SOUTH CHINA BOTANICAL GARDEN, CHINESE ACADEMY OF SCIENCES 2016 ANNUAL REPORT

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CHINESE ACADEMY OF SCIENCES

ANNUAAL REPORT | 2016

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Headlines

➤ Feb. 23-26th, SCBG hosted the 2016 Sino-American Symposium on biosystematics.

➤ Apr. 17th, Zhang Yaping, Vice President of CAS visited SCBG.

Headlines

➤ Apr. 28th, we successfully held the first work meeting of DNNR co-constructed by CAS & MEP and signing ceremony of MOU on biological diversity observation.

➤ May 19th, Liu Weiping, Vice President of CAS visited SCBG.

➤ Sep. 19th, Wang Enge, Vice President of CAS attended the unveiling ceremony of the Molecular Laboratory of SCBG-UNMSM.

➤ Nov. 17th, Ding Zhongli, Vice President of CAS visited SCBG.

➤ Dec. 1st, SCBG held a kick-off meeting for qualified evaluation of Forestry degree authorization centers and internal audit expert commenting.

➤ Dec. 1-3rd, Ten Year International Evaluation meeting was held in Dinghushan MAB Biosphere Reserve.

"One-Three-Five" Strategic Planning

1.One clearly-defined development strategy

Based on Southern China, we are committed to plant conservation, scientific research and knowledge dissemination at national and international regions with the same latitude. SCBG will develop into a high level research institution in the fields of Botany, Ecology, conservation and sustainable utilization of plant resources, and will be developed into a world-class botanical garden in five years.

2.Three major R&D breakthroughs

1) The theory and technology of rapid vegetation construction on the tropical coral islands

2) Current pattern and changing trend of carbon pools in forest ecosystems in China

3) Large-scale application of fresh-keeping logistics technology for fruits and vegetables

3.Five top priorities

1) The compilation of Ex Situ Cultivated Flora of Chinese Botanical Gardens

2) The plant diversity evolutionary mechanism of the important family and genera at the south subtropical evergreen broad-leaved forest

3) Response and adaptation of subtropical monsoon evergreen broad-leaved forest ecosystem to global change

4) Exploration and industrialization of high value economic crops (Wolfberry, Dendrobium, Licorice, etc.)

5) Gene cloning for crop safety and quality and application of high efficiency transformation technologies

Director's Foreword

Dr. Ren Hai

Farewell to the year of 2016 and welcome the New Year of 2017! At this happy moment of ringing out the old year and ringing in the new, on behalf of South China Botanical Garden (SCBG), I would like to extend my heartfelt thanks and sincere respects to leaders, fellow colleagues, as well as alumni and friends who have given us longstanding support and care.

2016 marks a good start of the "13th 5-Year Plan" and the implementation of the "Take the Lead Plan". SCBG staff developed the plan and received good recognition of the planning reviews of the Chinese Academy of Sciences (CAS) and achieved rather good performance. At the same time, we carried out all undertakings centering on the goals outlined by the 13th 5-Year Plan and made outstanding results.

Research Achievements. In 2016, we totally published 284 SCI papers, including 175 Top 30% papers, accounting for 62% of the total. We won 2 First prizes of Guangdong Science and Technology in two consecutive years. One Gold prize was awarded by Guangdong Patents, and one Silver prize was from Chinese Popular Science Writers Association, the Award for outstanding works of science popularization, and Popular Science film, television animation category. Twenty-eight patents were authorized. Eighteen monographs were published. Twelve new plant varieties were cultivated. The total funds for all annual new research projects and contracts reached 163.67 million Yuan, including one project of National Key R&D Plan, one project of CAS Strategic Priority Research Programme (A –type) and one key project of Natural Science Foundation of China (NSFC). Full funds in place reached 167.48 million Yuan. Guangdong Provincial Key Laboratory of Applied Botany (under preparation) was scored excellence in the evaluation of the provincial key laboratories, and Dinghushan Station was scored excellence in 3 consecutive years in the evaluation of field station of the CAS. One of three major R&D breakthroughs, the demonstration zone of the project "Vegetation Construction of Tropical Coral Island" was highly recognized by users.

Talents. A total of 26 talents of various types were introduced into SCBG in this year, including 3 persons from "Self-funded Hundred Talent Program", twelve young talents were sent to high level institutions abroad for further study. One person was selected as the leading scientist of National "Ten Thousand Talent Program". Four persons were selected as specially-hired researchers of "CAS Distinguished Research Fellow Program". Three persons were selected as excellent talents of Guangdong Special Supporting Program. One person was awarded the outstanding member of CAS Youth Innovation Promotion Association. There are 384 postgraduates (154 Ph.D. students and 230 master students). Twenty-four postdoctoral researchers entered the Postdoctoral Station, and 6 postdoctoral researchers leaved the station. Eighteen graduates received President's Excellence Prize, Zhuli Yuehua Excellence Prize etc.

Plants Conservation and Science Popularization. In 2016, we introduced 970 living plant accessions, in which 475 accessions were known from wild sources. The construction of Liana Garden was initiated and great progress

was made. We received 1.91 million visitors in SCBG and Dinghushan National Nature Reserve (DNNR). We were actively involved in large-scale science experience activities organized by the CAS and governments at different levels. We hosted science experience events "the 12th Public Science Day & 2016 Science &Technology Week of CAS" and organized "2016 Guangzhou National Science Day Ceremony" and the Large-scale Science Carnival. We also organized 454 times special science popularization activities and field explorations of environmental education.

Reform of HR System. We finished the reformation of the management departments with total 13 middle-level leadership appointed. The staff performance appraisal between 2011-2015 for research groups, research/management, supporting departments were completed and awards were given to some outstanding workers. The regulation of professional title evaluation was further improved and the professional title evaluation was organized.

Cooperation & Exchanges. We successfully held the first work meeting of DNNR co-construction by the CAS & the Ministry of Environmental Protection (MEP) and signed ceremony of cooperation agreement on biological diversity observation. We hosted the 2016 Sino-American Symposium on biosystematics. The Vice President of CAS, Mr. Wang Enge inaugurated China-Peru Joint Laboratory of Systematic Biology. Investigations, collections, and systematic researches were conducted on the biodiversity resources of Peru and the Andes Mountains. Total 10 international experts were hired. A total of 21 international cooperation projects were increased. We gained great results in application and promotion| of technology achievements.

Party Building & Innovative Culture. There are 11 party branches and 445 party members of Communist Party of China (CPC) in SCBG. We have earnestly undertaken studies on the theoretical and practical issues of party building with actual effect. All party branches carried out all forms of activities in terms of "The Year of System Building & Implementation". We have comprehensively implemented the main responsibility and oversight responsibilities of the Party in a strict manner, and made sure "one post and two responsibilities". Three basic learning models according with the practice of R&D management were established, including the CPC basic learning model, the basic model of transmission and exchanges, the basic model of enhancement and improvement. We were awarded 23 honors and prizes by Guangdong Province, CAS, Guangzhou City, and Tianhe District.

Back in 2016, SCBG made gratifying progress in different aspects. However, we fully understand that we need to make further efforts to meet the requirement of the CAS! In 2017, SCBG will further consolidate the aims of subjects in accordance with the statement of "One-Three-Five" Strategic Planning in the period of the 13th Five-Year Plan and the goals set for Director's Term of Office, strengthen talents team building and capacity building, to make new breakthroughs in undertaking key research projects and "Three Major Outputs", to make outstanding contribution in plant conservation and environmental education.

The year of monkey has gone and the year of rooster heralds a long new journey. We will remain committing to our mission and forge ahead to build SCBG into one of the top level research institutes in botany, ecology, as well as conservation and sustainable utilization of plant resources, and one of the best botanical gardens in the world.

2016 has been carrying the rich fruits into history, and 2017 with full hopes is coming to us!

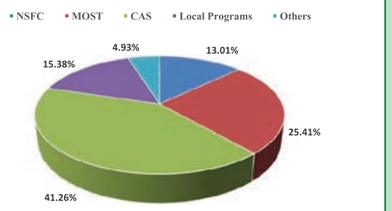
Dr. Ren Hai
The Director of SCBG

Contents

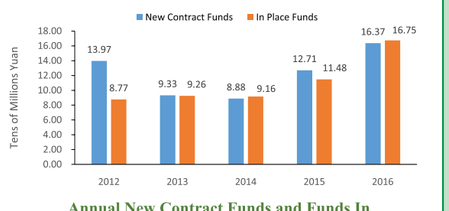
Research Achievements and Project Overview

In 2016, funds from newly contracted scientific projects reached 163.67 million Yuan. Funds in place reached 167.48 million Yuan. SCBG successfully got 47 key projects from the Ministry of Science and Technology, the NSFC and the CAS.

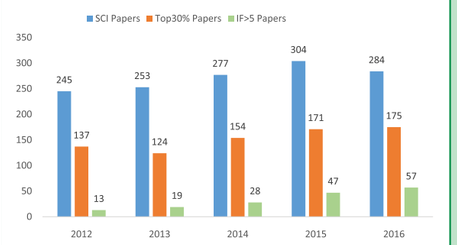
In 2016, according to incomplete statistics, SCBG published 284 SCI papers, of which 175 papers were listed as Top 30%, and 57 papers have the impact factors (IFs) over 5. Total 74 patent applications were submitted, in which 28 applications were granted. About 12 new cultivars were granted. Total 18 books were published. There are two projects awarded as the first prize of Science and Technology of Guangdong Province in two consecutive years. One project was granted Gold Medal of Guangdong Patent. One Silver Medal Award was granted by Chinese Science Writers Association.



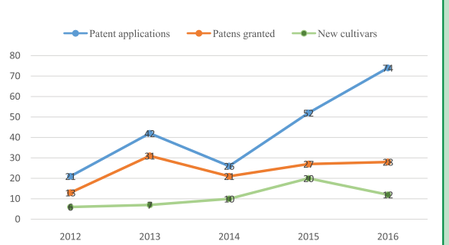
New Contract Funds In 2016



Annual New Contract Funds and Funds In Place in Recent Five Years



SCI Papers in Recent 5 Years



Patents, New Cultivars in Recent 5 Years

Highlighted Scientific Research Progress

1. The achievement of research and its industrialization of plant diversity in South China Sea islands won the first prize of Guangdong Provincial Science and Technology Awards

Island species are at high risk of extinction due to geographic isolation. However, island plants are very special in their spreading, distribution and ecological adaptation. They have played an important role in environmental protection and scientific utilization of islands. In order to scientifically utilize and conserve the island resources, we should know the present situation of those natural resources. Led by the Species Conservation Working Group of SCBG, collaborating with other 6 organizations, plant species and their distribution patterns in 238 islands were investigated. About 6200 plant species were recorded. The evaluation and utilization of some important economic plants were carried out.

The plant investigations were conducted in Sansha City, Hainan Island, Qizhou Island, Guangdong coastal islands, islands in Hongkong and Macao regions. All collected specimens were identified and materials were analyzed. It was the first time that 82 islands in Qizhou Island were systematically investigated. Total 14 new species were discovered, 700 species were newly recorded (104 in Xisha, 232 in Hainan, 106 in Hongkong, and 323 in Macao), 505 species were found endemic to Hainan. Limestone vegetation and plant communities were discovered for the first time in Hainan, and a new limestone vegetation classification system for Hainan has been proposed. It is found that the spread of birds and other animals plays a key role in the secondary succession of island vegetation in the South China Sea, and the effect of the spread of ocean currents is related to its direction. The study on the population, reproduction, and physiological ecology of *Bretschneidera sinensis* in Hainan revealed the causes of threatening and conservation measures were provided for the plants in Islands. In addition, the research on ethnobotany of Hainan showed that the knowledge of traditional medicinal culture was rich and well preserved by Run dialect and Qi dialect regions which are located in the central mountainous area of Hainan.

In the aspect of key technology innovation, this study made great breakthroughs in the evaluation and selection, cultivation, breeding, maintenance of ornamental plants, and the key technique slope repair as well as the vertical greening. A comprehensive evaluation system of suitable plants in islands and reefs was established. Forty-two new native plants were selected and promoted for application. The key techniques for efficient cultivation of Camellias and Magnolias were developed and the problem of long budding time and low germination rate was solved. The new varieties including “Yong Pink”, “Summer Glory”, and “Xia Men Yan Ping” were bred and promoted for application. The new rapid propagation technique of Gesneriaceae increased the supply of seedlings of understory shrubs and ground cover plants of islands. Four new plant maintenance technologies were invented, which improved the survival rate of transplanted trees, helped save water and reduced the construction quantity. This study also

Published monographs

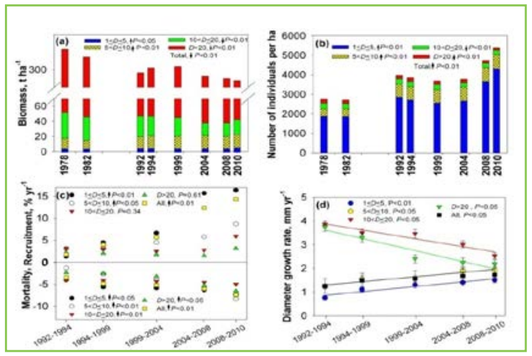
advanced the technology of vegetation restoration and vertical greening of islands and reefs. By employing the new technology of introducing native plants for greening the limestone slope, as well as increasing the greening thickness of the slope spray seeding, this study has effectively increased the greening effect of steep slope, thickened the vegetation, and improved the landscape effect. The installation of planting containers and irrigation/drainage devices overcame the difficulty of green wall maintenance, saved water resources by using recycling water. The above patents, new varieties and key technologies were employed in 12 nurseries of partner organizations for industrialized technology research and demonstration. About 42 million seedlings were produced with about 4.82 billion RMB were achieved in recent three years. Another 100 km^2 plantation area was extended and total 7.6 billion RMB earned.

Total 11 monographs and 126 research articles (23 were indexed in the SCI) were published. There were 16 authorized patents, and 4 new national authorized varieties. Nine doctoral and 12 master candidates were trained.

2. The achievement of "response mechanism to environmental changes of evergreen broad-leaved forest ecosystems stability and soil carbon sequestration" won the first prize of Guangdong Provincial Science and Technology Awards.

Evergreen broad-leaved forests are the zonal vegetation in tropical and subtropical regions of China, which constitutes an important landscape of this region and supports the ecological environment sustainability. In the context of global change, the stability of evergreen broad-leaved forest community structure and its succession direction in the future is a major ecological issue universally concerned by China or even the global. In 2006, the research result "The mature forest soil can sustainably accumulate organic carbon" points out the new way in the aspect of evergreen broad-leaved forest sequestrating carbon. However, the mechanism of soil carbon accumulation remains unclear. Understanding the stability of mature evergreen broad-leaved forests and the accumulation mechanism of soil organic carbon has an important ecological significance and extensive application value. Based on our previous researches on "The mature forest soil can sustainably accumulate organic carbon" and "The coupling research on carbon-nitrogen-water in tropical and subtropical forests"(the first prize of Guangdong Natural Science Awards in 2006 and the second prize of National Natural Science Awards in 2008, respectively), the change trend of evergreen broad-leaved forest community structures and its succession direction was found, and the soil organic carbon accumulation mechanism of zonal forest ecosystem was illustrated.

Professor Zhou Guoyi was invited to UN Climate Change Conference-Paris 2015.



Due to the mortality greater than the recruitment (c), the number of individuals increased (b) and community structure changed. Due to the decrease in the diameter at breast height (DBH) of larger trees and increase in the DBH of smaller trees (d), the average of trees and forest biomass decreased (a), resulting in forests dominated by a cohort of more and smaller individuals.

This research is jointly supported by the Guangdong Natural Science Foundation project "Forest ecosystem services in Guangdong and their contributions to global change", the Distinguished Young Scholars project of NSFC "Community and Ecosystems", the key program of NSFC "Processes for soil carbon accumulation and its key mechanism in subtropical forests". The key achievements of this research are as follows:

1）The succession direction and changing mechanism of zonal evergreen broad-leaved forests was discovered and clarified under global change for the first time. We found that the numbers of individuals and tree species have decreased since 1978, whereas the numbers of individuals and shrub species and small trees have increased over the same time period. The regional-scale drying induced by regional warming and changes in precipitation patterns is likely responsible for the biome's reorganization of evergreen broad-leaved forests. Our results suggest that the evergreen broad-leaved forests are changing toward a community dominated by short trees and shrubs.

2）Based on our previous results "The mature forest soil can sustainably accumulate organic carbon", we clarified the following mechanisms for soil carbon accumulation: (1) More carbon accumulated in soils rather than in biomass during forest succession, which is reflected by the evidence that more carbon allocated belowground in the form of dissolved organic carbon and fragments through the processes of litter decomposition and consequently contributed to soil carbon accumulation. The mechanism has never been noticed in the traditional theory of ecology. (2) Changes in regional warming and precipitation patterns resulted in decreases in the rate of soil organic carbon decomposition, which consequently increased the residence time of soil carbon. (3) The regional increasing nitrogen deposition decreased the rate of soil organic carbon decomposition in the mature forest and thus increased its residence time. The first mechanism showed the increases in soil carbon input, and the other two mechanisms provided the evidence showing the decreases in soil carbon decomposition.

Our achievements will promote the development of non-equilibrium theory of ecosystem ecology and provide valuable information on global change ecology. Our achievements will also offer a beneficial reference for regional ecological construction, especially in ecological forests, and help to better access the carbon accumulation ability of forests, increase the capacity of forest carbon accumulation, and accelerate economic development in the area. The principal investigator of this project (Professor Zhou Guoyi) was invited to UN Climate Change Conference–Paris 2015 by the National Development and Reform Commission.

Total 166 scientific articles were published, in which 98 papers were indexed in SCI and 42 papers were listed in Top10%. Ten representative articles were cited as many as 585 times, in which 440 times were cited in SCI and 145 times in CSCD. Other 20 main articles were cited 822 times, in which 606 times were cited in SCI and 216 times in CSCD.

3. Guangdong Provincial Patent Gold Medal Award: The application of polyhexamethylene guanidine hydrochloride on preventing and controlling citrus sour rot disease and its anti-staling agent

The patent, belonging to a basic type, found the inhibitory effect of polyhexamethylene guanidine (PHMG) on citrus sour rot pathogen Geotrichumcitri-aurantii and clarified its underlying mechanism for the first time, which effectively solved the key and common technical problems on sour rot control in citrus industry. The technology described by the patent is substantially different from the existing technologies, with novelty and creativity, and has advantages in safety, cost and environmental protection. The patent has been well implemented including patent license and technical services and the application was very effective. To protect the patent, one international patent and a series of other domestic patents were applied and authorized. The patent plays a role in promoting the progress of science and technology innovation, optimizing the industrial structure, ensuring food safety and protecting ecological environment, which is the encouraged and supported direction by nation.

4. "Track the Matchmakers of Plants" received Silver Medal in Television Animation Category Outstanding Works of Science Popularization Award of Chinese Science Writers Association

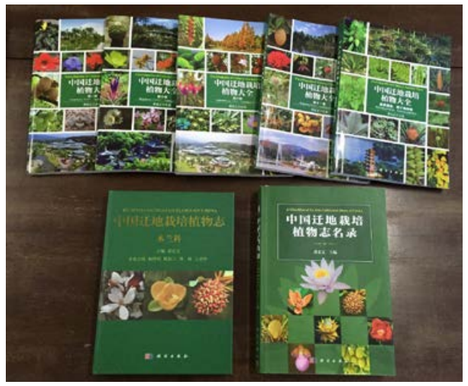
Pollination is the process that pollen is transferred from anther (male part) to stigma (female part) of the flower, thereby enabling fertilization and reproduction in plants. More commonly, the process of pollinating requires pollinators that carry or move the pollen grains from the anther to the receptive part of the carpel or pistil (stigma). Each plant species developed a unique floral strategy to attract its own pollinators.

