

# Global gathering of experts discuss ginger

► Commonly used plant has wide range of uses and economic value

By CHEN LIANG AND GUO ANFEI

**XISHUANGBANNA, Yunnan province:** Renowned botanists have traveled from across the world to the Xishuangbanna Tropical Botanical Garden (XTBG) to take part in a symposium from July 6 to 9 on a surprisingly useful plant – ginger.

More than 130 biologists and botanists from 14 countries and regions are attending the Fifth International Symposium on Zingiberaceae, more commonly known as ginger.

The symposium not only discussed the latest findings and research about ginger, but also contributed to conservation of biodiversity, said Dr Chen Jin, director of the botanical garden.

He noted that the garden's

collection has more than 200 species of ginger, which provide a unique opportunity for its own scientists to conduct research in collaboration with international partners.

"Indeed, we know that all plants in the family of ginger have economic value – they can be used as food additives, condiments and medicines – and are useful to our lives, but require special habitats to survive," he said.

"But overwhelming environmental degradation has put these plants at high risk and effective conservation action will require long-term commitment from a wide range of stakeholders, not only scientists, but also policy makers, concerned citizens and the general public.

"I am delighted that colleagues throughout the world have come

to share their scientific and conservation works about the family of ginger. I hope that all of us will work together to provide strategies for their sustainable use and effective conservation."

According to Tang Jiahua, vice-governor of Xishuangbanna Dai autonomous prefecture, Xishuangbanna is one of the major centers for ginger species and a place with richest biological diversity in China.

At present, 17 genera and more than 110 species of gingers have been recorded in the region. Its 12 local ethnic minority groups have a long history of recognizing and using the ginger plant.

Besides ginger species commonly used as condiments and medicines, the cultivation of *sha ren* – or *Amonum villosum* fruit – popularized and widely planted in Xishuangbanna since the 1970s has become an important source of income for the people who live in its mountainous areas.

XTBG has placed great importance to the collection and study of ginger plants since the 1960s.

"I believe that the symposium will provide a good platform for all of us to communicate with each other and promote study, utilization and conservation of ginger plants," said the official.

The four-day symposium includes presentations and group discussions covering such diverse fields as taxonomy and systems, molecular studies and phylogeny, phytochemistry and pharmacognosy, biodiversity and conservation, horticulture and hybridization and all aspects of ginger biology. Participants presented 95 abstracts of their work.

In addition to Dr Chen, the academic committee was composed of such leading biologists as Dr W John Kress from the Smithsonian Institution in the US, Dr Mark Newman from the Royal Botanic Garden in the UK, Dr Day Baker from Harold L Lyon



The Fifth International Symposium on Zingiberaceae – commonly known as ginger – has been underway at the Xishuangbanna Tropical Botanical Garden from July 6-9.

Arboretum in the US, professor Wu Telin from the South China Botanical Garden, Dr Jana Skornickova from the Singapore Botanical Garden, professor Mamiyil Sabu from the Uni-

versity of Calicut in India and Dr Piyakaset Suksathan from Queen Sirikit Botanic Garden in Thailand.

Participants in the symposium came from as far afield as

Bangladesh, China, the Czech Republic, India, Indonesia, Japan, Laos, Malaysia, New Guinea, Singapore, Thailand, the United Kingdom, the United States and Vietnam.

## Xishuangbanna garden: Daunting path to paradise

By YANG CHENG AND LI YINGQING

Today Xishuangbanna Tropical Botanical Garden (XTBG) is one of the world's renowned tropical gardens, but 50 years ago when it was founded in southwestern China's Yunnan province its pioneers faced deadly and daunting challenges from both nature and man.

Dr Chen Jin, director of the stunning 900-hectare nature preserve, recalled the sacrifice made by a group of hardy scientist and students.

"Fifty years ago, famous and respected Chinese botanist and professor Cai Xitao headed up a group of hot-blooded youngsters into this peninsula-shaped area covered by dense tropical forest," he said. "They had to cross the Luosuo River by canoe."

### Eight-person group

In May 1958, Cai led an eight-person group to Xiaojie, Damenglong, 46 km from Jinghong, capital of the Xishuangbanna Dai autonomous prefecture, and began pioneering work to create the XTBG.

According to Chen, Xiaojie near China's border with Myanmar and Laos was vulnerable to remnants of the Kuomintang army that had taken refuge in neighboring countries.

After in-depth surveys of the land, Cai submitted a report asking to move the site to an area nestled inside sharp bends in the Luosuo River. It was approved and became home to today's facility in Menglung township of Mengla county.

"It was an inhospitable piece of land with a Dai ethnic village of only six households on the riverside – which was also known as a leper's area for taking in a woman suffering from the disease of leprosy," Chen said.

