2 tsp finely chopped galangal</td>
<td>2 TBS finely chopped ginger</td>
</tr>
<tr>
<td>1 stalk lemongrass, finely chopped **</td>
<td>2 TBS finely chopped lemon or lime zest</td>
</tr>
<tr>
<td>6 kaffir lime leaves, midrib removed, finely chopped, about 2 tsp</td>
<td>6 kaffir lime leaves, midrib removed, finely chopped, about 2 tsp***</td>
</tr>
<tr>
<td>1/2 torch ginger bud, finely chopped, about 1 TBS***</td>
<td>1 TBS sugar</td>
</tr>
<tr>
<td>10 spearmint leaves</td>
<td>1 tsp salt</td>
</tr>
<tr>
<td>8 sweet basil or Thai basil leaves</td>
<td>1 TBS lemon or lime juice</td>
</tr>
<tr>
<td>10 laksa leaves, finely chopped ++</td>
<td>8 sweet basil or Thai basil leaves</td>
</tr>
<tr>
<td>1 TBS sugar</td>
<td>1 tsp salt</td>
</tr>
<tr>
<td>3/4 tsp salt</td>
<td>1 TBS lemon or lime juice</td>
</tr>
<tr>
<td>1 TBS lemon or lime juice</td>
<td>1 TBS sugar</td>
</tr>
</tbody>
</table>

*To make kerisik, place unsweetened, shredded coconut into a dry wok or skillet. Toast on medium-high heat, stirring often, until coconut turns a rich brown color. Transfer to a blender or food processor and blend until it is the consistency of sawdust. Leftovers can be stored in an airtight container in the freezer.

**To use lemongrass, remove the outer leaves until you have just the tender inner portion. Chop the bottom 3-4 inches (7.5-10 centimeters).

*** Chop only the tips of the torch ginger bud, until you reach the immature inflorescences.

++Laksa leaf = Polygonum odoratum (syn.: Persicaria odorata), also known as Vietnamese coriander/mint; daun kesom, daun laksa (Indonesia, Malaysia, Singapore); phak pheo (Laos); phak phai, phrik maa, chan chom, hom chan (Thailand); rau ram (Vietnam).

Chop herbs. Mix all ingredients together well. Serve at room temperature with other dishes that will not overpower the delicate flavor and aroma, such as the following salad.
Thai Green Mango Salad

2 green mangoes, peeled and cut into matchsticks (substitute 2 zucchinis and add an extra 2 TBS lemon or lime juice)
4 shallots, thinly sliced
3 cloves garlic, finely chopped
1/2 torch ginger bud, finely chopped, about 1 TBS*
6 kaffir lime leaves, midrib removed, chopped, about 2 tsp, OR 1 TBS finely chopped lemon or lime zest
1 stalk lemongrass, finely chopped**
2 bird chilis, finely chopped (substitute other chili peppers, such as one jalapeno)
3 TBS roasted peanuts, finely chopped
2 TBS sugar
2 TBS soy sauce or fish sauce
1 TBS lime or lemon juice
1/2 tsp salt

*Chop only the tips of the torch ginger bud, until you reach the immature inflorescences.

** To use lemongrass, remove the outer leaves until you have just the tender inner portion. Chop the bottom 3-4 inches/7.5-10 centimeters.

Combine all ingredients. Mix well.

Ingredients for mango salad, left to right: chili pepper, lemon grass, kaffir lime leaves, torch ginger bud, mango
Ginger rhizomes, left to right: *Alpinia galanga* (greater galanga), *Curcuma longa* (turmeric), *Zingiber officinale* (edible ginger)
Mango salad (left) and *nasi ulam* (right). Photos: Alina Niemi.
Enhancement of propagation efficiency in exotic varieties of Heliconia