A carpenter bee is visiting Alpinia flower.

"Track the Matchmakers of Plants" is a natural documentary film, which presents interesting stories happening between plants and their matchmakers. It takes more than one year in writing scripts, photographing and post production. We employ live action, time-lapse, high-speed, macro and micro photography techniques to display the vivid life of the subjects. A fantastic world about plant flowering, competition, mutualism and evolution brings visual enjoyment of beauty for the audience.

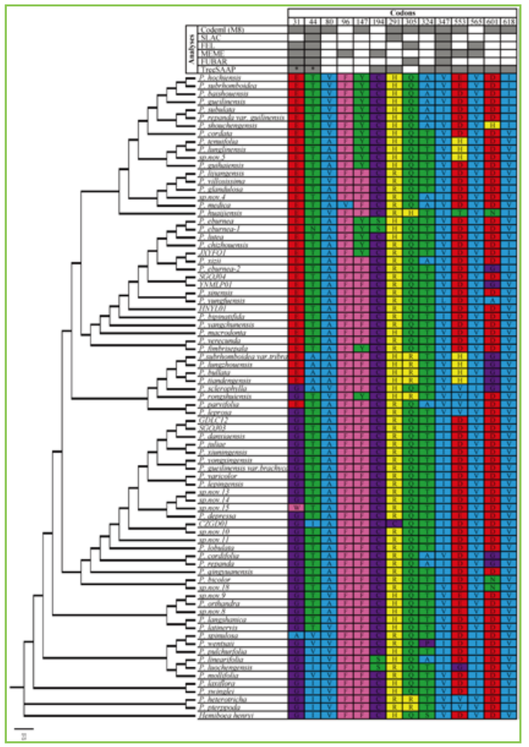
5. The compilation of *Ex Situ Cultivated Flora of China* has been made steady progress

The Living Collections of the Botanical Gardens not only support the central mission by serving key research, education, and conservation roles, but also in the entirety represent the scientific base and social responsibility. The Compilation of *Ex Situ Cultivated Flora of Botanical Gardens*, the National Science and Technology Infrastructure Program of China, has been officially launched in 2015. There are about 23 volumes initiated, such as Magnoliaceae, Myrsinaceae, Ericaceae, Orchidaceae, Acanthaceae, Lauraceae, Liliaceae, Theaceae, Gesneriaceae and so on. Steady progress has been made with some living collections based monographs published by Science Press: *A checklist of Ex Situ Cultivated Flora of China,* including 15,812 species in China; *Ex Situ Cultivated Flora of China,* volume Magnoliaceae; *Encyclopedia of Chinese Garden Flora*, volumes 1, 3, 6, 11 and 13. This project will take a common garden approach to contribute to the field observation of adaptively morphological traits, growth and development, phenology, cultivation and propagation, and disease and insect pests control of living plants, which is significant to provide complete, accurate and rich information for the further study of plant taxonomy and basic botany but also to improve the *ex situ* management, information records and data sharing of living collections, and to promote the effective conservation and utilization of plant resources.



6. Adaptive molecular evolution of the two-pore channel 1 gene *TPC1* in the karst-adapted genus *Primulina* (Gesneriaceae)

The genus *Primulina* has high species richness and exhibit specific soil-based habitat associations that are mainly distributed on calcareous karst soils. The adaptive molecular evolutionary mechanism of the genus to karst calcium-rich environments is still not well understood. Ca^{2+}-permeable channel *TPC1* sequences from 76 *Primulina* species were used in this study to test whether this gene is involved in the local adaptation of *Primulina* to karst high-calcium soil environments. The molecular evolutionary analyses showed that *TPC1* was dominated by purifying selection and the selective pressures were not significantly different among species lineages. However, significant signals of positive selection were detected at both *TPC1* codon level and amino acid level, and five sites under positive selective pressure were identified by at least three different methods. These results suggest that the Ca^{2+}-permeable channel *TPC1* may be involved in the local adaptation of *Primulina* to karst Ca^{2+}-rich environments. Different species lineages suffered similar selective pressure associated with calcium in karst environments, and episodic diversifying selection at a few sites may play a major role in the molecular evolution of *Primulina TPC1*.



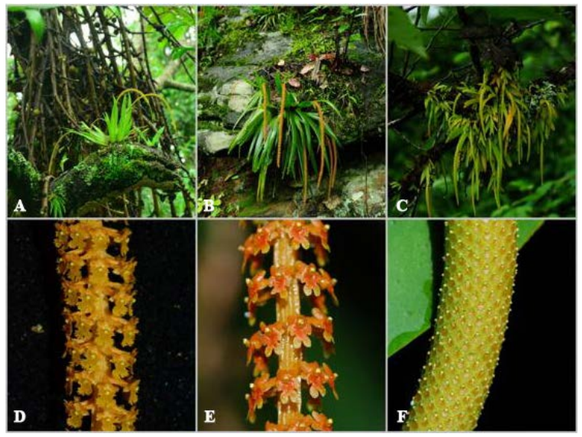
Amino acids in the same evolutionary positions showing strong selection signatures at the nucleic acid and amino acid levels.

7. Progress on the DNA barcoding study of *Oberonia* Lindl. (Orchidaceae) in China

The orchid genus *Oberonia* Lindl., is a taxonomically complex genus characterized by recent species radiations and many closely related species. It comprises about 150-200 species centered in tropical Asia and extending to tropical Africa, NE Australia and the Pacific islands. There are 44 species and 2 varieties distributed in China. All *Oberonia* species are under conservation as listed in the CITES and the IUCN Red List Categories and Criteria. Habitat loss and illegal collection in this region poses a great threat to species survival, particularly in the case of narrow endemic *Oberonia* species that confined to one location in Yunnan Province (Cardinale *et al*., 2012). Rapidly and correctly identifying *Oberonia* species in China could promote the monitoring of endangered taxa. Given its difficulties in taxonomy and conservation status, *Oberonia* is an excellent model for developing DNA barcodes.

Three analytical methods and five DNA barcoding regions (*rbcL*, *matK*, *trnH-psbA*, ITS and ITS2) were evaluated on 127 individuals representing 40 species and 1 variety of *Oberonia* from China. All the three plastid candidates

tested (*rbcL*, *matK* and *trnH-psbA*) have a lower discriminatory power than the nuclear regions (ITS and ITS2), and ITS had the highest resolution rate (82.14%). Two to four combinations of these gene sets were not better than the ITS alone, but when considering modes of inheritance, *rbcL*+ITS and *matK*+ITS were the best barcodes for identifying *Oberonia* species. Furthermore, the present barcoding system has many new insights in the current *Oberonia* taxonomy, such as correcting species identification, resolving taxonomic uncertainties, and the underlying presence of new or cryptic species in a genus with a complex speciation history.



Plants of Oberonia （Orchidaceae）from China
A,D. Oberonia kanburiensis;
B,E. Oberonia acaulis;
C,F. Oberonia pachyrachis.

This study entitled “DNA Barcoding Evaluation and its Taxonomic Implications in the Recently Evolved Genus *Oberonia* Lindl. (Orchidaceae) in China” was published in the *Frontiers in Plant Science* (2016, 7, 1791) by Prof. Xing Fuwu from the Plant Species Diversity and Conservation Group. It was financially supported by the NSFC (Grantno.31370231).

8. Phylogenetic relationships, character evolution and biogeographic diversification of *Pogostemon* s.l. (Lamiaceae)

Pogostemon (Lamiaceae; Lamioideae) sensu lato is a large genus consisting of about 80 species with a disjunct African/Asian distribution. The infrageneric taxonomy of the genus has historically been troublesome due to morphological variability and putative convergent evolution within the genus. Notably, some species of *Pogostemon* are obligately aquatic, perhaps the only Lamiaceae taxa which exhibit this trait. Phylogenetic analyses using the nuclear ribosomal internal transcribed spacer (ITS) and five plastid regions (*matK*, *rbcL*, *rps16*, *trnH-psbA*, *trnL-F*), confirmed the monophyly of *Pogostemon* and its sister relationship with the genus *Anisomeles*. *Pogostemon* was resolved into two major clades, and none of the three morphologically defined subgenera of *Pogostemon* was supported as monophyletic. Inflorescence type (spikes with more than two lateral branches vs. a single terminal spike, or rarely with two lateral branches) is phylogenetically informative and consistent with the two main clades we recovered. Accordingly, a new infrageneric classification of *Pogostemon* consisting of two subgenera is proposed. Molecular dating and biogeographic diversification analyses suggest that *Pogostemon* split from its sister genus in southern and southeast Asia in the early Miocene. The early strengthening of the Asia monsoon system that was triggered by the uplifting of the Qinghai-Tibetan Plateau may have played an important role in the subsequent diversification of the genus. In addition, our results suggest that transoceanic long-distance dispersal of *Pogostemon* from Asia to Africa occurred at least twice, once in the late Miocene and again during the late-Miocene/early-Pliocene.

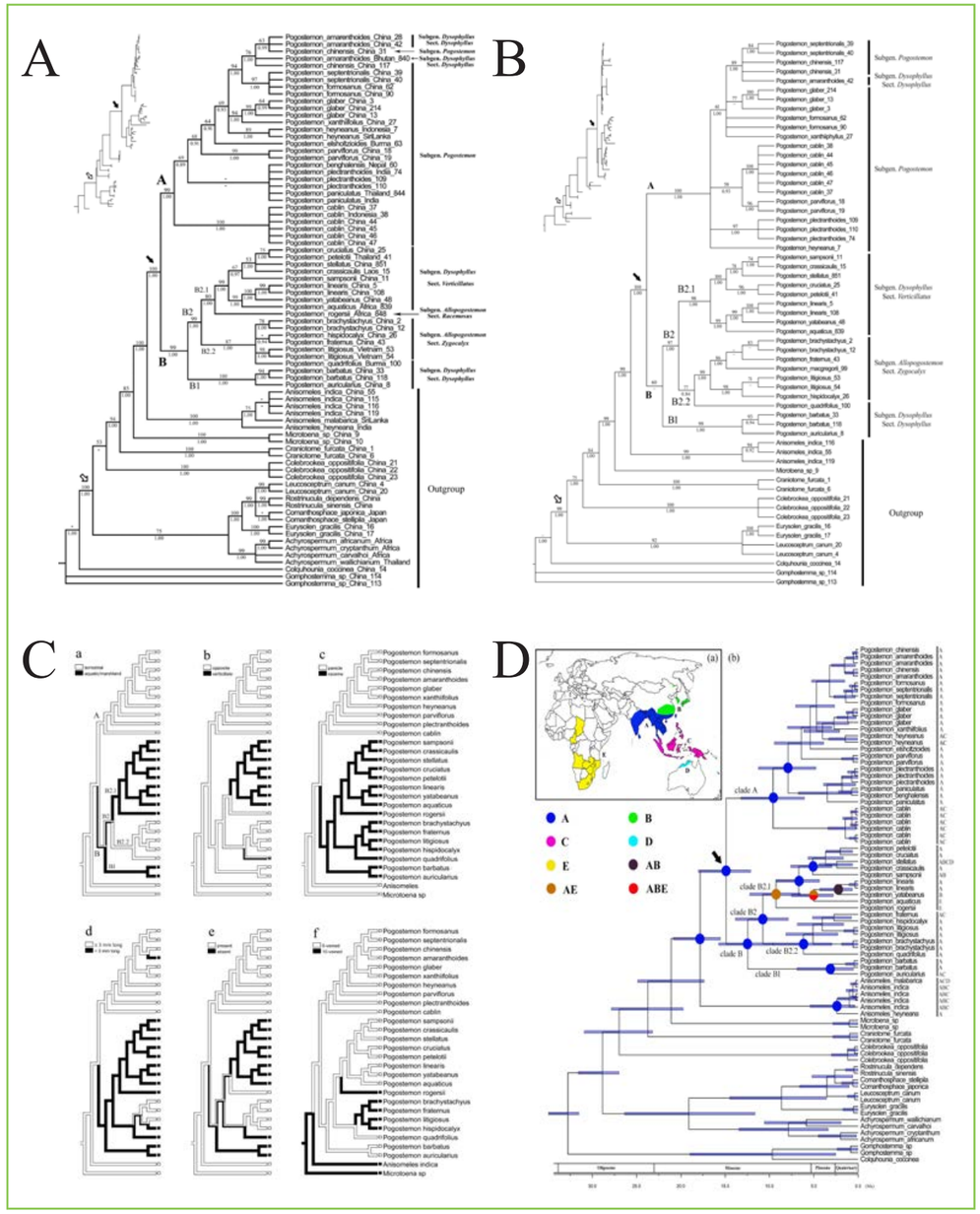
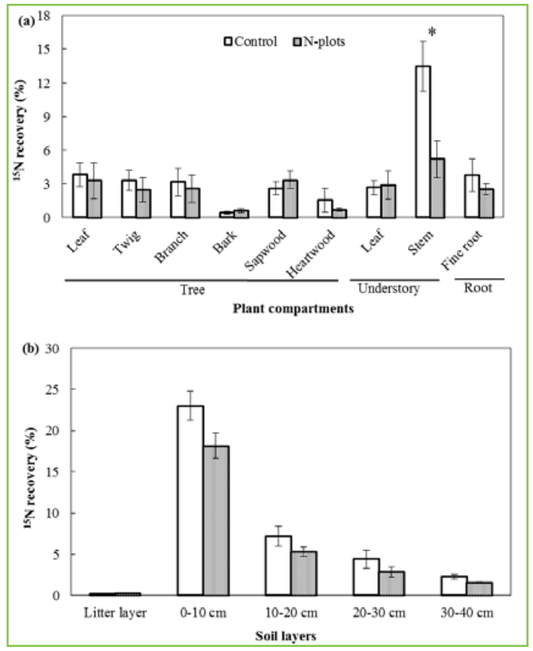


Fig. A. Bayesian consensus tree from combined cpDNA dataset (*matK, rbcL, rps16, trnH-psbA, trnL-F*).
Fig. B. Bayesian consensus tree from the nrITS dataset.
Fig. C. Selected traits optimized onto a subtree of Fig. 3 for Pogostemon, Anisomeles, and Microtoena. (a) habitat, (b) phyllotaxy, (c) inflorescence type (1: spikes with more than two lateral branches; 2: a single terminal spike, or rarely with two lateral branches), (d) calyx size, (e) secondary calyx veins, (f) number of calyx veins.
Fig. D. Ancestral distribution of the Pogostemon species.

9. Nitrogen-saturated mature tropical forest ecosystem is still an unignorable nitrogen sink.

It is well documented that "N saturated" ecosystem is open and has little ability to retain deposited N, particularly in tropical/subtropical forests. However, our knowledge on the fates of deposited N in tropical forest ecosystems and its retention mechanisms is limited. To explore this question, Dr. Geshere Abdisa Gurmesa and Dr. Lu Xiankai and their colleagues, from the Ecosystem Management Group (PI: Dr. Mo Jiangming), expanded the first whole ecosystem ^{15}N labeling experiment performed in a N-rich old-growth tropical forest in southern China. They found that total tracer recovery in plant and soil (N retention) in the control plots was 72% and similar to those observed in temperate forests. The retention decreased to 52% in the N-plots. Soil was the dominant sink, retaining 37% and 28% of the labeled N input in the control and N-plots, respectively. Leaching below 20 cm was 50 kg N ha-1 yr-1 in the control plots and was close to the N input (51 kg N ha-1 yr-1), indicating N saturation of the top soil. In addition, N addition increased N leaching to 73 kg N ha-1 yr-1. However, of these only 7 and 23 kg N ha-1 yr-1 in the control and N-plots, respectively, originated from the labeled N input. These findings indicate that deposited N, like in temperate forests, is largely incorporated into plant and soil pools in the short term, although the forest is N-saturated, but high cycling rates may later release the N for leaching and/or gaseous loss. Thus, N cycling rates rather than short-term N retention represents the main difference between temperate forests and the studied tropical forest. Related research results have been published in *Global Change Biology* (2016, 32, 3608−3620).

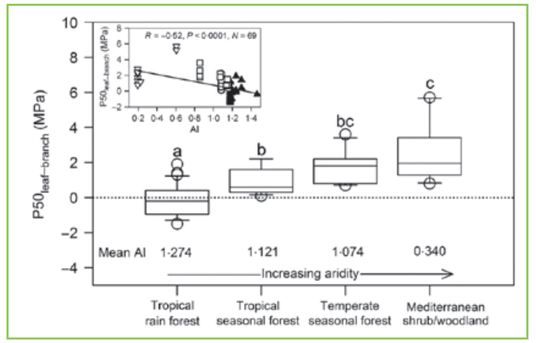


Percent ^{15}N recoveries in (a) plant pools grouped as tree, understory plant and roots, and (b) litter layer and mineral soil pools. Error bars indicate SE among plots (n = 3). In (a) significant effects of N addition on percent ^{15}N recovery was observed only for understory plants, and it is indicated by (*) sign.

10. New progress was made on the vulnerability segmentation hypothesis

Vulnerability segmentation hypothesis proposes that plant branches are more resistant to cavitation than their terminal leaves, namely, the difference in vulnerability to cavitation between branches and their terminal leaves is positive ($P50_{leaf–branch}>0$). This allows leaves to act as "safety valves" to protect hydraulic pathway from dysfunction. However, recent studies showed that several species from humid regions have negative values of $P50_{leaf–branch}$, indicating a lack of vulnerability segmentation in these species (LVS species). LVS species may take compensatory hydraulic strategies to maintain safety margins during drought periods.

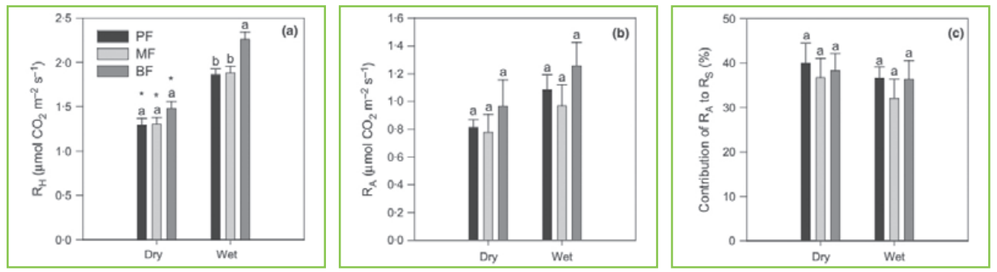
Dr. Zhu Shidan and Dr. Liu Hui from the Plant Water Relation Group (PI: Dr. Ye Qing), compiled branch and leaf hydraulic trait data of 69 broadleaved woody species belonging to different biomes with contrasting climatic conditions as indicated by variable aridity index (AI), and found that $P50_{leaf–branch}$ became small and even negative with the increase of AI. Although leaves of LVS species may lose their function as "safety valves", their deep rooting, great hydraulic conductivity, and/or high stem capacitance features are critical for them to maintain hydraulic safety. The results indicate that vulnerability segmentation is evidently common for species from arid regions, but not necessarily the case for some species from humid regions. With robust cavitation-resistant leaves and effective hydraulic compensatory strategies, LVS species can maintain water supply and the functionality of leaves, thus giving them a hydraulic advantage over counterparts in the face of potential drought stress. Related research results have been published in *Functional Ecology* (2016, 30, 1740−1744).



The difference in P50 between leaves and branches ($P50_{leaf–branch}$) for woody species across biomes. Aridity index (AI) was calculated as the ratio of mean annual precipitation and potential evapotranspiration for a given site using Global Aridity Index Geospatial Database, and the mean values of AI for different biomes are shown. Different letters indicate statistically significant differences at $P< 0.05$ (one-way *ANOVA*). Inset: relationship between $P50_{leaf–branch}$ and AI across biomes. Each point denotes one species (*filled upright triangles*, tropical wet forest; *open circles*, tropical dry forest; *open squares*, temperate forest; *open inverted triangles*, Mediterranean shrub/woodland).