It was also home to leaches, swarms of noxious insects and potentially dangerous animals.

The pioneers of the garden set some bold targets – to comprehensively research plant



Dr Chen Jin, garden director

ecology and cultivation, then develop tropical plant science and a botanical garden.

"They worked six and a half days each week, six days building the garden and a half day growing grain," he said.

"The rainy seasons and incredibly hot sun in dry seasons were unbearable," Chen



The boat-sized King Lotus

said. "Torrential rains and storms often devastated the grass cottages. Floods from the Luosuo River sometimes washed away houses."

The first group of pioneers not only contributed their youth and sweat but even their lives.

Deng Jian, Bao Jilong, Li Wenxin and Zhou San all died while helping start the garden.

By 1963, houses, laboratories and offices had been built along with a nursery for specimens. More than 1,000 species from home and abroad were planted and cultivated.

The garden made advances in the introduction and domestication of oil-bearing fruit, propagation of the medicinal plant *Rauwolfia* useful in treating high blood pressure and culti-

vation of high-yielding banana and cassava.

Prestigious researchers Yu Dejun, Chen Fenghui and Sheng Chengui all lauded the efforts at the first conference on botanical gardens of the Chinese Academy of Sciences (CAS).

In 1965, administrators vowed to build the operation into a world-class botanical garden, but some 30 experts including Cai were persecuted between 1965 and 1971 during early years of the cultural revolution and development of the garden was crippled, Chen said.

Following his release, Cai again led efforts beginning in 1972 to develop the garden, with 1,000 plant species rescued and more than 2,000 new species planted.

By 1978 new offices, plantations and national, provincial-level research all took root, but the garden's development continued to be challenging. Cai died in 1981, floods hit in 1984 and 1985, and an earthquake shattered the area in 1988.

Yet administrators and experts continued to blaze new trails, with enterprises in tourism, pharmaceuticals and science established in the 1980s, when a total of 10 million yuan was spent on renovation.

In 1997, the garden's annual income hit 10 million yuan, which supported its further development, stabilized its staff and increased scientific research, Chen said.

Its number of plant species collected has gradually increased to more than 4,000 and it has sponsored a range of



Part of the palm tree sector at the botanical garden

nationally recognized research. Its tropical plant germplasm bank was begun as scientific facilities were improved. In 1997, it was combined the Kunming Institute of Ecology.

### On a fast track

In 1998, XTBG became a pilot project in the CAS Knowledge Innovation Program and has since made further advances in scientific research, species conservation, collections and education.

The garden now has 20 research groups. Among the 1,000 academic papers they have released, 248 have been published in international peer-reviewed journals and 30 books based on their research have been published.

Its herbarium now has more than 100,000 specimens, mainly vascular plants from tropical and subtropical areas, with photos of all identified plants on the XTBG website.

A 20-hectare tropical rainforest dynamics plot has been started in conjunction with the Xishuangbanna National Nature Reserve Administration Bureau.

The garden's number of plant species has increased to 12,000, now one of the richest preserves of outdoor plants in the world.

"The garden's overall layout and scenery have also been improved to meet the province's goal of enhancing tourism," Chen said.

Some 600,000 people visit the garden every year. Its tropical botanical museum now hosts about 300,000 visitors annually.

The garden also creates 500 job opportunities for local youth and generates other income to the local economy.

Some 34 species have been identified for economic use, with

14 now in pilot experiments and 12 under development. Various species have been commercialized and produced across a total of 4,000 hectares.

Research into energy derived from the physic nut tree shows particular promise for China.

The garden also offers training and post-graduate studies for students from Southeast Asian nations.

It has been designated as a research and internship center for many of the nation's prestigious universities.

To Chen's delight, the garden's faculty continues to grow in depth and strength. In 1998, XTBG staff included only two PhDs and eight research groups. Today 46 members of its staff hold PhDs and the number of research groups has increased to 20.

XTBG is now itself accredited to award PhD degrees as well as serve as a workstation for postdoctoral research.

About 200 doctoral and master's degree candidates, 10 post-doctors and visiting scholars are now conducting research at the botanical garden.

Ten XTBG professors serve in international academic organizations or sit on the editorial boards of international peer-reviewed journals.

It also has six full-time foreign research fellows and 10 international students and postdoctoral researchers.

Chen said the garden "will become a world-class botanical garden and a thriving research center for plant biodiversity conservation and ecology."

To meet the goal, the garden has spent 70 million yuan to upgrade its research conditions and the plantation zones and opened a new 18,000 sq m research center.