Reshmi C.R. and Sheela V.L., Department of Pomology and Floriculture, College of Agriculture, Vellayani, Trivandrum, Kerala, India. PIN-695 522

reshmiharimalu@yahoo.co.in

ABSTRACT

Studies were conducted to standardize rapid propagation techniques in Heliconia under in vitro and in vivo conditions. Three Heliconia varieties belonging to three distinct groups, viz., H. psittacorum ‘St. Vincent Red’ (small erect type), ‘Golden Torch Adrian’ (hybrid: H.psittacorum x H. spathocircinata) and H. chartacea ‘Sexy Pink’ (large pendent type) were selected for the study. For in vitro culture establishment of all the three varieties, Murashige and Skoog (MS) medium supplemented with BA 5.00 mg l⁻¹ was found to be the best. MS medium supplemented with BA 2.00 mg l⁻¹ resulted in the highest shoot proliferation in the variety ‘St. Vincent Red’. In ‘Golden Torch Adrian’, BA 2.00 mg l⁻¹ + NAA 0.20 mg l⁻¹ gave better results. In the variety ‘Sexy Pink’, Kinetin 5.00 mg l⁻¹ + NAA 0.20 mg l⁻¹ was the best. Full MS medium was found to be the best for in vitro rooting of the variety ‘Sexy Pink’. Addition of NAA 0.50 mg l⁻¹ to the MS medium gave better results for in vitro rooting in ‘Golden Torch Adrian’ and ‘Sexy Pink’. The field experiment was conducted twice. The first one was laid out in split plot design with the three varieties, two modes of application (rhizome dip and foliar spray) and six levels of growth regulators (BA and GA₃ each at 500, 750 and 1000 mg l⁻¹). Based on the results, a second experiment was laid out in randomized block design with BA (700, 850 and 1000 mg l⁻¹) and GA₃ (500, 650 and 800 mg l⁻¹) applied as foliar spray. The interaction effect of varieties and growth regulators revealed that the highest number of suckers (4.75) in the variety ‘St. Vincent Red’ was produced by BA 700 mg l⁻¹ whereas ‘Golden Torch Adrian’ (4.88) and ‘Sexy Pink’ (3.75) recorded the highest with BA 850 mg l⁻¹.

Acknowledgements

The authors thank Heliconia Society International for providing Research Grant and Jawaharlal Nehru Memorial Fund, Teen Murti House, New Delhi for providing fellowship for doctoral studies.

The 5th International Symposium on the Family Zingiberaceae

Ray Baker, Lyon Arboretum, University of Hawai‘i, 3860 Mānoa Road, Honolulu HI 96822

raymondb@hawaii.edu

Most photos: Joyce and Ray Baker

The 5th International Symposium on the Family Zingiberaceae was held 6-9 July 2009 at the Xishuangbanna Tropical Botanical Garden (XTBG) co-sponsored by the Chinese Academy of Sciences. About 130 participants attended the conference, with many of them staying in the garden’s accommodations. Earlier this year XTBG celebrated its 50th anniversary in Menglung Township, Mengla County of Yunnan Province. Our thanks go out to the director, Prof. Dr. Jin Chen, Dr. Qing-Jun Li and the organizing committee, and Dr. W. John Kress and the academic committee for putting together a wonderful four days.
Days 1, 2, and 4 were taken up with lectures on systematics and classification, evolution, genomics, regional floras, information sources on websites, horticulture, phytochemistry, ethnobotany, morphology, cytology, physiology, and ecology. In other words, it had something for everyone.

On day 3 we spent half the day touring the garden, especially the ginger collection, and the other half traveling several hours to walk in the forest canopy in the Bubang Nature Reserve.

On the first evening we were treated to a show of ethnic music and dance performed very professionally by the staff of XTBG—the tour guides, drivers, etc. Talk about multi-talented!

Some people think these conferences are all work, work, work. (At least, that’s what we tell our wives.) Here (from the front of the line) are John Kress, Mike Bordelon, Tom Wood, and Qing-Jun Li getting into the act.
The next International Ginger Symposium will be held in 2012 in Calicut, India.

Left: The backyard of the Museum of Ethnic Culture and Rainforest Ecology at XTBG. The statues (or relief) present the relationships between the ethnic religions and plant usage.

Right: A Dai ethnic style pavilion in the flower garden of XTBG.

Group photo of most of the participants at the 5th International Symposium on the Family Zingiberaceae. Photo: Qi-Wu Duan.