11. Changes in soil respiration components and their specific respiration along three successional forests in subtropics

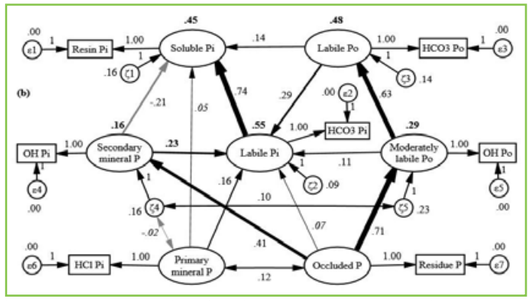
Understanding how soil respiration components change with forest succession is critical for modelling and predicting soil carbon processes and its sequestration below ground. The specific respiration (a ratio of respiration to biomass), is increasingly being used as an indicator of forest succession conceptually based on Odum's theory of ecosystem development. However, the hypothesis that specific soil respiration declines with forest succession remains largely untested. Dr. Huang Wenjuan from the Ecosystem Ecology Group (PI: Dr. Zhou Guoyi) used a trenching method to partition soil respiration into heterotrophic and autotrophic respiration (RH and RA) and then evaluated the specific RH and specific RA in three successional forests in subtropical China. Our results showed a clear seasonality in the influence of forest succession on RH, with no significant differences among the three forests in the dry season but a higher value in the old-growth forest than the other two forests in the wet season. RA in the old-growth forest tended to be the highest among the three forests. Both the specific RH and specific RA decreased with the progressive maturity of three forests. Our results highlight the importance of forest succession in determining the variation of RH in different seasons. With forest succession, soil microbes and plant roots become more efficient to conserve carbon resources, which would result in a greater proportion of carbon retained in soils. Related research results have been published in *Functional Ecology* (2016, 30, 1466−1474).



Mean soil heterotrophic respiration (RH) (a), autotrophic respiration (RA) (b) and the contribution of RA to total soil respiration (RS) (c) in the three successional forests in subtropical China from January 2011 to July 2012. Different lowercase letters indicate significant differences among forests in each season (P < 005). Stars in the panel (a) indicate significant differences between seasons in each forest. PF, pine forest; MF, mixed pine and broadleaved forest; BF, monsoon evergreen broadleaved forest.

12. A structural equation model analysis of phosphorus transformations in global unfertilized and uncultivated soils

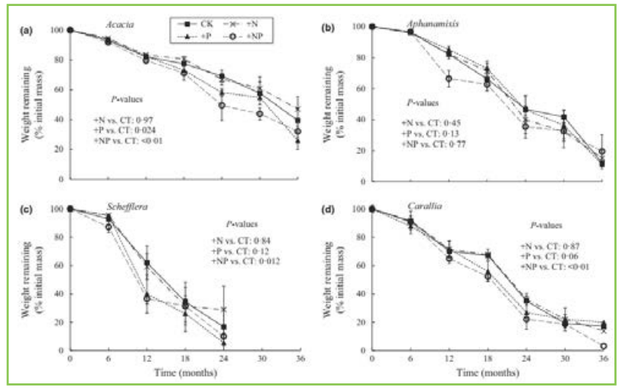
Understanding the soil phosphorus (P) cycle is a prerequisite for predicting how environmental changes may influence the dynamics and availability of P in soil. Dr. Hou Enqing from the Environment Ecology Group (PI: Dr. Wen Dazhi) compiled a database of P fractions sequentially extracted by the Hedley procedure and its modification in 626 unfertilized and uncultivated soils worldwide. With this database, we applied structural equation modeling to test hypothetical soil P transformation models and to quantify the importance of different soil P pools and P transformation pathways in shaping soil P availability at a global scale. Our models revealed that soluble inorganic P (Pi, a readily available P pool) was positively and directly influenced by labile Pi, labile organic P (Po), and primary mineral P and negatively and directly influenced by secondary mineral P; soluble Pi was not directly influenced by moderately labile Po or occluded P. The overall effect on soluble Pi was greatest for labile Pi followed by the organic P pools, occluded P, and then primary mineral P; the overall influence from secondary mineral P was small. Labile Pi was directly linked to all other soil P pools and was more strongly linked than soluble Pi to labile Po and primary mineral P. Our study highlights the important roles of labile Pi in mediating P transformations and in determining overall P availability in soils throughout the world. Related research results have been published in *Global Biogeochemical Cycles* (2016, 30, 1300−1309).



Structural equation models of soil P transformations using published data from unfertilized and uncultivated soils worldwide. (a) Model C is the best-fit path model respecified from the a priori path model in Figure S4. (b) Model D is respecified from model C using each soil P fraction as a single indicator of a soil P pool. All data were log10 transformed. The numbers on arrows are unstandardized path coefficients; values that did not differ significantly from zero are in italics. Arrow width indicates the strength of the paths. Arrows with positive and negative path coefficients are shown in black and grey, respectively. Numbers in bold near endogenous variables are the R-squared values. Error variables (ε 1– ε 7, ζ 1– ζ 4) are standardized values. The overall fit of the two models was the same: χ 2 = 6.51, df = 6, P = 0.369, RMSEA = 0.015, and AIC = 50.50.

13. The response of soil surface coarse woody debris decomposition to nutrient addition in tropical forest

Tropical forests represent a major terrestrial store of carbon, a large proportion of which is contained in woody biomass. Woody debris decomposition thus plays a key role in forest carbon dynamics because it contains a sizeable proportion of total forest carbon. Understanding the factors controlling woody organic matter decomposition is critical to mitigate climate change. Empirical and conceptual studies suggest that wood decomposition is regulated by many factors. Among these factors, the nutrient limitation of decomposition has received much attention in tropical forests. As atmospheric N deposition increasing



Patterns of mass loss of woody debris of four species during 36 months of decomposition in a fertilization experiment in a secondary mixed tropical forest; error bars show standard errors of means for n = 5, and P-values for treatment effects based on individual species models are given; Acacia: Acacia auriculaeformisAphanamixis: Aphanamixispolystachya, Schefflera: Scheffleraoctophylla and Carallia: Carallia brachiate; CT: Control, +N: N-fertilized, +P: P-fertilized, +NP: N- and P-fertilized. a: Acacia, b: Aphanamixis, c: Schefflera, d: Carallia.

dramatically and P-limited in tropical soil, Ms Chen Yao from the Soil Science and Ecological Engineering Group (PI: Dr. Li Zhian) conducted a factorial fertilization experiment using branch segments from four dominant tree species in a tropical forest to investigate the effects of N and P-fertilization on wood decomposition and nutrient release.

They observed P fertilization increased decomposition rates by 5-53% and the magnitude was species-specific, while N fertilization had no significant effect on decomposition rates. Many of the nutrient release patterns can be explained by the stoichiometry of the substrate and activity of decomposer organisms. The results indicate that wood decomposition is primarily constrained by P availability in the tropical forest. It is conceivable that decay rates of CWD in tropical forests can be predicted by C:P or lignin:P ratios but additional work with more tree species is needed to determine whether the patterns we observed are more generally applicable. Related research results have been published in *Functional Ecology* (2016, 30, 295−304).

14. Key technology and commercial application of storage and transport of specialty fruits and vegetables in south China

China is the world's largest producer of fruits and vegetables, but the issues of the fast decline in quality and serious decay of fruits and vegetables after harvest, abuse of chemical fungicides and preservatives are still existing. To solve these problems, the Postharvest Fruit and Vegetable Group (PI: Dr. Jiang Yueming) systematically studied the mechanism of quality deterioration and then developed about 10 key technologies for decay reduction and quality maintenance of harvested fruits and vegetables, with a series of the authorized invention patents.

Key technology and commercial application of storage and transport of specialty fruits and vegetables

The main technical invention is as follows:

1) The new technology of applying non-toxic polyhexamethylene guanidine hydrochloride (PHMG) to control acid rot disease of citrus fruit was invented. After a variety of biological source materials obtained exhibited a strong inhibitory effect on postharvest fungi of fruits, a biological preservation technology to control fruit decay was developed. The successful application of this technology can reduce the amount of chemical fungicides by 30-50%.

2) Based on the study of the characteristics of quality deterioration of fruits and vegetables postharvest, a special preservation technology using the signal molecules, such as 1-MCP, NO and AiBA to delay the senescence and induce cold tolerance of fruits and vegetables after harvest was developed, which extended the shelf life by more than 60%.

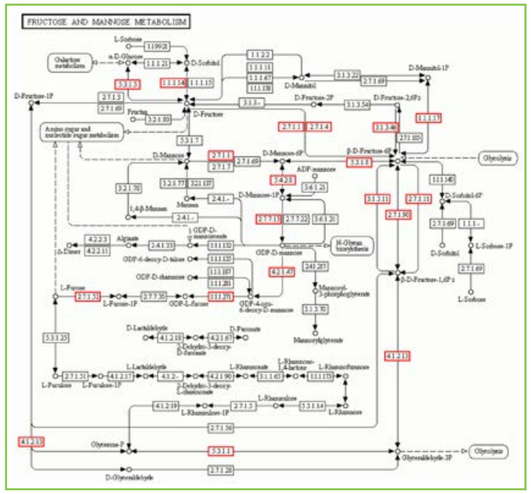
3) Focused on the technical difficulties of serious decay and short shelf life of special fruits after harvest in south China, the physiological, biochemical and pathologic bases of postharvest fruits were systematically studied, the comprehensive fruit preservation technology including anti-aging technology, biological sources preservation technology, temperature and humidity control technology and pre-cooling technology was developed well, which extended the fruit preservation period by over 60% compared with the traditional method.

4) Total 24 invention patents were authorized, 94 papers / monograph chapters were published and the first prize of

Guangdong Provincial Science and Technology was awarded. The technology of this project has promoted significantly application in Guangdong, Fujian, Guangxi, Hainan, Zhejiang, Jiangsu and other provinces of China, with remarkable economic and social benefits.

15. The research progress in *Dendrobiumofficinale* polysaccharides biosynthesis metabolism

Dendrobiumofficinale is the traditional and rare Chinese medicinal herb. At present, a lot of Chinese medicine and health products have been developed. *D.officinale* Polysaccharides (DOP), mainly composed of glucose and mannose, is one of the main active ingredients that has biological activity of antioxidation, decreasing blood glucose, and strengthening people's immunity, etc. However, there is very little published research on *D.officinale* Polysaccharides biosynthesis metabolism. In order to reveal the molecular regulation mechanism of polysaccharides biosynthesis, the genes expression database in the different development stages of *D.officinale*is established by using the transcriptome sequencing, bioinformatics and functional genomics methods. According to the comparison analysis of gene expression in the different development stages, fructose and mannose metabolic pathways and 135 genes involved in the pathway were determined. Furthermore, 430 glycosyltransferase, 89 cellulose synthase genes, and 627 transcription factors involved in *D.officinale* secondary metabolism were identified. 37 cellulose synthase genes that play an important role in *D.officinale* mannan polysaccharide synthesis were screened and identified. *PMM* and *DoCSLA6*, key enzyme gene involved polysaccharide synthesis, were cloned and analyzed. It is found that they not only involve in polysaccharides biosynthesis metabolism, but also in stress resistance in *D.officinale*. The above results will provide important clues to further study of *D.officinale* polysaccharide synthesis and regulatory mechanism. The related study results have been published in the journal of *Frontiers in Plant Science* (2016, 7, 5； doi: 10.3389/fpls.2017.00173) and *Protoplasma* (doi: 10.1007/s00709-016-1044-1).



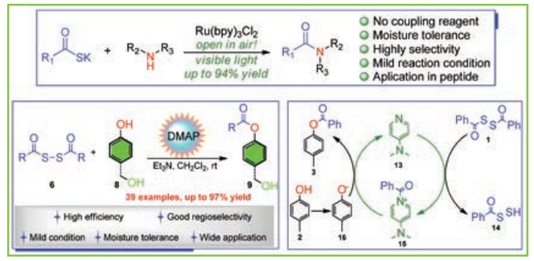
Putative fructose and mannose metabolic pathway of *D.officinale*.

16. Progress in natural products synthesis and structural modification

Amide and ester motifs are two of the most ubiquitous and intriguing functional groups in the repertoire of organic chemistry, forming the basic building block of various biologically meaningful natural products, pharmaceuticals and agrochemicals. In this regard, the discovery of novel, eco-friendly acylation and esterification reagents as well as green, convenient protocol is still deemed worthy of pursuit.

The Natural Products Chemistry Biology Group (PI: Dr. Qiu Shengxiang)had developed a remarkable visible light promoted photoredox catalytic methodology involved with amines and eco-friendly potassium thioacids for amide formation. This approach can mimic the natural coenzyme acetyl-CoA to selectively acylate amines without affecting other functional groups such as alcohols, phenols, esters, etc. The developed strategy may hold the bright promise for a comprehensive display of biologically interesting peptide synthesis and amino acid modification. On the basis

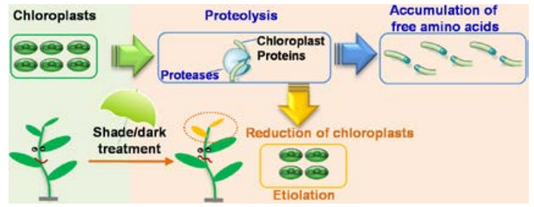
of the aforementioned result, another remarkable DMAP catalytic methodology for efficient ester formation involved with alcohols and ecofriendly diacetyl disulfides was also uncovered. The implementation of this strategy would pave new ground for site-selective acylation of hydoxyl group in the repertoire of synthetic chemistry and biology, especially in the natural products modification. These research results were published in *ACS Catalysis* (2016, 6, 1732-1736, Most read article) and *Organic Letters* (2016, 18, 5584−5587).



Selective structural modification of amine and phenol compounds

17. Regulation mechanisms of formation of quality-related compounds of tea (*Camellia sinensis*) leaves

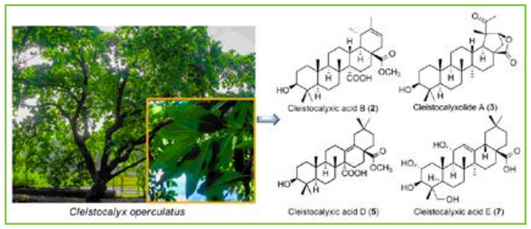
Polyphenols, amino acids, and aroma compounds are fundamental for tea quality. The content of polyphenols in teas is 18-36% of dry weight, whereas amino acids and aromas account for 1-4% and 0.005-0.03%, respectively. Due to the relative contents of amino acids and aromas in teas, improvement of the amino acids and aromas of tea has recently attracted increasing attention. The Plant Metabolomics Group (PI: Dr. Yang Ziyin) currently focuses on the formation of amino acids and aroma compounds in tea in response to biotic and abiotic stresses before/ after harvest, including stress-response mechanisms of the pathways, enzymes, and genes involved in the biosynthesis of these quality-related metabolites, as well as the practical applications for the improvement of tea quality during the cultivation and manufacturing processes. In 2016, we obtained several important findings concerning research of amino acids in tea. (1) Dark treatment significantly increased content of free amino acids and reduced content of soluble proteins in pre-harvest tea leaves. Quantitative proteomics analysis showed that most enzymes involved in bio-syntheses of amino acids were down-regulated by dark treatment. Chloroplast numbers reduced in dark-treated leaves and the content of soluble proteins reduced in the chloroplasts isolated from dark-treated leaves compared to control. These suggest that proteolysis of chloroplast proteins contributed to amino acid accumulation in dark-treated leaves (See Figure). (2) During processing of postharvest tea leaves, a combination of anoxic stress and mechanical damage are essential for the high accumulation of GABA, which is associated with both enhanced mRNA accumulation and CaM-activated enzymatic activity of CsGADs. The combination of stress due to mechanical damage and anoxia are essential for the dramatic accumulation of GABA, which is quite different from the stress responses of the model plant *A. thaliana*. (3) Tea flowers, which are a waste and abundant resource, were found to contain proteases with strong proteolysis ability towards proteins from tea leaves. The crude proteases from tea flowers increased by 177% of total amino acids of tea infusion, which was much higher than those of commercial proteases. (See *Journal of Functional Foods*, 2016, 25, 149-159; *Scientific Reports*, 2016, 6, 23685; Patent application, application No. 201610067080.1)



Regulation mechanism of formation of amino acids in pre-harvest tea leaves by dark treatment

18. Bioactive PentacyclicTriterpenoids from the Leaves of *Cleistocalyxoperculatus*

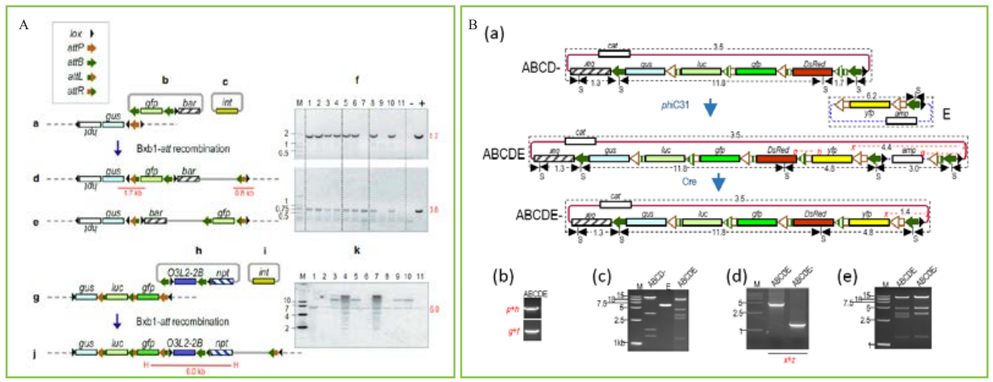
Cleistocalyxoperculatus, an evergreen tree belonging to the family Myrtaceae, is widely distributed in southern China and other areas of tropical Asia. Its leaves and flower buds have long been used as herbal tea and herbal medicine in South China and Vietnam for the treatment of cold fever, inflammation, and gastrointestinal disorders. In a continuing endeavor to discover bioactive compounds from medicinal plants growing in South China, the constituents of the leaves of *C. operculatus* were investigated. Thirteen new pentacyclictriterpenoids, cleistocalyxic acids A-K (1, 2, 4, 5, and 7-13) and cleistocalyxolides A (3) and B (6), and fifteen known analogues (14-28), based on taraxastane, oleanane, ursane, multiflorane,andlupane skeletons, were isolated. The structures of 1-13were elucidated by analysis of their spectroscopic data and ECD/TDDFT computations. Cleistocalyxic acid B (2) displayed cytotoxicity against HepG2, NCI-N87, and MCF-7 cancer cell lines with IC_{50} values ranging from 3.2 to 6.5 mM and cleistocalyxic acid D (5) was active against HepG2 and NCI-N87 cells with the values around 5.0 mM. The non-cytotoxic cleistocalyxic acid E (7) inhibited production of IL-6 by 68.1% and TNF-a by 53.7% in LPS-induced RAW 264.7 macrophages at the concentration of 2 mM. This study was reported in *Journal of Natural Products* (2016, *78*, 2912-2923).