Tropical Forest and Ethnic Culture Museum

## Flourishing array of botanical wonder

By LI YINGQING

Xishuangbanna Tropical Botanical Garden (XTBG), ringed on three sides by the Luosuo River, a branch of the Lancang – or Mekong River – was founded by leading botanist Cai Xitao five decades ago and has since evolved into a comprehensive research, popular science, tourism and conservation center.

As the nation's largest botanical garden, it covers 900 hectares and has nearly 12,000 species of plants, some of which have been introduced from other parts of the world.

Since its founding, XTBG scientists have completed some 900 research projects, 3,000 academic papers and published

more than 30 books.

It has been selected as national-level scientific education center, a national AAAA tourism scenic area and a national cultural tourism model.

The garden has a range of facilities including hotels, meeting rooms, academic halls, swimming pools, telecommunications networks and tourist markets.

Hundreds of thousands of tourists visit the garden every year, and it also attracts many domestic and foreign state leaders and scholars.

Xishuangbanna has 44 of the 100 species of fig trees that grow across China, with 1.3 hectares devoted to their cultivation.

It is also home to an "ethnic forest culture garden" that covers more than 3.3 hectares with a museum at its center. Zones in the sub-garden include those

for ethnic medicines, edible plants, religious plants and plants famed in literature or other forms of culture.

In the prevailing Dai culture in that area of Yunnan, young couples often express love at native mulberry trees while singing songs.

XTBG's palm tree garden has the richest species of palms in the nation. Begun in 1976 and covering 93.3 hectares, it has 458 palm species and is now a top research center and seed bank for the family.

With bridges, islands, wetlands, it is renowned among both researchers and visitors.

Another attraction is an exotic plant garden begun in 1999 when Kunming hosted the World Horticultural Exposition that covers almost

a hectare with 243 species of valuable exotic plants.

**Remarkable plants**

The botanical garden also grows so-called miracle fruit only 2 cm long that turns from sweet from sour in just two hours after it is picked that is used as a treatment for diabetes.

Another natural marvel is the *Ficus Benjamina* Linn., a tree known as the "killer of tropical forest" for its parasitic life on other trees. Growing as tall as 20 m with a trunk 30-50 cm in diameter, it gradually closes the nutritional sources of host trees.

Yet another exotic bit of flora in the garden is the antiaristoxin – or breadfruit – tree, the most poisonous on earth. While its fruit is edible, its sap is deadly and used by some cultures to make poison darts.

## High praise for burgeoning growth

By YANG CHENG AND LI YINGQING

Xishuangbanna Tropical Botanical Garden (XTBG) now has a leading international role in the study of tropical biology that impresses W John Kress, a scientist with the National Museum of Natural History at the Smithsonian Institution in the US, one of the world's largest museums and research organizations.

"Especially with the Association for Tropical Biology and Conservation (ATBC), the largest professional society devoted to understanding and protecting the biodiversity of the topics in the world, the XTBG has played

a significant part and made great progress in cooperation of other such organizations," he noted.

Dr Chen Jin, Dr Cao Min and Dr Li Qingjun with the XTBG have made important contributions to the journal *Biotropica*, a premier research publication.

The garden hosted the 2006 ATBC annual meeting that attracted tropical biologists from around the world. Chen was also elected president of the Asian-Pacific chapter of the ATBC.

"These are all hardly trivial endeavors and reflect the impor-

tant role that XTBG is playing in the international scientific arena," the Smithsonian scientist said.

Kress, who has conducted research with XTBG since 1995 and has served the garden as a foreign consultancy expert since 2003 also lauded other developments.

"In the taxonomy of tropical plants, one of its recognized successes is the digitization of images of the entire herbarium at the garden, making these specimens accessible to researchers anywhere around the world," he said.



John W Kress

The garden's efforts in tropical forest ecology include noted projects on the evolutionary ecology of pollination and dispersal of gingers and figs.

XTBG recently established a new 20-hectare forest dynamics plot as part of the Center for Tropical Forest Science's world-wide consortium.

"I am equally impressed with the newly established program in forest genomics, headed up by Dr Chuck Cannon, which will take the gardens in new directions of understanding on the evolution of tropical forest communities," Kress stressed.

New efforts in development of biofuels through genetic engineering and breeding pro-

grams for the woody, oil-bearing *Jatropha* plant and oil palms as alternative fuel sources promise to be an important new source of innovation and funding for the garden.

XTBG has evolved from a garden in a changing forest to a horticultural showcase of tropical plants and a world leader in education, research and conservation of tropical plant species and habitats, Kress said.

"Through various programs in horticulture, science and outreach, especially during the last decade, XTBG has grown to be a recognized leader in China and the world in the field of tropical botany and ecology," the scientist pointed out.



Sunset at the garden