Bioactive pentacyclictriterpenoids from the leaves of Cleistocalyxoperculatus

19. Site-specific gene stacking

In many crop species, transgenic traits are introduced into transformable varieties before introgressing them out to elite field cultivars. For diploids or polyploids that behave as diploids, the 'n' number of unlinked transgenic loci can be assorted as homozygous into a single genome at a probability of $(1/4)^n$. However, along with the 'x' number of other nontransgenic traits that breeders need to assemble into the same genome, the $(1/4)^{n+x}$ probability for a 'breeding stack' makes line conversion difficult. To minimize the number of segregating transgenic loci, the option

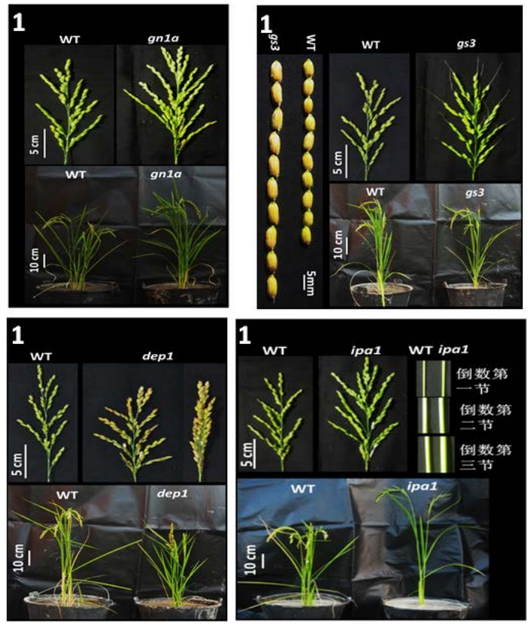


Site-specific integration system. A: Bxb1-mediated gene integration in rice and tobacco. a,d,e: diagram of site-specific integration in rice; g and j: diagram of site-specific integration in tobacco; f and k: Southern blotting analysis confirmed the site-specific integration in rice and tobacco respectively. B: Fourth cycle cointegration and removal of unwanted DNA for in vitro gene stacking. (a) Not to scale depiction of recombination between molecules ABCD- and E to yield ABCDE (or ABCDE', not shown), followed by deletion to generate ABCDE-. PCR and SalI (S) analysis of representative cointegrate clones (b, c, respectively), and deletion clones (d, e, respectively). PCR fragments shown in red, restriction fragment sizes in kb. Lane M is marker lane.

of in vitro stacking prior to its introduction into the plant genome would mean the re-engineering and re-deregulating of previously introduced traits each time a new trait is introduced. The option of bypassing introgression by directly transforming field cultivars is also not practical as most field cultivars are difficult to transform. Moreover, each local-specific cultivar would harbor an independent integration event that requires individual de-regulation. Previously, Ph.D. student Hou Lili and colleagues have demonstrated recombinase-mediated gene stacking in tobacco. To implementing this system in rice, a number of precise target sites in the rice genome were screened. In 2016, Associate Researcher Li Ruyu and colleagues have developed a biolistic mediated method for site-specific integration and have demonstrated that gene insertion into those target sites works efficiently (*Methods in Molecular Biology*, 1469: 15-30). Ph.D. student Chen Weiqiang further developed a method to stack genes in vitro that would be compatible with the recombinase-mediated gene stacking system in vivo (*Methods in Molecular Biology,* 1469: 31-47), and David Ow (*Plant Biotechnology Journal* ,2016, 14, 441-117) authored a recombinase mediated gene stacking review.

20. Reassessment of the four yield-related genes *Gn1a, DEP1, GS3*, and *IPA1* in rice using a CRISPR/Cas9 system

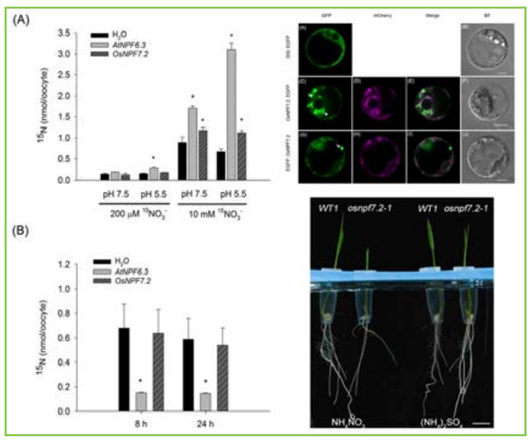
In modern rice farming, high yield has accordingly become one of the major objectives of breeders and growers over recent decades. Rice yield per plant is determined by three component traits: number of panicles per plant, number of grains per panicle, and grain weight. The Energy Plant Group (PI: Dr. Wu Guojiang) used the CRISPR/Cas9 system to mutate the *Gn1a*, *DEP1*, *GS3* and *IPA1* genes of rice cultivar Zhonghua 11, genes which have been reported to function as regulators of grain number, panicle architecture, grain size and plant architecture, respectively. The T2 generation of the *gn1a*, *gs3*, and *dep1* mutants featured enhanced grain number (Fig. 1A), larger grain size dense (Fig.1B) and erect panicles (Fig.1C), respectively. Furthermore, semi-dwarf, and grain with long awn, phenotypes were observed in *dep1* and *gs3* mutants, respectively. The *ipa1* mutants showed two contrasting phenotypes, having either fewer tillers or more tillers, depending on the changes induced in the OsmiR156 target region (Fig. 1D) (*Frontiers in Plant Science*, 2016, 7, 377). This finding offers the prospect of efficiently reassessing the roles of yield-related genes in different rice cultivar backgrounds, and it may be possible to directly combine different types of interesting high yield traits in the same genetic background without necessitating the time-consuming production of nearly isogenic lines. Consequently, it may become feasible to pyramid useful genes into a single cultivar for breeding purposes.



CRISPR/Cas9-induced *gn1a* (1A), *gs3* (1B), *dep1* (1C), and *ipa1* (1D) mutant plants

21. Molecular analysis of rice nitrogen utilization

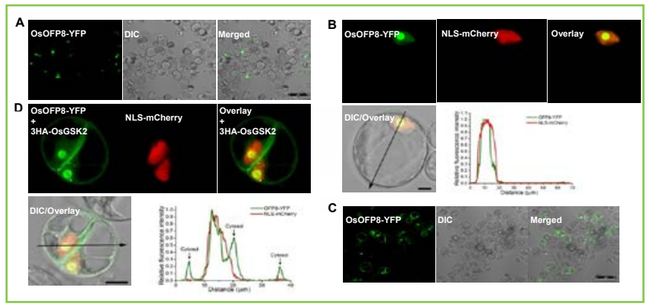
Nitrogen is an essential nutrient for plant growth and development, and it is also an important limiting factor for crop yield. Plant nitrogen utilization may be divided into three aspects: uptake, assimilation and reutilization, all of them are related to transportation of nitrogenous compounds in intracellular, between intercellular, tissues and organs. Therefore, nitrogen nutrient transport is an important process for plant growth and development. In 2016, the Plant Nutrition Physiology Group (PI: Dr. Zhang Mingyong) found that the nitrate transporter *OsNPF7.2* affects intracellular balance of NO_3^- in the cells of the balance. *OsNPF7.2* is a vacuolar NO_3^- transporter, and affects rice growth under high concentrations of NO_3^- (*Frontiers in Plant Science,* 2016, 7, 1529). We also found that nitrogen fertilizer promotes tillering of rice through microRNA *OsMIR393* mediating auxin response. Nitrogen fertilizer induces up-expression of *OsMIR393*, and then high-expression of *OsMIR393* inhibits the expression of auxin response genes *OsTIR1* and *OsAFB2*, which finally reduce the sensitivity of lateral tiller to IAA, and promote the growth of rice tillers (*Scientific Reports,* 2016, 6, 32158). For rice breeding, hybrid rice cultivar "Zhiyou523" was authorized the new variety protection. New hybrid rice "Zhiyou701" was completed two-year regional test in Guangdong Province.



Effect of vacuolar nitrate transporter *OsNPF7.2* on rice growth

22. OVATE family protein 8 positively mediates brassinosteroid signaling through interacting with the GSK3-like kinase in rice

OVATE gene was first identified as a key regulator of fruit shape in tomato, OVATE family proteins (OFPs) are characterized as plant-specific transcription factors and conserved in *Arabidopsis*, tomato, and rice. Roles of these OsOFPs involved in plant development are not understood. Brassinosteroids (BRs) are a class of steroid hormones involved in diverse biological functions. OsGSK2 play a critical role in BR signaling by phosphorylating downstream components such as OsBZR1 and DLT. Here the Plant Pathology Group (PI: Dr. Li Jianxiong) report in rice that *OsOFP8* plays a positive role in BR signaling pathway, BL treatment induces an increase in mRNA transcript and leads to enhanced accumulation of OsOFP8 protein. The gain-of-function mutant *Osofp8* and *OsOFP8* overexpression lines show enhance lamina joint inclination, whereas *OsOFP8* RNAi transgenic lines are less sensitive to BL treatment. Further analyses indicate that OsOFP8 interacts with and is phosphorylated by OsGSK2, phosphorylated OsOFP8

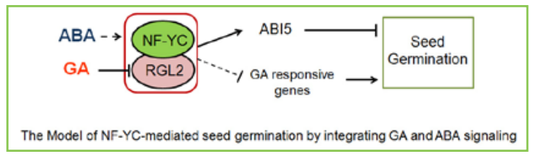


OsGSK2 protein affects the sub-cellular localization of OsOFP8

shuttles to the cytoplasm and is targeted for the proteasomal degradation. These results demonstrate that OsOFP8 is a substrate of OsGSK2, which suggests that OsOFP8 may regulate plant development, at least in part, through BR signaling pathway.

23. A crucial role of *Arabidopsis* NF-YC in regulation of plant seed germination

Seed germination is an important developmental process in plant. Germination determines when and where plants sprout, which is the basis for plant species propagation, distribution, and agricultural production. It is well known that germination process is principally controlled by the phytohormone balance of gibberellic acids (GA) and abscisic acids (ABA) that have antagonistic effects on this vital developmental phase. However, the molecular mechanism of such phytohormone interaction remains largely elusive. Liu et al, in the Phytohormone Regulation Group (PI: Dr. Hou Xingliang), found that *Arabidopsis* NF-YC (Nuclear Factor Y-C) plays a crucial role in regulation of seed germination. *NF-YC* homologues negatively regulate GA-mediated seed germination. Using the molecular biology approaches, they found that the DELLA protein RGL2, a key repressor of GA signaling, acts as NF-YC-interacting protein. By the high-throughput sequencing and biochemical genetic analysis, they confirmed that NF-YCs and RGL2 act interpedently to co-regulate GA and ABA signaling via interacting and co-targeting to CCAAT-boxes in the promoter of *ABI5*, the gene encoding a core component of ABA signaling, thus controlling seed germination. These findings illustrate a regulatory model that reveals a central molecular link of NF-YC-RGL2-ABI5 in seed germination and provide new insights into the interaction of GA and ABA signaling pathways involved in plant development. These results have been published in the *Nature Communications* (2016, 7, 12768).



The Model of NF-YC-mediated seed germination by integrating GA and ABA signaling

Team Building and Talent Training

In 2016, according to the overall scheme of CAS "Take the Lead Plan" and the request of "Further Implementation of Talent Training & Recruitment Programs Package of the CAS"and "Talent Highland Construction Plan of the CAS", SCBG further strengthened the construction of talent team focusing on the development goals of "One-Three-Five" Strategic Planning and made good achievements.

General Information for Talent Introduction

In 2016， total 26 talents were introduced into SCBG via open recruitment, including 2 research professors, 8 associate professors. Among them, there were 9 doctors, 14 masters, and 3 returnees from abroad. Among the staff of SCBG, 166 staff have doctoral degree by the end of 2016.

Introduction and Cultivation of High-level Talents

Dr. Zhang Yu from Lakehead University, Dr. Li Linfeng from Washington University in St. Louis and Dr. Deng Shulin from Temasek Life Sciences Institute in Singapore passed the evaluation of "Self-funded Hundred Talent Program". Dr. Zhang Yu and Dr. Li Linfeng have signed contracts with SCBG and already started to work in SCBG. Dr. Deng Shulin planned to start to work in 2017. Dr. Ye Hong, the candidate of "Hundred Talent Program" received the final evaluation held by the CAS and got the "good rating".

Recruitment of Dr. Zhang Yu

Recruitment of Dr. Li Linfeng

Final evaluation meeting of Dr. Ye Hong

Excellent Talents Nominated for Various Honors

Dr. Duan Xuewu was selected as the leading scientist of National "Ten Thousand Talent Program". Prof. Zhou Guoyi won the honorary title of "National Excellent Science and Technology Workers". Prof. Ge Xuejun, Kang Ming, Yan Junhua and Ye Qing were selected as specially-hired researchers of "CAS Distinguished Research Fellow Program". Prof. Shen Weijun was recommended as one of Millions of Leading Engineering Talents of Guangdong Special Supporting Program. Associate Prof. Lu Xiankai was recommended as one of Millions of Young Top-notch Engineering Talents of Guangdong Special Supporting Program. Associate Prof. Zhou Zhongyu was recommended as one of Young Top-notch Talents in science and technology innovation of Guangdong Special Supporting Program. Prof. Kang Ming was promoted as an excellent member of CAS Youth Innovation Promotion Association. Dr .Yang Songguang and Dr. Luo Ming were promoted as members of CAS Youth Innovation Promotion Association in 2017.

Cultivation of Postdoctor

SCBG further established a joint training program in cooperation with 4 work stations and 11 postdoctors were recruited. In 2016, 24 postdoctors entered these stations, 6 postdoctors left and 7 postdoctors exited. There are 43 postdoctors in these stations, which sets a new record of the number of postdoctors in position. Through project presentations and training of postdoctoral projects, SCBG was rewarded 12 various projects financially supported by the Nation, CAS and Guangdong province. In addition, one person was funded by National "Boxin Program" Fund.

Application speech of postdoctoral project

Employment According to Post

With "2016 Implementation of Employment According to Post", position competition of professionals, clerk, logistics jobs was carried out. Total 57 professional staff were promoted to higher positions. Four staff and 5 staff were hired as "Chen Huanyong Researcher" and "Chen Huanyong Associate Researcher", respectively.

Talent Training

In 2016, 384 postgraduate students studied in SCBG, including 154 doctoral candidates (9 foreign doctoral candidates) and 230 master students. Thirty-eight doctoral candidates (2 foreign doctoral candidates) and 78 master students (4 minority cadres and 18 examination-free candidates) were enrolled in 2016. Six master students were co-cultured by SCBG and other colleges. Total 80 postgraduate students graduated in 2016, among of them 77 postgraduate students were conferred degrees (32 doctoral degree and 45 master's degree). Their research papers were published in famous international journals, including *Ecology Letters*, *The Plant Cell*, *Soil Biology and Biochemistry*, *Journal of Agricultural and Food Chemistry*, *American Journal of Botany*, etc.

Group photo of graduates and supervisors in 2016

In order to strengthen scientific literacy ability of postgraduate students in SCBG, public required course “Scientific Quality” was set up for the first time in 2016. In addition, students were encouraged to take an active part in all kinds of academic exchanges including “Graduate Symposium” held by Guangzhou Education Base and “The Ninth Graduate Academic Forum” held by SCBG. During 2016, 8 postgraduate students were sponsored by National Scholarship to study abroad and 6 postgraduate students were sponsored by International Cooperation Program of CAS to study abroad. Two Ph.D. candidates were sponsored by CAS to attend the international conference.

Postgraduate students in SCBG received various awards, including CAS President Award (one student), Zhuli Yuehua Excellent Doctoral Candidates of CAS (one student), Di Ao Award of CAS (three students), National Scholarship (four Ph.D. candidates and five master candidates), Pu Bang Scholarship (six master candidates) and BIOMIGA Scholarship (two Ph.D. candidates and two master candidates). One supervisor was rewarded one of Zhuli Yuehua Excellent Teachers.

Various recreational and sports activities were carried out to promote postgraduate students’ humanistic quality cultivation, physical and psychological health, including New Year’s party, students association, social practice, ball games, winter games, examination and appraisal of student dormitory, study room, old clothes recycling, scientific public welfare activities and so on.

In order to attract excellent students to SCBG, the fourth “Outstanding College Students - SCBG Summer Camp” was organized successfully in 2016. Two hundred and thirty-eight undergraduate students from 67 universities signed up for that summer camp and 44 of them were admitted. As a result, 9 undergraduate students passed the exemption interview and received scholarship from CAS. In addition, Research Practice Training Plan of College Students in the CAS was implemented successfully with 42 participants in 19 teams from 8 universities including Lanzhou University, South China Agriculture University, etc.

In the aspect of discipline construction, evaluation work of first-level discipline including Biology, Ecology and Forestry was organized in SCBG. As the leading unit of first-level discipline Forestry, SCBG held a kick-off meeting for qualified evaluation of Forestry degree authorization centers and internal audit expert commenting.

Graduation ceremony


Autumn trip

Health and safety appraisal

New Year's party

International Cooperation

In accordance with International Propulsion Strategy of CAS in 2016, with a global vision to stimulate innovation, SCBG has actively promoted institutional instruction and co-operation with Southeast Asia and South America for protection of biodiversity. SCBG has also excelled in international recruitment of talents and collaboration with developing countries in science and education.

(1) In September 2016, Wang Enge, Vice President of CAS, visited Colombia, Ecuador and Peru, and attended the unveiling ceremony of the Molecular Laboratory of SCBG-UNMSM (National University of San Marcos, Peru), of which the signing ceremony was jointly witnessed by Premier Li Keqiang and Peruvian President Ollanta Humala on May, 22, 2015. In July 2016, Liu Congqiang, Deputy Director General of NSFC visited CONCYTEC and UNMSM, promoted mutual understanding and communication between NSFC and Pure, and dawned the first step for further cooperation.

(2) SCBG also achieved remarkable results in international research projects in Southeast Asian in 2016. SCBG reached agreement with Vietnam Forestry University (VFU) and the Center for Plant Conservation (CPC), laying solid foundation for future cooperation.

(3) International talent program in 2016 has been in steady development. Eight international talent programs were in good progress, 5 new programs and 2 foreign talent projects respectively funded by CAS and State Administration of Foreign Experts Affairs (SAFEA) have been approved. In addition, SCBG has been authorized to organize the 5th International Training Course sponsored by CAS, which will enhance the biodiversity conservation experience in partnership with institutions from Southeast Asia, South America, etc. By virtue of all these programs, international cooperation publications of SCBG accounted for over 43 percent of total number of SCBG in 2016.

(4) Three “Chen Huanyong” Series Academic Lectures and nearly forty Academic Reports were organized at SCBG in 2016, which extremely strengthened academic exchange and promoted academic development.


Wang Enge, Vice President of CAS attended the unveiling ceremony of the Molecular Laboratory of SCBG-UNMSM (National University of San Marcos, Peru).


Liu Congqiang, Deputy Director General of NSFC visited Pure.

Technology Transfer

In 2016, according to the requirement of "Take the Lead Plan" of CAS, we integrated the achievements of long-term research, strengthened the coordination, specifically strengthened the integrated application and demonstration expansion of scientific research results. The scale and industrialization of scientific research results were promoted through systematic technology innovation, model innovation and system innovation. Total 14 contracts of technology service, technology development, variety authorization and patent implementation license were signed with contract amount of 5.85 million Yuan. Ten contracts were renewed with amount of 18.33 million Yuan.

(1) Led by project cooperation, a new pattern of technology transfer was formed

A set of flexible industrialization operation scheme of Five in One including "Politics, Industry, Learn, Research, Business" or "Politics, Industry, Learn, Research, Application" was formed by integrating existing services, new products of SCBG, as well as linking capital markets, management agencies and government departments, aiming at building an economic mode of the whole industrial chain cooperation and three-dimensional circular, leading scientists to be involved in the implementation of projects in the form of PPP (usually translated as Public Private Partnerships). In the mean while, we maximized the benefit of science and technology achievements, through jointly developing new commercial cooperation mode working with authoritative science and technology incubation enterprises. Existing successful patterns include sandalwood, aloes, medlar and liquice, etc.

Contract signing ceremony with China Green Industry Ally and Cultural Exchange Association

(2) Aiming at national strategy, specially conduct "top ten poverty alleviation" task

According to national strategic positioning, major social demands and CAS development direction, based on South China incubator, extended to Western China (Guizhou and Xinjiang), Central China (South Henan), South China (The Pearl River Delta, Hainan), and Northwest China region (Shanxi, Ningxia), etc. We preliminarily improved the macroscopic layout from science and technology innovation to promoting social economic development.

Poverty alleviation program

(3) Integrating industries, improving the construction of scientific research innovation service platform

Following the requirements of CAS combining with local needs, we initially completed the macroscopic layout from science and technology innovation to promoting social economic development. Science and technology achievement transfer and innovation service platform of whole industry chain of internet+, herbal medicine and special economic plants was established by working with many domestic high-technology service incubators and traditional Chinese medicine processing and selling companies to jointly develop new variety research and development, products development, capital operation and market docking.

National Development and Reform Commission, Hu Hengyang et al. visited the Guizhou Center

A case study on poverty alleviation in western China: "the Guizhou Economic Plant Breeding Center of SCBG" (here after Guizhou Center). By the end of 2016, the first phase of Guizhou Center has been completed and put into use with the total investment of 23 million Yuan. At the second phase, one lab with an area about 800 Mu was established, which can hold about 50 million plants and about 200 varieties. Currently, about 30 million tissue culture seedlings were planted. A comprehensive development mode was established, which mainly focused on Chinese herbal medicine, integrated fruits and vegetables, nursery stock flowers and landscape architecture, as well as special economic plants development. About 300 local people from 200 households were hired and out of poverty. The expected economic benefit will reach 5 million Yuan in 2017.

Incubator platform in South China region- Shunde Economic Plants Breeding Center of SCBG provided technique service for about 30 local enterprises, trained about 100 people, provided scientific advice and technique service 100 times, as well as science popularization activities 100 times in 2016. Total 7 research and demonstration projects from Guangdong Agriculture Department were successfully supported with a total grant of 2.8 million Yuan. Three papers were published, two patents were applied, one new variety and one enterprise standard were declared.

The contract with the technology base of the central area of science and technology in south Henan (Tongbai) industrialization cooperation project base was signed and will put into effect in 2017. The feasibility study of south Henan (Dengzhou) International Zhang Zhongjing Chinese Medicine Culture Industrial Garden was initiated.

(4) Overall planning resources, strengthening the management of foreign investment

In 2016 we gained over 10 million Yuan from the Guangdong Zhongkeqilin Gardening limited company, of which 5.1 million Yuan has reached to SCBG account. The 17% Stakes (worth 12,831,600 Yuan) held by SCBG has been officially listed in South United Property Rights Trading Center on December 30, 2016. We plan to sell these shares at a base price of 14,114,700 Yuan, which are combined with the "goodwill" value.

(5) Coordinating the communication, strengthening the management of union, committee and technique center.

We finished the annual audit, data sorting, updating, reporting and checking work of Development Engineering Technology Research Center of Characteristics Plant Resources of Guangdong Province. We also assisted in the application of *Dendrobium* Committee and Industry Innovation Union (fruits fresh-keeping, sandalwood, Maca, etc.).

Xiamen International Conference on health industry

Horticulture and Public Education

1. Horticulture and Ex-situ Conservation

The Garden carried out scientific management for living plant collections, put forward species conservation, data recording and horticulture, improved plant evaluation and propagation for new cultivar breeding, and promoted utilization of plant resources.

Plant Collection and Ex Situ Conservation

Nine hundred and seventy new accessions (475 are known wild sources) of living plants were collected from 20 countries，13 provinces or regions of China. Total 6515 individual living plants (pots / clusters) were labeled, 3336 accession numbers were verified. Six thousand four hundred and twenty-two living plants were mapped, 7968 historical data of introduction from 1956-1975 were reviewed and updated.

Twenty batches of 125 plant species were provided for scientific research, including 7 batches of 72 species for SCBG and 13 batches of 53 species for other universities and scientific institutions. Three thousand and eight plant species and 53779 plants (pots) were propagated, 920 bottles of *Dendrobium*, *Aristolochia* and *Ardisia* were cultivated via tissue culture, 4496 plants of 1102 species were transplanted. Phenological observation of 1012 plant species was recorded. Two hundred and ninety-eight plant species were identified and verified.

Landscape Upgrade and Thematic Flower Show

The construction of Liana Garden was the core task of SCBG in 2016. The infrastructure construction, design and planting were completed. About 796 plants of 275 vine species (19 unidentified species) were planted. Some thematic flower shows were launched all year round, including Peony Flower Show in Spring Festival, King Flower Show in National Day, Camellia Flower Show, Magnolia Flower Show, Mucuna Flower Show, Seasonal Flower Show in Labor Day, Chinese Herbal Tea Culture Exhibition, Rhododendron Flower Show, Ginger Flower Show and Bougainvillea Flower Show.

Construction of Liana garden

New plant variety: *Ardisia* “Red Pearl”

Evaluation and Utilization of Plant Resources

The breeding of new plant varieties was continually carried out. Two new varieties *Ardisia* “Red pearl” and *A*. “Zhongke Zijin No.2” passed the initial trial of new cultivar patent of State Forestry Bureau. And the new variety of *Melastoma* “Bixia” passed the verified trial of new cultivar patent. The reproductive technology invention patents of *Primulina tabacum, Strongylodon macrobotrys* and *Saraca griffithiana* were applied. Funded by the science and technology project of Guangdong province, the domestication, breeding and adaptability evaluation of the rare ornamental plant *Saraca griffithiana* were conducted. The breeding of Yao Nationality Herbal Plants and eco-agricultural tourism development, efficient planting and demonstrating medicinal plants under the forests in North Guangdong mountainous area, the study of Cool Tea Plants and Tea Culture were carried out. The patent of promoting Radix Companumoea in vitro rapid propagation medium and methods was applied. The aquatic plant demonstration project in Dongguan Botanical Garden and Lotus science popularization exhibition project in Dongguan Ecological Garden were implemented.

Monograph Research Based on Living Collections

The kick-off meeting for *Compilation of Ex-situ Cultivated Flora of Botanical Garden* was held in Boyang Lake Branch of Lushan Botanical Garden, including the compilation of Lauraceae, Berberidaceae, Begoniaceae, Iridaceae, Caprifoliaceae, Hoya, Ericaceae, Coniferous and Liliaceae, and the establishment of the living plant data management platform. The *Ex Situ Cultivated Flora* contains 16231 species (including infraspecific taxa) and 12562 pictures from home and abroad. The “*Greenhouse Management Handbook*” and the training manual of “*Landscape of Guangdong Wetland Plant Application Guide*” were developed; *Encyclopedia* of *Chinese Garden Flora* (Vol. 1 and 13), *Ex situ Cultivated Flora of China - Magnoliaceae* and *Plant Resources of Chinese Zingiberaceae* were published. We were also involved in the projects of island plants research, the *Pan Himalaya Flora*, Subfamily Bamboo for *Hongkong Flora*, *Vietnamese Bamboo Survey,* and *Chinese Bamboo Investigation* organized by International Bamboo and Rattan Organization, and so on.

2. Knowledge Dissemination and Science Popularization Tourism

Based on the living collections and conservation of plant resources, some special public education activities were carried out, strengthening science communication, improving tourism management and service. In 2016, there were more than 900,000 visitors, of which more than 100,000 were teenagers, and the income from entrance tickets and other activities was over 17 million Yuan.

Public Education Activities

We participated in large-scaled science popularization activities organized by the CAS and other government departments. Scientific experience activities of “12th Public Science Day and 2016 Science and Technology Week of CAS”, the “2016 Guangzhou National Science Day Ceremony” and the “Large-scale Science Carnival” were successfully held in May and September respectively, which greatly enlarged the profile of SCBG in the aspect of public education.

Total 95 times of activities including “Birding, Insects Guided Tour”, “Mystery Green Winter Camp for Science and Technology”, “Wonderful Night Hike in Botanical Garden”, “Weekend Nature Camp” and science popularization in schools/communities were held, which played an exemplary role in science popularization education.

Actively Promoting Science Popularization

Promoting science popularization tourism via mobile was the major focus of SCBG in 2016. SCBG WeChat consists of three function menus: “Public Tour Guide”, “Audio Guide” and “Flower in Blooming”, providing information query and navigation services for tourists. Articles about “Blooming Information”, “Scientific Education Activities”, “Plant Stories” and “Scientific Research Progress” were timely published so that the public could be aware what happened in SCBG.

Wonderful night hike in Botanical Garden

In 2016, a total of 56 pieces of news about ornamental plants exhibition and activities were reported in newspapers, TVs and radios. Three hundred and seventy-seven pieces of tourism information were announced in all kinds of networks. Two hundred and nine pieces of official information were released in micro-blog. One hundred and seventy articles were delivered through WeChat. And 108 articles were published in related CAS websites.

Achievements of Science Popularization Tourism

Total 13 science popularization projects were successfully funded with a total of 1.3432 million Yuan, which strengthened scientific education research and the construction of popular science base. Major science popularization activities were carried out, including “Bird Watching in the Wild”, “Wonderful Night Hike”, “Plants Guided Tour by the Top Ten Interpreters”. Good progress in science popularization theory research has been made, including the popularization method research for both community residents and urban citizens, the system construction of public education curriculum in botanical gardens.

The Garden’s science popularization work was highly evaluated by the society and relevant departments. The Garden was authorized as “Advanced Unit of Science Communication” in the year 2014-2015 by the CAS, and was awarded “Guangzhou Outstanding Patriotic Education Base” by the Propaganda Department of Guangzhou Municipal Committee. The Public Education Department of SCBG was awarded the title “Women’s Civilization Post” by Guangdong province. Mr. Song Zhengping won the Advanced Individual Award of the CAS Science Popularization in the year 2014-2015.

Dinghushan National Nature Reserve (DNNR)

In 2016, under the guidance of co-construction task of the CAS and the MEP with the aim of establishing a demonstrative nature reserve in line with international standards, DNNR focused on the functions of natural conservation, scientific research and monitoring, science communication, management and service of scientific research platform. Great progress has been achieved through the efforts input by the staff, which offered a valuable gift for 60 anniversary of Chinese nature reserves construction.

Major Work of the Nature Reserve

DNNR successfully organized the first working meeting of the co-construction between CAS and MEP in April, with the attendance of Zhang Yaping, Vice President of the CAS, and Huang Runqiu, Deputy Minister of MEP. The MAB Biosphere Reserve Ten Year International Evaluation meeting was held in December, attended by Xu Zhihong, President of Chinese National Committee for Man and the Biosphere Programme. Internal institutional reform and personnel recruitment were completed. DNNR was also involved in some decision-making, such as construction and management of Nature Reserve, National Nature Reserve Development Planning (2016-2025)，etc. The album of *Man and the Biosphere* was completed to commemorate the 60 anniversary of establishment of Chinese nature reserves.

MOU signing of Dinghushan co-construction by CAS and MEP

The group photo of the decade assessment conference of Dinghushan MAB biosphere nature reserve

Nature Conservation and Management

The capacity of management team with an undergraduate student recruited was improved greatly. No forest fire and safety incidents were happened the whole year. With the great support from the local governments, local people tombs and fire investigations were carried out. Forest fire break with the total area of 18.9 km and the fire break of outer wall of the organizations inside the Dinghushan were cleared. The performance testing of intelligent Patrol System was carried out and put into use. The Yangangtou Management Station was built and put into use.

The management and conservation team are conducting wind extinguisher exercise

Scientific Research Monitoring Platform

Three Youth Fund projects were successfully funded by NSFC. Twelve academic papers were published, of which 7 papers are listed as Top 10% SCI with the highest impact factor 8.444. The monitoring of the soil moisture, regional meteorology and atmosphere and the comprehensive investigation of woody plants in every five years in Dinghushan Plot with an area 20ha were conducted. The field monitoring of birds, mammals, butterfly and pine wilt disease was carried out. Some new record species in Dinghushan were found, including 1 bird species, 4 butterflies species and 1 centipede species. The "Wildlife Monitoring Excellence Award" was granted by the Biodiversity Committee of the CAS.

Dinghushan engaged and provided services for the field practice teaching of 1094 teachers and students from Guangdong Parmaceutical College. Total 49 batches with 421 experts and scholars from domestic and abroad visited Dinghushan.

Science Popularization Activities and Social Publicity

The Construction of "Guangdong Province Nature School Dinghushan Classroom" was initiated with the funds from the Publicity and Education Center of Guangdong Province Environment Protection. The evaluation of Guangdong Teenager Science and Technology Education Base was carried out once in every 5 years and got good grades. An MOU on the winter and summer camp was signed, cooperating with an Early Education Information Consultation Limited Company in Guangzhou.

Seven science popularization activities were conducted with the involvement of 1320 people, such as "exploring the magical and fabulous forests", etc. Three hundred and five batches of 4242 people participated the Field Exploration Activity of Environment Education. Forty-seven batches of 2619 tourists visited the theme exhibition hall. The science popularization was conducted through various ways including Wechat and website etc. About 17 articles on science popularization were published, of which 7 articles were adopted and published by "Xijiang Daily".


Summer camping in Dinghushan

Party Building and Innovative Culture

There are 11 party branches and 445 party members of CPC in SCBG. In 2016, a total of 5 staff were newly recruited and approved to be party members. SCBG won 23 awards at all levels of CAS, Guangdong Province, etc. The Party Committee supports the reform of SCBG, organizes studies on the theoretical and practical issues of party building in a deep-going way, and plays the role of political core and supervision.

1. Studies on the theoretical and practical issues of party building have fostered the rapid progress of all undertakings in SCBG

We take the lead to enhance studies and provide moral motivation of cohesion. The Party Committee of SCBG has organized studies on the theoretical and practical issues of party building in a deep-going way. Director/Party Secretary Ren Hai has mobilized us to combine the work focus on the 13th Five-Year Plan, and he has identified the emphasis of the work of party building. Regarding to the problems arising from the auditing in each administration, he pointed out the efforts must be made in the future. He specially emphasized that we should consolidate learning practically in combination with the year of system building. The members of theoretical team of SCBG's Party Committee (the center team) took the lead to study, each party branch committee took the lead to study and party members were encouraged to follow suit. Party leaders, branch party secretary or branch committee took an initiative to give party lectures on branch meetings. All these activities have aroused great learning interests from the party members of SCBG. Party leaders took part in the learning at party branches in the form of ordinary party members. The Party Committee (the center team) and each branch committee carried out studies in four special subjects which are Party constitution, Party rules, speeches, purposes according to time schedule. Party cadres have strengthened their belief, abided by strictly the political rules, and enhanced their sense of mission of "Four Consciousness" and innovation of science and technology for people.


Director/Party Secretary Ren Hai mobilized learning on the theoretical and practical issues of party building at the education mobilization meeting.

Lay a solid foundation and establish learning model which conforms to the actual situation of management of R&D. "Learning original articles, talking about experience, writing experience and essays" is the basic learning model of the Party organization. "Bulletin board, intranet feature, e-version Monthly Learning, QQ, wechat, e-mail, telephone" is the basic model of communication. "Special subject report, video communication workshop, situational questions and answers of studies on the theoretical and practical issues of party building of CAS, knowledge contest on Party constitution and Party rules, watching typical story feature films of outstanding units and individuals" is the enhanced and improved basic model. The utilization of

Deputy Director Mr. Wang Yongfu, Lecturers' Group of Provincial Publicity Dept. of the CPC gave a special counselling report on studies of theoretical and practical issues of party building

these models let Party cadres learn the essence of Party constitution and Party rules and enhance their awareness.

Doing solid work, brand building of Party Building has made good progress. The Party Committee finished recommendation of candidates of the 19th CPC National Congress and attended the recommendation work of delegates of the 1st Party Congress of Guangzhou Branch and candidates for Commission for Discipline Inspection and Party Committee. Organizational relationship investigation and the general election of the Party branch have been finished. Special training for Party affairs cadres was organized. Collection, management and internal statistics about Party membership fee were completed in a timely manner. Combined with studies on the theoretical and practical issues of party building, the Party Committee has conducted branding building which features achieving new success based on our duty. During the process, the 1st Branch of R&D was awarded the Advanced Grass Root Party Branch of CAS, the 1st Branch and 3rd Branch of R&D was awarded the Advanced Party Branch of SCBG. Zhou Guoyi was awarded the National Excellent Worker in Science and Technology. Duan Xuewu was awarded the Outstanding CPC Member of CAS. Eight CPC members were awarded Excellent Party Affairs Workers and CPC Members of SCBG. The secretary of the 3rd Branch of R&D Zeng Songjun presided over 5 projects including one project of National Key R&D Plan. The achievements obtained by Zhou Guoyi and Xing Fuwu of the 1st Branch and 2nd Branch of R&D won the first prize of Guangdong Science and Technology Awards respectively. Ren Hai from the 3rd Branch of R&D undertook one project of CAS Strategic Priority Research Programme (A –type) and one project of National Key R&D Plan.

SCBG's Director/Party Secretary Ren Hai, Vice Party Secretary/Secretary of Inspection Commission Zhang Fusheng presented awards to medalists of Guangdong July the 1st Medals

The 1st Branch of R&D Representative, Mr. Zhang Wei received award in Beijing.

Carry forward the fine culture and advocate the system culture. We will continuously deliver content to "Let's talk about Innovative Culture" Column in the intranet, and advocate system culture on the basis of building "inclusive culture". 2016 is the year of "system building year". SCBG party and administrative leaders seriously implement The Eight Point Austerity Rules of Political Bureau of the Central Committee and CAS implementation rules and the spirit of relevant measures of implementation of Guangdong Province, and resolutely oppose the formalism, bureaucracy, hedonism, extravagance. In combination of interim audit, special supervision and inspections being related with The Eight Point Austerity Rules of Political Bureau of the Central Committee and "12 Rules" of the CAS Party Group, special inspections about assessment fees and labor costs, a lot of problems have been corrected, and a set of rules and regulations have been set up, perfected and standardized.

A new breakthrough was made in the theoretical aspects of political thoughts. For the first time, the optional project of CAS Political Research Committee was funded by CAS. Research from Guangzhou Branch of CAS has been undertaken on how to implement the supervisory responsibilities for Discipline Inspection Commission. "Probe a new model of Party Building with SCBG's own characteristics" was awarded the first prize of outstanding paper. "The problems and countermeasures of democratic management and democratic supervision at present stage" won the third prize of outstanding paper.

2. Implement clean government responsibility, safeguard the development of SCBG

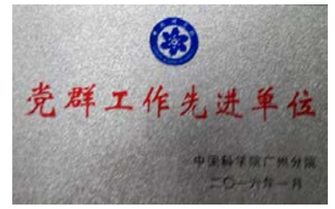
We earnestly implement the main responsibility and oversight responsibilities of the Party in a comprehensive and strict manner, and make sure "one post and two responsibilities". Party and administrative leaders have signed individualized

Responsibility Letter with the directors of management departments, scientific research centers, research groups, business operation of SCBG. Activities have been carried out in terms of the middle-level management cadre appointing announcing and honest conversation on anti-corruption, light punishment, commandment talk, and monthly discipline education. Internal audit has been conducted on authenticity and legitimacy of economic business of 8 research groups. Party members and cadres have been organized to listen to the tour report "Probity and Self-discipline Rules of CPC"、"CPC Disciplinary Regulations" and studied "Codes" and "Regulations". Do a good job of handling letters, and letters and visits work according to work procedures and requirements. Through the combination of supervision, education, discipline execution and warning, measures have been taken to protect Party cadres and the backbones of scientific researchers, and maintain the harmony and stability of SCBG.

Guangzhou Branch hosting《Codes》《Regulations》Tour report in SCBG

3. New progress was made in the United Front, Returned Overseas Chinese Federation and the Mass organization building

SCBG was awarded the advanced unit of Party Work by Guangzhou Branch, and the advanced unit of National Fitness Day of CAS. The Public Education Department of Horticulture Center was awarded the title "Women's Civilization Post" by Guangdong province. The family of Zhou airong was awarded one of the top ten scholarly families and one of the most beautiful families in Guangzhou city. At the same time, Zhou airong received the honors of the Female Red Banner Pacesetter of Guangzhou and Guangzhou Good Person. Xu xinlan was elected an active representative of duty performance by Tianhe District People's Congress. The renovation of the badminton hall was completed. We received good performances by attending the sport contests organized by CAS, Guangdong provincial authorities, Guangzhou Branch of CAS, etc. The 2nd Branch of Jiu San Society, the Returned Overseas Chinese Federation and the Youth League have finished leadership changes. Jiang houquan acted as a new representative of Guangzhou Municipal People's Congress, and Xu xinlan acted as a representative of Tianhe District People's Congress. The Trade Union organized Single Youth Fellowship. Youth League and Youth Innovation Promotion Association of CAS invited the headmaster of Changban Primary School to have an informal discussion meeting at SCBG. A series of activities have been undertaken: conducting Care Project, delivering services to vulnerable groups, visiting more than 43 households (people), issuing 62,100 Yuan's worth of assistance. We went and saw the sick staff in the hospitals and the staff living in the Old People's Home, and gave them the warmth from the organization.



Team Members (6 people) on behalf of Guangzhou Branch attending the Contest with good performance

Research Platform and Infrastructure Construction

Key Laboratories

Key Laboratory of Plant Resources Conservation and Sustainable Utilization, CAS

The key laboratory aims to meet the needs of national development strategy, with the researches focusing on the conservation and sustainable utilization of plant resources. Using multidisciplinary methods from gene, individual to population and community levels, the laboratory carries out both basic and applied basic research in the following three fields: the mechanism of biodiversity formation and maintenance, the conservation and sustainable utilization of plant diversity, as well as the utilization of germplasm, genetic and chemical resources. The laboratory also aims to provide a theoretical and technological basis for the protection and sustainable utilization of important plant resources.

The director of the laboratory is Professor Jiang Yueming, the deputy director is Professor Kang Ming, and the chair of the academic committee is Professor Huang Hongwen. At present, the laboratory has 13 research groups with 84 staff, including 65 scientific researchers, among which 24 researchers are professors. Two researchers were selected by the "National Hundred, Thousand and Ten Thousand Talent Project". One researcher won the fund for the Distinguished Young Scholars of NSFC. One researcher was selected as the leading scientist of National "Ten Thousand Talent Program", and four researchers were selected by the "Hundred Talent Program" of the CAS. In 2016, Professor Duan Xuewu won the 13th Guangdong Ding Ying Science and Technology Award. Professors Kang Ming and Ge Xuejun were selected as specially-hired researchers of "CAS Distinguished Research Fellow Program". Professor Kang Ming was selected as the excellent member of CAS Youth Innovation Promotion Association. Associate Professor Zhou Zhongyu was selected as one of Young Top-notch Talents in science and technology innovation of Guangdong Special Supporting Program.

In 2016, the laboratory received 52.27 million Yuan with 174 scientific research projects, including two projects from the National Basic Research Program of China (973 Program, 5.79 million Yuan), one project from CAS Strategic Priority Research Programme (6.08 million Yuan), two projects from the Key Research Program of the CAS (1.34 million Yuan), 66 grants from NSFC (10.20 million Yuan), and one project for International Cooperation (0.74 million Yuan). In addition, the laboratory got 73 newly funded scientific projects with 57.29 million Yuan in 2016.

This year the staff in the laboratory published 144 SCI papers, including 47 Top 30% papers and 23 Top 10% papers. Eighteen invention patents were granted, and two new cultivars were registered in International Union for the Protection of New Varieties of Plants. One project was granted as Guangdong Patent Gold Award and one project was granted the first prize of Science and Technology Award by Guangdong Province. One project was granted the first prize of Technological Invention Award by Hubei Province, another project was granted Silver Medal in television animation

category outstanding works of science popularization award of Chinese Science Writers Association.

In 2016, the laboratory affiliated 12 postdoctors, 58 Ph.D. candidates and 90 master students. One postdoctor completed the research work, 12 Ph.D. candidates and 18 master students were awarded for Ph.D. or M.S. degrees, respectively. Specially, the Ph.D. candidate Li Taotao (Supervisor: Pro. Jiang Yueming) won the CAS President Award and SCBG BIOMIGA scholarship. In the same year, he became a postdoctor in SCBG and was selected for a grant of "Postdoctoral Innovative Talent Supporting Program" with 0.6 million Yuan. One graduate student won the first scholarship prize from Pubang Garden Co. Ltd, and four graduate students won national scholarships. Professor Jiang Yueming won the Zhuli Yuehua Excellent Teacher Award, and Professors Kang Ming and Chen Hongfeng won the honor of excellent postgraduate tutors of Guangzhou Education Base.

Key Laboratory of Vegetation Restoration and Management of Degraded Ecosystems, CAS

In the year of 2016, the key laboratory received 58.5 million Yuan funding from 51 projects, including 3 grants supported by the National Key R&D Plan, 18 grants from NSFC, 8 from Minstry of Science and Technology, 13 from CAS and 4 from other agencies. Total 72 papers were published in international journals, in which 58 papers were published in the Top 30% journals of the related fields. Three national patents were authorized in 2016. In total, 27 postgraduates earned their Ph.D. or M.S. degrees. Dr. Zhou Guoyi won the honor of "National Outstanding Researcher". Dr. Mo Jiangming received the "Special Government Allowance of the State Council".

Symposium of the international innovation team of forest ecology and global change

Key Laboratory of South China Agricultural Plant Molecular Analysis and Genetic Improvement, CAS

In the year of 2016, the key laboratory has 47 members, in which 2 members were recruited this year. The lab received 101.7 million Yuan funding from 100 projects, and among them, 35 projects (58.98 million Yuan contracted funds) are newly funded. The lab published 41 SCI papers including the Top journals like *Nature Communications* and *Plos Pathology*. Eight patents were authorized in 2016. Currently the lab has 6 postdoctural fellows, 42 Ph.D. students and 60 M.S. students. In total, 3 postdocs and 17students graduated in 2016. Dr. Yang Ziyin and Dr. Hou Xingliang were nominated as "excellent advisors of CAS at Guangzhou Education Base in 2016". Dr. Yang Ziyin was funded by Guangdong Outstanding Young Scientist Fellowship.

Key Laboratory of Digital Botanical Garden of Guangdong Province

Following the primary working plan of 2016, the lab put great efforts on enhancing the ability of data collection and utilization. Throughout the year, some achievements have been made: 1) the digital dictionary of “the flora of Guangdong” (an APP for Android mobile phone) ; 2) Bio-surveyor 1.0 APP for Android mobile phone; 3) the data management system of heritage and historical trees in Zhaoqing city; 4) the living plant management system of Nanning Arboretum; 5) the first phase of data management system for the Chinese Union of Botanical Gardens; 6) the data platform for East Asia Phenology Network.

All these software or data management systems have been tested and used in botanical garden living plant documentation and data collection.The ability of data management, analysis and visualization has been improved significantly. The lab received a good ranking in 2016’s peer review which was organized by The Science and Technology Department of Guangdong Province.

The data management system of heritage and historical trees in Zhaoqing city

The data platform for East Asia Phenology Network.

Data management system for the Chinese Union of Botanical Gardens

Key Laboratory of Applied Botany of Guangdong Province

The key laboratory was established in 2014. The lab comprises 26 research groups with 122 permanent staff. The director of the laboratory is Prof. Huang Hongwen, the executive deputy director is Prof. Ren Hai and the academic committee director is Wu Weihua. In the year of 2016, 101 new research projects of more than 100,000 Yuan were funded, and annual actual fund was 122 million Yuan. There were 178 papers published in international journals, 51 of which were published in the Top 10% journals of the related fields. In addition, the laboratory published 5 monographs. There were 15 invention patents granted and 12 new cultivars. Fifty-two postgraduates were awarded Ph.D. or M.S. degrees. In the triennial assessment of Guangdong provincial key laboratory, the laboratory won the first of the life and science group in 189 participating laboratories.

Assessment of Guangdong provincial key laboratory

Annual academic meeting and committee meeting

Display panels

中国科学院华南植物园

广东省应用植物学重点实验室

论文奖励办法（试行）

为适应广东省重点实验室验收和评估指标的要求，进一步提高广东省应用植物学重点实验室的学术影响力，特制订本奖励办法：

第一条 凡署名单位为“Guangdong Provincial Key Laboratory of Applied Botany”的外文论文和署名为“广东省应用植物学重点实验室”的中文论文，均可得到广东省应用植物学重点实验室的资助和奖励。

第二条 发表在SCI收录期刊上的英文论文，奖励金额为影响因子×2000元；中文文章每篇奖励1000元。

第三条 奖励领取方式为作者将论文电子版发送至邮箱 dxj@scbg.ac.sn，持论文及期刊封面复印件到实验室秘书处存档并办理相关手续。

第四条 本办法解释权归广东省应用植物学重点实验室主任办公室。

第五条 本办法自发布之日起执行。

广东省应用植物学重点实验室

2016年11月3日

Reward systems

序号	课题名称	负责人	负责人单位
1	预测开花植物花期的物候学模型	时培建	南京林业大学
2	广东中西部金线莲野生资源调查引种与林下人工种植技术研究	邵 玲	肇庆学院
3	乳酸菌发酵香蕉汁饮料的安全性、稳定性与品质研究	杜 冰	华南农业大学
4	组蛋白去乙酰化酶SlHDT3参与番茄抗青枯病的机制研究	李 涛	广东省农业科学院蔬菜研究所
5	苏木科植物种质资源遗传多样性—分子遗传标记开发	代色平	广州市林业和园林科学研究院
6	植物激素BR调控稻米淀粉合成及其理化特性研究	李钱峰	扬州大学
7	金钗石斛组织培养工厂化育苗关键技术集成研究	张华通	广东生态工程职业学院
8	桉树与林下植物功能群相互关系对施用石灰的响应与适应	万松泽	江西农业大学
9	华南植物园树种的木材密度和水分利用对气候变暖的适应性研究	黄玉清	中国科学院广西植物研究所
10	粤北地区淫羊藿资源调查及优质品系筛选	张燕君	中国科学院武汉植物园
11	匍匐型野牡丹属新品种培育	周仁超	中山大学
12	金银岗梅颗粒制备方法、质控指标测定及药理研究	陈优生	广东食品药品职业学院
13	甘蔗响应低钾胁迫的分子机制及关键基因发掘	齐永文	广东省生物工程研究所
14	蕨类植物高级分类单元的叶绿体系统发育基因组学研究	王 艇	华南农业大学

Open projects

Research Stations

Dinghushan National Field Research Station of Forest Ecosystem

Dinghushan station is one of the Chinese Ecosystem Research Network (CERN) members, and one of the national public research platforms of the Chinese National Ecosystem Research Network (CNERN). Its research objective is forest ecosystems. The station focuses on ecosystem ecology, oriented by national and local demands and frontier ecology subject development, aims at national and CAS science and technology innovation, ecology talent cultivation, public ecological awareness education. Target at an important ecological research base, international famous ecosystem ecology integrated platform foundation, and zonal forest ecosystem succession processes and regularities comprehensive research. Reveal adaptation regular and regulation mechanism on tropical and subtropical forest ecosystem carbon, nitrogen, potassium, water cycling and these elements coupling key process how to response to global change, offer key scientific support for national and local ecological environment protection, and sustainable resource utilization.

The main task of the station is forest environmental monitoring and data accumulation, and providing a good platform and essential logistical support for all experts and scholars who are carrying their projects or propose to make scientific research in Dinghushan. The station has offered scientific platforms for more than 10 institutes and universities for long term scientific researches, including a batch of important projects such as international cooperation projects, National Basic Research Program of China (973 Program), the key program of NSFC, the Distinguished Young Scholar Program of NSFC, etc. These programs highlighted the important supporting role of the platform.

Dinghushan station has its unique location advantage, well improved platform basement, and abundant research accumulation, it has become an important ecological research station in China and abroad. According to incomplete statistics, more than 50 projects were launching at Dinghushan station, the total annual contract fee was more than 50 million Yuan, and most of the projects were benefitted from field sites, research facilities, observation data, background data, and staff assistance, respectively. All those research activities embodied the strongest supporting function of the station.

In 2016, 58 papers were published by the Dinghushan staff, 31 of them were published in the SCI journals, the total impact factors are 112.45. One patent was granted. Guest researchers published 16 papers, and five of them are SCI papers. Prof. Zhou Guoyi, Yan Junhua and Ye Qing were selected as specially-hired researchers of "CAS Distinguished Research Fellow Program". The achievement of "response mechanism to environmental changes of evergreen broad-leaved forest ecosystems stability and soil carbon sequestration" won the first prize of Guangdong Science and Technology Awards with dependent intellectual property right in 2016. Due to all the achievements of the station, Dinghushan station won the third time of title of "Excellent Ecological Station", 5-year-interval evaluation of CERN during 2010-2015.

Heshan National Field Research Station of Forest Ecosystem

Heshan station, which is also named as Heshan Hilly Land Integrated Experimental Station, CAS, is a member of CNERN and CERN. The station locates in Heshan city of Guangdong province. It is a template of south subtropical evergreen broadleaf plantation ecosystem. The station supports the study of degradation and restoration mechanisms of degraded ecosystems in South China, develops the methods and key techniques of ecological restoration, and carries out the revegetation of degraded wasteland and regional sustainable development demonstration mode. Up to now, Heshan station has 23 researchers and 7 technicians, 1 weather station, 6 permanent experimental sites and 45 long-term experimental plots.

In 2016, Heshan station won the first prize of Guangdong Science and Technology Award of 2015, published 1 monograph and 30 papers including 21 papers published in the SCI journals, supported 53 post-graduate students (including 22 Ph.D. and 31 Master) conducting their thesis research, and applied 4 patents and got 2 patents being granted. In 2016, researchers in Heshan station obtained one project of National Key R&D Plan, and 6 projects funded by NSFC (including 1 key program). Besides, Prof. Shen Weijun was selected as one of Millions of Leading Engineering Talents of Guangdong Special Supporting Program.

During 2015 and 2016, researchers in Heshan station finished the investigation of old and famous tree resources in Heshan city. They found that the old trees are mainly distributed in Fengshui woodland by the villages, including *Castanopsiscarlesii, Machiluschinensis, Machiluschekiangensis, Ficusbenjamina, Cinnamomumcamphora, Vitexquinata, Machilusrobusta, Endospermumchinense, Glyptostrobuspensilis, Aquilariasinensis, Heliciacochinchinensis* and so on. They also found 3 old tree communities, which are rare wild plant resources, such as *Castanopsiscarlesii* community, community composed of *Vitexquinata, Machiluschinensis, Machiluschekiangensis* and *Machilusrobusta*, and community composed of *Cinnamomumcamphora* and *Endospermumchinense*. By investigation, they also found some excellent native species. For example, rare species including *Glyptostrobuspensilis* and *Aquilariasinensis*; species with high ornamental values including *Cassia javanica* var. indo-chinensis, *Ochnaintegerrima*, *Ilex rotunda* and *Pyrenariaspectabilis* etc.; species of important afforestation and greening tree including *Machiluschinensis*, *Machiluschekiangensis*, *Machilusrobusta*, *Endospermumchinense* and *Heliciacochinchinensis* etc.

Photos of old trees

One monograph will be published based on this investigation, in order to promote the understanding of local people and government about the status of old and famous tree resources and the wild plant resources protection, and to promote the exploration and utilization of the native species by production and operating departments.

Xiaoliang Research Station for Tropical Coastal Ecosystem

Xiaoliang station aims at the restoration of degraded tropical coastal land. In 2016, the station has obtained seven new grants, including a funding with more than four million Yuan from CAS Strategic Priority Research Programme and four grants from General Program of NSFC. Other 3 grants were from National Key R&D Plan, Guangdong Province, and Guangzhou City, respectively. Dr. Wang Faming was nominated as “Pearl River New Star”. Prof. Huang Jianguo obtained a grant from the key international cooperation project of CAS. Totally, the station got nearly 10 million Yuan funding in 2016, the best over the recent years. Moreover, three NSFC grants were completed in 2016. In this year, total 30 SCI papers were published or accepted for publishing, 3 of them were published in the Top 10% journals in corresponding research fields. Currently, there are 15 ongoing projects in this station. Two Ph.D. students and two master students graduated in 2016.

Forest restoration has been proposed as an effective strategy for the sequestration of atmosphere CO_2. Understanding the mechanisms of soil organic carbon dynamics in afforestation is important to quantify and enhance carbon sequestration. After 70 years afforestation with two conifer and three broadleaf tree species in monocultures in Northeast USA, they measured soil carbon pools as well as carbon fractions in these plantations and nearby pasture control. Soil carbon stored in forest floor was increased by afforestation, especially in conifer stands. Total carbon stock in mineral soils was not statistically different among species, but carbon fractions had been altered. Compared to pasture land, afforestation decreased coarse particle organic carbon fraction, while increased recalcitrant mineral associated soil organic carbon fraction. Afforestation decreased the macro-aggregate carbon fraction in the 0-5 cm soil, but increased the micro-aggregate carbon fraction in the 5-15 cm soil. Totally, they found that 1) Afforestation using conifers could improve the whole soil-profile carbon stock compared to broadleaves when the forest floor is included (Table 1); 2) Even though the overall mineral soil carbon stock was not changed, afforestation could improve soil carbon stabilization through increasing mineral associated soil organic carbon fraction and forming more micro-aggregate carbon fraction in deeper soils.

Table 1 Soil bulk density and C stock (mean ± SE) in different stands and pastures after 70 years afforestation

Types	Stand	Bulk Density (g/cm^3)		C Stock (g/m^2)			
	Species	0–5 cm	5–15 cm	FF	0–5 cm	5–15 cm	Total
Conifer	NS1	0.54 ± 0.02	0.97 ± 0.03	1550 ± 203	1537 ± 80	2188 ± 92	5275 ± 218
	NS2	0.62 ± 0.01	0.90 ± 0.03	2169 ± 147	1101 ± 39	1522 ± 171	4793 ± 328
	RP1	0.63 ± 0.01	0.87 ± 0.03	1110 ± 94	1125 ± 140	2146 ± 326	4381 ± 509
	RP2	0.64 ± 0.04	0.89 ± 0.01	697 ± 164	1151 ± 138	1891 ± 228	3740 ± 250
	Average	**0.61 ± 0.01**	**0.91 ± 0.02**	-	**1228 ± 72**	**1937 ± 126**	**4547 ± 183**
Broadleaf	BL1	0.55 ± 0.01	0.95 ± 0.05	0	1867 ± 373	1905 ± 102	3771 ± 337
	BL2	0.71 ± 0.05	1.02 ± 0.04	0	1179 ± 100	1594 ± 106	2772 ± 26
	RO1	0.70 ± 0.05	0.93 ± 0.03	1159 ± 183	787 ± 102	1465 ± 53	3410 ± 175
	RO2	0.61 ± 0.09	0.94 ± 0.03	624 ± 71	1137 ± 186	1881 ± 103	3643 ± 293
	SM1	0.57 ± 0.03	1.00 ± 0.03	970 ± 65	1028 ± 36	1889 ± 98	3887 ± 182
	SM2	0.56 ± 0.00	0.89 ± 0.02	0	1364 ± 51	1990 ± 288	3354 ± 246
	Average	**0.62 ± 0.02**	**0.96 ± 0.02**	**-**	**1226 ± 128**	**1787 ± 67**	**3472 ± 110**
Pasture	-	0.47 ± 0.02	0.92 ± 0.07	0	1315 ± 98	1920 ± 240	3235 ± 143

FF Forest floor, *NS* Norway spruce, *RP*, Red Pine; *SM* Sugar maple, *BL* Black locust, *RO* Red oak

Herbarium

The SCBG herbarium was founded in 1928 and comprises a collection of more than one million plant specimens, with more than 20,000 new items being added each year since 2008. The earliest specimen was collected in 1849.The main functions of herbarium are collection preservation, research support and social services. So in 2016, we continued to emphasize our work on the collection of specimens in some important areas and groups, scientific research support and technical training on plant collection and identification.

Exploration and specimen collection: With the survey of biological resources of the tropical and insular regions of China supported by National Science & Technology Infrastructure Program, the wildlife resources investigation of Guangdong funded by Guangdong Provincial Forestry Department and some other projects, we explored mainly in Guangdong and neighboring provinces, and collected over 25 thousands specimens.

Research support and social services: We hosted 627 visits, served 81 times on plant illustration and offered 18 loans, with a total of 441 specimens for researchers all over the country. In the past year, 11,238 collections were mounted and near 6,500 specimens were imaged. At the end of April, one-week training course on plant drawing was invited to be held in Fairylake Botanical Garden, Shenzhen & CAS. On September 23, workshop on specimen collection and identification was opened in Hengshan National Nature Reserve, and closed on September 29, with more than 50 participants from Guangdong, Hunan, Fujian, Hainan, Chongqing and other provinces and cities. From October to November, comprehensive skill training for medicinal plant identification was held four times in SCBG for 280 students from Guangdong Food and Drug Vocational-technical School, grouped by four and two and a half day for each group.

Group photo: 2016 workshop on specimen collection and identification

Public Laboratory

The report meeting of review in public technical center of CAS

In 2016, all equipments in the Public Laboratory were frequently and efficiently used with 93941 samples measured. The laboratory was granted one CAS large instrument functional development project, and participated in one CAS large instrument development project and 13 NSFC projects. The laboratory also published 17 papers and applied for 5 patents. The staff of the pubic lab attended 22 training and technical exchange activities. The public lab hosted 10 technique lectures with 310 participants, 7 large equipment professional trainings with 25 trainees, and 3 laboratory certification management trainings with about 30 trainees.

The repairing and purchasing project of genetic resources and evolution research experiment platform in 2015 was completed successfully with the installation of 120KV transmission electron microscopy of 3.15 million Yuan. The repairing and purchasing project bidding of biological resources microscopic structure and function analysis platform in 2016 was completed with the ultra-high resolution fast scanning confocal microscopy imaging system of 6.30 million Yuan. The self-raised funds project bidding of triple level 4 pole liquid chromatography mass spectrometry instrument was accomplished. The repairing and purchasing project of molecular structure of biological resources and function analysis platform in 2017 was funded by the Ministry of Finance with a total of 5.80 million Yuan.

Seven years review in public technical center of CAS (Life science field) was accomplished and outstanding achievements were obtained with running funds award of 0.50 million Yuan per year from 2017 to 2021.

The CMA and CNAS lab double qualification certifications were passed successfully with two and a half years of efforts. Technical level and management level of Public Laboratory won the approval of national related departments.

Director Xu Xinlan served as a reviewing expert (Group leader) for instrument repairing/purchasing project and was elected as the council member of Chinese society of electronic microscope. She is also deputy director of professional committee of agriculture and forestry of electron microscopy society of China and deputy director of Guangdong electron microscopy society. At the same time, she is the member of the Standing Committee of People's Congress of Tianhe District, Guangzhou and deputy director of Guangdong council of Women of JIU SAN Society. Jia Yongxia was elected as the deputy director of the Public Laboratory.

The review meeting of qualification certification

Yuan Yunfei is responsible for nuclear magnetic resonance spectrometer unit. Pan Xiaoping is responsible for stable isotope mass spectrometer unit and Hu Xiaoying is responsible for scanning electron microscopy unit. They obtained outstanding units of Life science instrument center in Guangzhou.

Supporting Center

Library

As in previous years, library resources development is one of our key works. This year we optimized library collection based on the actual demand of scientific research activities in our institution. We cut down expenditure on paper version and invested more money for electronic resources (see the table below). We maintained the total kinds of periodicals including print and online version available to our staff and students, and unsubscribed 13 print magazines.In addition to subscribing 13 kinds of network databases as in 2015, we purchased some other online resources, including 11 periodicals, to better meet the needs of our researchers.

In 2016, we collected 766 copies of 77 kinds of overseas periodicals (including exchange), 1854 copies of 224 kinds of Chinese magazines (including exchange). We purchased 145 books in English, and 137 in Chinese. We received 86 books of 49 kinds donated by individuals and groups from home and abroad.

Expenditure of Resources in Recent Years（￥）

Year	Chinese Periodical	Overseas Periodical	Chinese Book	Overseas Book	Network Database	Total
2016	47780.01	387097.51	17197.41	97297.08	573359.24	112273.25
2015	57092.64	388006	17858.36	76734.01	457061.68	996752.69
2014	54108.35	390487	28625.32	55894.80	416583.27	945698.74
2013	50663.84	405372.13	22144.65	109819.75	237,848.30	825848.67

In 2016, there were more than 900 readers visiting the library. Total 1254 volumes were checked out with 508 person-times, 1141 volumes were returned with 453 person-times, and 241 books needed by our readers were borrowed from other libraries through interlibrary co-operation systems. More than 500 complete peer reviewed papers and 19 copies of academic dissertation claimed by our readers were transmitted to our library.

A subproject of *Constructing the Knowledge Service Ability* supported by National Science Library, CAS was overfulfilled. In addition, we uploaded 500 pieces of data for SCBG-IR and 7000 pieces of complete documents for an independently constructed database.

Office of *Journal of Tropical and Subtropical Botany*

In 2016, we published *Journal of Tropical and Subtropical Botany*, Vol. 24 (issue 1-6). Total 223 manuscripts were received and 93 papers with 1.34 million words altogether were selected for publication after peer review. Among them, 92 papers were supported by research funds, which accounted for 98.9% of the total; and 47 of them were supported by the state-level research funds.

According to “Chinese Academic Journal Comprehensive Citation Report Statistics”, our journal has an impact factor 0.756, with total 1909 citations and 35.8 thousand internet downloads. Our journal was included by the Chinese Core Journals of Science and Technology, and American PubMed Database in 2016.

Computer Network Center

The computer network system has been upgraded significantly in 2016. Forty TB Cloud Storage capacity has been newly deployed, 100 megabits extra outlet bandwidth has been added to the system, a backup optic fiber outlet line started to serve the system， and the system supports fast handoff and seamless switch between different lines. Our computer network has expanded to newly constructed laboratory building number 4 and 5, and a new network control room is about to be finished. All these methods are conducive to maintain a bigger, faster and safer computer network for the institute.

On the other hand, the informatization status for the institute was improved by the progress of scientific data management, plant science related software (or APP for mobile phone) development, and the usage of supercomputer application on plant science. For example, the following software and data systems were all developed in 2016: 1) the digital dictionary of “ the flora of Guangdong” (an APP for Android mobile phone) ; 2) Bio-surveyor 1.0 APP for Android mobile phone; 3) the data management system of heritage and historical trees in Zhaoqing city; 4) the living plant management system of Nanning Arboretum; 5) the first phase of data management system for the Chinese Union of Botanical Gardens; 6) the data platform for East Asia Phenology Network;

Up to the end of the year, we helped to open 10 accounts in National Center for Supercomputing Applications (NCSA), which allowed scientists from our institute to access the great computing and data resources of NCSA. Through this way, 12 high quality scientific papers have been published.

South China Plant Identification Center

In 2016, South China Plant Identification Center (SCPIC) kept its good tradition and provided plant identification services for the whole society. For example, SCPIC provided more than 90 batches of plant identification services for public security, customs, courts, universities and companies from Guangdong and its surrounding areas. In October, 2016, the new director of SCPIC, Dr. Luo Shixiao, cooperated with specialists of SCPIC, updated the service scope, identify appraisal, and other regulars of identification. More information on SCPIC, please check the new web page of SCPIC (http://scpic.scbg.ac.cn/).

Appendix I. Major Projects and Publications

Awards Obtained in 2016

Project Name	Award Type	Prize Grade	Main Contributors	SCBG's Ranking
Response mechanism to environmental changes of evergreen broad-leaved forest ecosystems stability and soil carbon sequestration	Guangdong Provincial Science and Technology Award	First Class	South China Botanical Garden	Zhou Guoyi、Mo Jiangming、Zhang Deqiang、Liu Juxiu、Lu Xiankai,etc
Research and its industrialization of plant diversity in South China Sea islands	Guangdong Provincial Science and Technology Award	First Class	South China Botanical Garden,etc	Xing Fuwu、Wang Faguo、Chen Hongfeng、Zhao Qiangmin、Liu Derong,etc
The application of polyhexamethylene guanidine hydrochloride on preventing and controlling citrus sour rot disease and its anti-staling agent	Guangdong Provincial Patent Award	Gold Award	South China Botanical Garden	Duan Xuewu、Jiang Yueming、Feng Linyan、Wu Fuwang
Track the matchmakers of plants	Outstanding Works of Science Popularization Award of Chinese Science Writers Association	Silver Medal in Television Animation Category	Product Unit: China Agriculture Film and Television Center、South China Botanical Garden,etc	Author: Kuang Yanfeng、Liao Jingping、Jiang Houquan、Zhang Shenggui、Huang Fang ,etc

Main Papers Published in 2016

No.	Title	Journal Name	Issue Volume	Start	Stop	Impact Factor	Authors
1	The NF-YC–RGL2 module integrates GA and ABA signalling to regulate seed germination in Arabidopsis	NATURE COMMUNICATIONS	7	12768		11.329	Liu X, Hu PW, Huang MK, Tang Y, Li YG, Li L , Hou XL*
2	Reply to ‘Space-time asymmetry undermines water yield assessment’	NATURE COMMUNICATIONS	7	11604		11.329	Chen XZ, Wei XH, Sun G, Zhou P, Zhou GY*
3	Potassium Thioacids Mediated Selective Amide and Peptide Constructions Enabled by Visible Light Photoredox Catalysis	ACS CATALYSIS	6	1732	1736	9.307	Liu HX, Zhao LY, Yuan YF, Xu ZF, Chen K*, Qiu SX*, Tan HB*
4	High retention of 15N-labeled nitrogen deposition in a nitrogen saturated old-growth tropical forest	GLOBAL CHANGE BIOLOGY	22	3608	3620	8.444	Gurmesa GA, Lu XK, Gundersen P, Mao QG, Zhou KJ, Fang YT, Mo JM*

No.	Title	Journal Name	Issue Volume	Start	Stop	Impact Factor	Authors
5	Pattern of xylem phenology in conifers of cold ecosystems at the Northern Hemisphere	GLOBAL CHANGE BIOLOGY	22	3804	3813	8.444	Rossi S, Anfodillo T, Čufar K, Cuny HE, Deslauriers A, Fonti P, Frank D, Gričar J, Gruber A, Huang JG*, Jyske T, Kašpar J, King G, Krause C, Liang E, Mäkinen H, Morin H, Nöjd P, Oberhuber W, Prislan P, Rathgeber CB, Saracino A, Swidrak I, Treml V
6	In vitro propagation of Paphiopedilum orchids	CRITICAL REVIEWS IN BIOTECHNOLOGY	36	521	534	7.510	Zeng SJ*, Huang WC*, Wu KL, Zhang JX, da Silva JAT*, Duan J*
7	Reduction of Cd in Rice through Expression of OXS3-like Gene Fragments	MOLECULAR PLANT	9	301	304	7.142	Wang CH, Guo WL, Ye S, Wei PC, Ow DW*
8	Interactions among energy consumption, economic development and greenhouse gas emissions in Japan after World War II	RENEWABLE & SUSTAINABLE ENERGY REVIEWS	54	1060	1072	6.798	Lu HF, Lin BL*, Campbell DE, Sagisaka M, Ren H*
9	Diacyl Disulfide: A Reagent for Chemoselective Acylation of Phenols Enabled by 4-(N,N-Dimethylamino) pyridine Catalysis	ORGANIC LETTERS	18	5584	5587	6.732	Liu HX, Dang YQ, Yuan YF, Xu ZF, Qiu SX*, Tan HB*
10	OVATE Family Protein 8 Positively Mediates Brassinosteroid Signaling through Interacting with the GSK3-like Kinase in Rice	PLOS GENETICS	12	e1006118		6.661	Yang C, Shen WJ, He Y, Tian ZH*, Li JX*
11	Maize OXIDATIVE STRESS2 Homologs Enhance Cadmium Tolerance in Arabidopsis through Activation of a Putative SAM-Dependent Methyltransferase Gene	PLANT PHYSIOLOGY	171	1675	1685	6.280	He LL, Ma XL, Li ZZ, Jiao ZL, Li YQ*, Ow DW*
12	The Contribution of Carbon and Water in Modulating Wood Formation in Black Spruce Saplings	PLANT PHYSIOLOGY	170	2072	2084	6.280	Deslauriers A, Huang JG*, Balducci L, Beaulieu M, Rossi S
13	The long road to recombinase-mediated plant transformation	PLANT BIOTECHNOLOGY JOURNAL	14	441	447	6.090	Ow DW*
14	The rice YABBY4 gene regulates plant growth and development through modulating the gibberellin pathway	JOURNAL OF EXPERIMENTAL BOTANY	67	5545	5556	5.677	Yang C, Ma YM, Li JX*
15	Transcriptomic analysis of heteromorphic stamens in Cassia biscapsularis L.	SCIENTIFIC REPORTS	6	31600		5.228	Luo ZL, Hu J, Zhao ZT, Zhang DX*
16	Mangrove succession enriches the sediment microbial community in South China	SCIENTIFIC REPORTS	6	27468		5.228	Chen Q, Zhao Q, Li J, Jian SG*, Ren H*
17	Altitudinal patterns and controls of plant and soil nutrient concentrations and stoichiometry in subtropical China	SCIENTIFIC REPORTS	6	24261		5.228	He XJ, Hou EQ, Liu Y, Wen DZ*
18	Comparative transcriptome and metabolome provides new insights into the regulatory mechanisms of accelerated senescence in litchi fruit after cold storage	SCIENTIFIC REPORTS	6	19356		5.228	Yun Z, Qu HX, Wang H, Zhu F, Zhang ZK, Duan XW, Yang B, Cheng YJ, Jiang YM*
19	Pollutant-induced cell death and reactive oxygen species accumulation in the aerial roots of Chinese banyan (Ficus microcarpa)	SCIENTIFIC REPORTS	6	36276		5.228	Liu N*, Cao C（共同第一）, Sun ZY, Lin ZF，Deng RF
20	MicroRNA393 is involved in nitrogen-promoted rice tillering through regulation of auxin signal transduction in axillary buds	SCIENTIFIC REPORTS	6	32158		5.228	Li X, Xia KF, Liang Z, Chen KL, Gao CX, Zhang MY*
21	Warming effects on photosynthesis of subtropical tree species: a translocation experiment along an altitudinal gradient	SCIENTIFIC REPORTS	6	24895		5.228	Li YY, Liu JX*, Zhou GY, Huang WJ, Duan HL
22	AtSWEET4, a hexose facilitator, mediates sugar transport to axial sinks and affects plant development	SCIENTIFIC REPORTS	6	24563		5.228	Liu XZ, Zhang Y, Yang C, Tian ZH*, Li JX*
23	Regiospecific synthesis of prenylated flavonoids by a prenyltransferase cloned from Fusarium oxysporum	SCIENTIFIC REPORTS	6	24819		5.228	Yang XM, Yang JL, Jiang YM, Yang HS, Yun Z, Rong WL, Yang B*
24	Somatic embryogenesis and enhanced shoot organogenesis in Metabriggsia ovalifolia W. T. Wang	SCIENTIFIC REPORTS	6	24662		5.228	Ouyang Y, Chen YL, Lu JF, da Silva JAT*, Zhang XH, Ma GH*
25	Schima superba outperforms other tree species by changing foliar chemical composition and shortening construction payback time when facilitated by shrubs	SCIENTIFIC REPORTS	6	19855		5.228	Liu N, Guo QF, Ren H*, Sun ZY
26	Invariant community structure of soil bacteria in subtropical coniferous and broadleaved forests	SCIENTIFIC REPORTS	6	19071		5.228	Wang XL, Wang XL, Zhang WX, Shao YH, Zou XM, Liu T, Zhou LX, Wan SZ, Rao XQ, Li ZA, Fu SL*
27	The sphingolipid biosynthetic enzyme Sphingolipid delta8 desaturase is important for chilling resistance of tomato	SCIENTIFIC REPORTS	6	38742		5.228	Zhou Y, Zeng LT, Fu, XM, Mei X, Cheng SH, Liao YY, Deng RF, Xu XL, Jiang YM, Duan XW, Baldermann S, Yang ZY*
28	Novel synthesized 2, 4-DAPG analogues: antifungal activity, mechanism and toxicology	SCIENTIFIC REPORTS	6	32266		5.228	Gong L, Tan HB, Chen F, Li TT, Zhu JY, Jian QJ, Yuan DB, Xu LX, Hu WZ, Jiang YM, Duan XW*
29	Whole genome sequencing of a banana wild relative Musa itinerans provides insights into lineage-specific diversification of the Musa genus	SCIENTIFIC REPORTS	6	31586		5.228	Wu W, Yang YL, He WM, Rouard M, Li WM, Xu M, Roux N, Ge XJ*
30	Reforestation in southern China: revisiting soil N mineralization and nitrification after 8 years restoration	SCIENTIFIC REPORTS	6	19770		5.228	Mo QF, Li ZA, Zhu WX, Zou B, Li YW, Yu SQ, Ding YZ, Chen Y, Li XB, Wang FM*

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31	Dual mechanisms regulating glutamate decarboxylases and accumulation of gamma-aminobutyric acid in tea (Camellia sinensis) leaves exposed to multiple stresses	SCIENTIFIC REPORTS	6	23685		5.228	Mei X, Chen YY, Zhang LY, Fu XM, Wei Q, Grierson D, Zhou Y, Huang Y, Dong F, Yang ZY*
32	Decadal drought deaccelerated the increasing trend of annual net primary production in tropical or subtropical forests in southern China	SCIENTIFIC REPORTS	6	28640		5.228	Wang WT, Wang JX, Liu XZ, Zhou GY, Yan JH*
33	Tree aboveground carbon storage correlates with environmental gradients and functional diversity in a tropical forest	SCIENTIFIC REPORTS	6	25304		5.228	Shen Y, Yu SX*, Lian JY, Shen H, Cao HL, Lu HP, Ye WH*
34	To What Extent Local Forest Soil Pollen Can Assist Restoration in Subtropical China?	SCIENTIFIC REPORTS	6	37188		5.228	Sun ZY, Wang J*, Ren H*, Guo QF, Shu JW，Liu N
35	A large-scale chloroplast phylogeny of the Lamiaceae sheds new light on its subfamilial classification	SCIENTIFIC REPORTS	6	34343		5.228	Li B, Cantino PD, Olmstead RG, Bramley GLC, Xiang CL, Ma ZH, Tan YH, Zhang DX*
36	Changes in soil respiration components and their specific respiration along three successional forests in the subtropics	FUNCTIONAL ECOLOGY	30	1466	1474	5.210	Huang WJ, Han TF, Liu JX, Wang GS, Zhou GY*
37	Are leaves more vulnerable to cavitation than branches?	FUNCTIONAL ECOLOGY	30	1740	1744	5.210	Zhu SD，Liu H（共同第一），Xu QY，Cao KF，Ye Q*
38	Nitrogen saturation in humid tropical forests after 6years of nitrogen and phosphorus addition: hypothesis testing	FUNCTIONAL ECOLOGY	30	305	313	5.210	Chen H, Gurmesa GA, Zhang W, Zhu XM, Zheng MH, Mao QG, Zhang T, Mo JM*
39	Nutrient limitation of woody debris decomposition in a tropical forest: contrasting effects of N and P addition	FUNCTIONAL ECOLOGY	30	295	304	5.210	Chen Y, Sayer EJ, Li ZA, Mo QF, Li YW, Ding YZ, Wang J, Lu XK, Tang JW, Wang FM*
40	Subordinate plants sustain the complexity and stability of soil micro-food webs in natural bamboo forest ecosystems	JOURNAL OF APPLIED ECOLOGY	53	130	139	5.196	Shao YH, Wang XL, Zhao J, Wu JP, Zhang WX, Neher DA, Li YX, Lou YP, Fu SL*
41	Arabidopsis thaliana: A Model Host Plant to Study Plant-Pathogen Interaction Using Rice False Smut Isolates of Ustilaginoidea virens	FRONTIERS IN PLANT SCIENCE	7	192		4.495	Andargie M, Li JX*
42	Overexpression of the Starch Phosphorylase-Like Gene (PHO3) in Lotus japonicus has a Profound Effect on the Growth of Plants and Reduction of Transitory Starch Accumulation	FRONTIERS IN PLANT SCIENCE	7	1315		4.495	Qin SS, Tang YH, Chen YP, Wu PZ, Li MR, Wu GJ, Jiang HW*
43	Temporal-Spatial Transcriptome Analyses Provide Insights into the Development of Petaloid Androecium in Canna indica	FRONTIERS IN PLANT SCIENCE	7	1194		4.495	Tian XY, Yu QX, Liu HF*, Liao JP*
44	Transcriptome Analysis of Dendrobium officinale and its Application to the Identification of Genes Associated with Polysaccharide Synthesis	FRONTIERS IN PLANT SCIENCE	7	5		4.495	Zhang JX, He CM, Wu KL, da Silva JAT, Zeng SJ, Zhang XH, Yu ZM, Xia HQ, Duan J*
45	Proteomic Analysis of Differentially Expressed Proteins Involved in Peel Senescence in Harvested Mandarin Fruit	FRONTIERS IN PLANT SCIENCE	7	725		4.495	Li TT, Zhang JY, Zhu H, Qu HX, You SL, Duan XW*, Jiang YM
46	Reassessment of the Four Yield-related Genes Gn1a, DEP1, GS3, and IPA1 in Rice Using a CRISPR/Cas9 System	FRONTIERS IN PLANT SCIENCE	7	377		4.495	Li MR, Li XX, Zhou ZJ, Wu PZ, Fang MC, Pan XP, Lin QP, Luo WB, Wu GJ*, Li HQ*
47	DNA Barcoding Evaluation and Its Taxonomic Implications in the Recently Evolved Genus Oberonia Lindl. (Orchidaceae) in China	FRONTIERS IN PLANT SCIENCE	7	1791		4.495	Li YL, Tong Y, Xing FW*
48	A structural equation model analysis of phosphorus transformations in global unfertilized and uncultivated soils	GLOBAL BIOGEOCHEMICAL CYCLES	30	1300	1309	4.495	Hou EQ, Chen CR, Kuang YW, Zhang YG, Heenan M, Wen DZ*
49	Knock-Down of a Tonoplast Localized Low-Affinity Nitrate Transporter OsNPF7.2 Affects Rice Growth under High Nitrate Supply	FRONTIERS IN PLANT SCIENCE	7	1529		4.495	Hu R, Qiu DY, Chen Y, Miller AJ, Fan X, Pan XP, Zhang MY*
50	Hydraulic Balance of a Eucalyptus urophylla Plantation in Response to Periodic Drought in Low Subtropical China	FRONTIERS IN PLANT SCIENCE	7	1346		4.495	Zhang ZZ，Zhao P*，McCarthy HR，Lei OY，Niu JF，Zhu LW，Ni GY，Huang YQ
51	Dual Function of NAC072 in ABF3-Mediated ABA-Responsive Gene Regulation in Arabidopsis	FRONTIERS IN PLANT SCIENCE	7	1075		4.495	Li XY, Li XL, Li MJ, Yan YC, Liu X*, Li L*
52	The Complete Chloroplast Genome Sequences of Five Epimedium Species: Lights into Phylogenetic and Taxonomic Analyses	FRONTIERS IN PLANT SCIENCE	7	306		4.495	Zhang YJ, Du LW, Liu A, Chen JJ, Wu L, Hu WM, Zhang W, Kim K, Lee SC, Yang TJ*, Wang Y*
53	Influence of the decoupling degree on the estimation of canopy stomatal conductance for two broadleaf tree species	AGRICULTURAL AND FOREST METEOROLOGY	221	230	241	4.461	Zhang ZZ, Zhao P*, McCarthy HR, Zhao XH, Niu JF, Zhu LW, Ni GY, Ouyang L, Huang YQ
54	Structure identification of a polysaccharide purified from litchi (Litchi chinensis Sonn.) pulp	CARBOHYDRATE POLYMERS	137	570	575	4.219	Yang B, Prasad KN, Jiang YM*
55	Influence of Butylated Hydroxyanisole on the Growth, Hyphal Morphology, and the Biosynthesis of Fumonisins in Fusarium proliferaturn	FRONTIERS IN MICROBIOLOGY	7	1038		4.165	Li TT, Jian QJ, Chen F, Wang Y, Gong L, Duan XW, Yang B, Jiang YM*
56	Rooftop production of leafy vegetables can be profitable and less contaminated than farm-grown vegetables	AGRONOMY FOR SUSTAINABLE DEVELOPMENT	36	41		4.141	Liu T, Yang M, Han ZG, Ow DW*
57	An inclusion complex of eugenol into beta-cyclodextrin: Preparation, and physicochemical and antifungal characterization	FOOD CHEMISTRY	196	324	330	4.052	Gong L, Li TT, Chen F, Duan XW, Yuan YF, Zhang DD, Jiang YM*
58	Phenolics from strawberry cv. Falandi and their antioxidant and alpha-glucosidase inhibitory activities	FOOD CHEMISTRY	194	857	863	4.052	Yang D, Xie HH*, Jiang YM, Wei XY

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59	Norsesquiterpenoids and triterpenoids from strawberry cv. Falandi	FOOD CHEMISTRY	203	67	72	4.052	Yang D, Liang J, Xie HH*, Wei XY
60	Assessment of influences of cooking on cadmium and arsenic bioaccessibility in rice, using an in vitro physiologically-based extraction test	FOOD CHEMISTRY	213	206	214	4.052	Zhuang P, Zhang CS, Li YW, Zou B, Mo H, Wu KJ, Wu JT, Li Z*
61	Uncovering the spatio-temporal drivers of species trait variances: a case study of Magnoliaceae in China	JOURNAL OF BIOGEOGRAPHY	43	1179	1191	3.997	Liu H, Lundgren MR, Freckleton RP, Xu QY, Ye Q*
62	Adaptive molecular evolution of the two-pore channel 1 gene TPC1 in the karst-adapted genus Primulina (Gesneriaceae)	ANNALS OF BOTANY	118	1257	1268	3.982	Tao JJ, Feng C, Ai B, Kang M*
63	Different leaf cost-benefit strategies of ferns distributed in contrasting light habitats of sub-tropical forests	ANNALS OF BOTANY	117	497	506	3.982	Zhu SD, Li RH, Song J, He PC, Liu H, Berninger F, Ye Q*
64	Stomatal uptake of O-3 in a Schima superba plantation in subtropical China derived from sap flow measurements	SCIENCE OF THE TOTAL ENVIRONMENT	545	465	475	3.976	Niu JF, Zhao P*, Sun ZW, Zhu LW, Ni GY, Zeng XP, Zhang ZZ, Zhao XH, Zhao PQ, Gao JG, Hu YT, Zeng XM, Ouyang L
65	Responses of soil buffering capacity to acid treatment in three typical subtropical forests	SCIENCE OF THE TOTAL ENVIRONMENT	563	1068	1077	3.976	Jiang J, Wang YP, Yu MX, Li K, Shao YJ, Yan JH*
66	Prolonged acid rain facilitates soil organic carbon accumulation in a mature forest in Southern China	SCIENCE OF THE TOTAL ENVIRONMENT	544	94	102	3.976	Wu JP, Liang G, Hui DF, Deng Q, Xiong X, Qiu QY, Liu JX, Chu GW, Zhou GY, Zhang DQ*
67	Consistent effects of canopy vs. understory nitrogen addition on the soil exchangeable cations and microbial community in two contrasting forests	SCIENCE OF THE TOTAL ENVIRONMENT	553	349	357	3.976	Shi LL, Zhang HZ, Liu T, Zhang WX, Shao YH, Ha DL, Li YQ, Zhang CM, Cai XA, Rao XQ, Lin YB, Zhou LX, Zhao P, Ye Q, Zou XM, Fu SL*
68	Characterization of functional proteases from flowers of tea (Camellia sinensis) plants	JOURNAL OF FUNCTIONAL FOODS	25	149	159	3.973	Chen YY, Fu XM, Mei X, Zhou Y, Du B, Tu YY, Yang ZY*
69	Inhibitory mechanism of butylated hydroxyanisole against infection of Fusarium proliferatum based on comparative proteomic analysis	JOURNAL OF PROTEOMICS	148	1	11	3.867	Li TT, Jian QE, Wang Y, Chen F, Yang CW, Gong L, Duan XW, Yang B, Jiang YM*
70	Prof. Huan-Yong Chen: a leading botanist and taxonomist, one of the pioneers and founders of modern plant taxonomy in China	PROTEIN & CELL	7	773	776	3.817	Huang RL*
71	Phylogenetic relationships, character evolution and biogeographic diversification of Pogostemon s.l. (Lamiaceae)	MOLECULAR PHYLOGENETICS AND EVOLUTION	98	184	200	3.792	Yao G, Drew BT, Yi TS, Yan HF, Yuan YM, Ge XJ*
72	Advances in Dendrobium molecular research: Applications in genetic variation, identification and breeding	MOLECULAR PHYLOGENETICS AND EVOLUTION	95	196	216	3.792	da Silva JAT*, Jin XH*, Dobranszki J*, Lu JJ*, Wang HZ*, Zotz G*, Cardoso JC*, Zeng SJ*
73	Precipitation legacy effects on dryland ecosystem carbon fluxes: direction, magnitude and biogeochemical carryovers	BIOGEOSCIENCES	13	425	439	3.700	Shen W*, Jenerette GD, Hui D, Scott RL
74	Effects of nitrogen and phosphorus additions on nitrous oxide emission in a nitrogen-rich and two nitrogen-limited tropical forests	BIOGEOSCIENCES	13	3503	3517	3.700	Zheng MH, Zhang T, Liu L, Zhu WX, Zhang W, Mo JM*
75	Bioactive Pentacyclic Triterpenoids from the Leaves of Cleistocalyx operculatus	JOURNAL OF NATURAL PRODUCTS	79	2912	2923	3.662	Wang C, Wu P, Tian S, Xue JH, Xu LX, Li HX, Wei XY*
76	Rhodomentones A and B, novel meroterpenoids with unique NMR characteristics from Rhodomyrtus tomentosa	ORGANIC & BIOMOLECULAR CHEMISTRY	14	7354	7360	3.559	Liu HX, Chen K, Yuan Y, Xu ZF, Tan HB*, Qiu SX*
77	Spatial climate-dependent growth response of boreal mixedwood forest in western Canada	GLOBAL AND PLANETARY CHANGE	139	141	150	3.548	Jiang XY, Huang JG*, Stadt KJ, Comeau PG, Chen HYH
78	Aging and/or tissue-specific regulation of patchoulol and pogostone in two Pogostemon cablin (Blanco) Benth. Cultivars	PHYSIOLOGIA PLANTARUM	158	272	283	3.520	Ouyanga PY, Liu YL, Wang Y, Mo XL*, Zeng SH*
79	Canopy stomatal uptake of NOX, SO2 and O-3 by mature urban plantations based on sap flow measurement	ATMOSPHERIC ENVIRONMENT	125	165	177	3.459	Hu YT, Zhao P*, Niu JF, Sun ZW, Zhu LW, Ni GY
80	The Plant Resources, Structure Characteristics, Biological Activities and Synthesis of Pyranoflavonoids	CURRENT MEDICINAL CHEMISTRY	23	3078	3115	3.455	Yang B, Yang JL, Zhao YP, Liu HL, Jiang YM*
81	Spatial differences in (Z)-3-hexen-1-ol production preferentially reduces Spodoptera litura larva attack on the young leaves of Nicotiana benthamiana	PLANT SCIENCE	25	367	373	3.362	Zhang YQ, Fu XM, Wang FY, Yang ZY*
82	Detecting significant decreasing trends of land surface soil moisture in eastern China during the past three decades (1979-2010)	JOURNAL OF GEOPHYSICAL RESEARCH-ATMOSPHERES	121	5177	5192	3.318	Chen XZ, Su YX, Liao JS, Shang JL, Dong TF, Wang CY, Liu W, Zhou GY*, Liu LY
83	Isolation, synthesis, and biological activity of tomentosenol A from the leaves of Rhodomyrtus tomentosa	RSC ADVANCES	6	25882	25886	3.289	Liu HX, Zhang WM, Xu ZF, Chen YC, Tan HB*, Qiu SX*
84	Euryachins A and B, a new type of diterpenoids from Eurya chinensis with potent NO production inhibitory activity	RSC ADVANCES	6	85958	85961	3.289	Song JL, Yuan Y, Tan HB, Wu JW, Huang RM, Li H , Xu ZF, Na N*, Qiu SX*
85	Isolation and biomimetic total synthesis of tomentodiones A-B, terpenoid-conjugated phloroglucinols from the leaves of Rhodomyrtus tomentosa	RSC ADVANCES	6	48231	48236	3.289	Liu HX, Chen K, Tang GH, Yuan YF, Tan HB*, Qiu SX*
86	Characteristics of Three Thioredoxin Genes and Their Role in Chilling Tolerance of Harvested Banana Fruit	INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES	17	1526		3.257	Wu FW, Li Q, Yan HL, Zhang DD, Jiang GX, Jiang YM, Duan XW*

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87	Transformation of Litchi Pericarp-Derived Condensed Tannin with Aspergillus awamori	INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES	17	UNSP 1067		3.257	Lin S, Li Q, Yang B, Duan XW, Zhang MW, Shi J, Jiang YM*
88	Sandalwood: basic biology, tissue culture, and genetic transformation	PLANTA	243	847	887	3.239	da Silva JAT*, Kher MM*, Soner D*, Page T*, Zhang XH*, Nataraj M*, Ma GH*
89	Structure identification of a polysaccharide purified from Lycium barbarium fruit	INTERNATIONAL JOURNAL OF BIOLOGICAL MACROMOLECULES	82	696	701	3.138	Yuan YF, Wang YB, Jiang YM, Prasad KN, Yang JL, Qu HX, Wang Y, Jia YX, Mo H, Yang B*
90	Methods for genetic transformation in Dendrobium	PLANT CELL REPORTS	35	483	504	3.088	da Silva JAT*, Dobranszki J*, Cardoso JC*, Chandler SF*, Zeng SJ*
91	Biological nitrogen fixation and its response to nitrogen input in two mature tropical plantations with and without legume trees	BIOLOGY AND FERTILITY OF SOILS	52	665	674	3.069	Zheng MH, Chen H, Li DJ, Zhu XM, Zhang W, Fu SL, Mo JM*
92	Soil potential labile but not occluded phosphorus forms increase with forest succession	BIOLOGY AND FERTILITY OF SOILS	52	41	51	3.069	Zhang HZ, Shi LL, Wen DZ*, Yu KL
93	Warming effects on biomass and composition of microbial communities and enzyme activities within soil aggregates in subtropical forest	BIOLOGY AND FERTILITY OF SOILS	52	353	365	3.069	Fang X, Zhou GY, Li YL, Liu SZ, Chu GW, Xu ZH, Liu JX*
94	Controls and dynamics of biochar decomposition and soil microbial abundance, composition, and carbon use efficiency during long-term biochar-amended soil incubations	BIOLOGY AND FERTILITY OF SOILS	52	1	14	3.069	Jiang XY*, Denef K, Stewart CE, Cotrufo MF
95	Systematic Isolation and Characterization of Cadmium Tolerant Genes in Tobacco: A cDNA Library Construction and Screening Approach	PLOS ONE	11	e0161147		3.057	Zhang M*, Mo H, Sun W, Guo Y, Li J
96	Genome-Wide Analysis of the AP2/ERF Gene Family in Physic Nut and Overexpression of the JcERF011 Gene in Rice Increased Its Sensitivity to Salinity Stress	PLOS ONE	11	e0150879		3.057	Tang YH, Qin SS, Guo YL, Chen YB, Wu PZ, Chen YP, Li MR, Jiang HW, Wu GJ*
97	Morphological and Molecular Phylogenetic Data Reveal a New Species of Primula (Primulaceae) from Hunan, China	PLOS ONE	11	e0161172		3.057	Xu Y, Yu XL, Hu CM, Hao G*
98	Senecio changii (Asteraceae: Senecioneae), a New Species from Sichuan, China	PLOS ONE	11	e0151423		3.057	Ren C*, Tong TJ, Hong Y, Yang QE
99	New Species of the Fern Genus Lindsaea (Lindsaeaceae) from New Guinea with Notes on the Phylogeny of L. sect. Synaphlebium	PLOS ONE	11	e0163686		3.057	Dong SY*, Zuo ZY, Chao YS, Damas K , Sule B

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100	The Use of DNA Barcoding on Recently Diverged Species in the Genus Gentiana (Gentianaceae) in China	PLOS ONE	11	e0153008		3.057	Liu J, Yan HF, Ge XJ*
101	Population Genetic Structure of Glycyrrhiza inflata B. (Fabaceae) Is Shaped by Habitat Fragmentation, Water Resources and Biological Characteristics	PLOS ONE	11	e0164129		3.057	Yang LL，Chen JJ，Hu WM，Yang TS，Zhang YJ，Yukiyoshi T，Zhou YY，Wang Y*
102	Ethnobotanicalstudyonmedicinalp lantsusedbylocalHoklospeople on HainanIsland,China	JOURNAL OF ETHNOPHARMACOLOGY	194	358	368	3.055	Li DL, Xing FW*
103	Changes of soil C stocks and stability after 70-year afforestation in the Northeast USA	PLANT AND SOIL	401	319	329	2.969	Wang FM, Zhu WX*, Chen H
104	Effects of nitrogen addition on litter decomposition and nutrient release in two tropical plantations with N-2-fixing vs. non-N-2-fixing tree species	PLANT AND SOIL	399	61	74	2.969	Zhu XM, Chen H, Zhang W, Huang J, Fu SL, Liu ZF, Mo JM*
105	Regulation of biosynthesis and emission of volatile phenylpropanoids/benzenoids in petuniax hybrida flowers by multi-factors of circadian clock, light, and temperature	PLANT PHYSIOLOGY AND BIOCHEMISTRY	107	1	8	2.928	Cheng SH, Fu XM, Mei X, Zhou Y, Du B, Watanabe N, Yang ZY*
106	Proposals to expand Article 38.5 to cover a name of a subdivision of a genus	TAXON	65	909	909	2.907	Deng YF*
107	(246-247) Two proposals to amend the Code concerning type designation	TAXON	65	646	647	2.907	Deng YF*
108	(263) Proposal to amend Article 29.1 with regard to ISSN and ISBN	TAXON	65	653	653	2.907	Deng YF*
109	(282-283) Proposals to add a new paragraph with new Examples to Article 55 dealing with names originally assigned to later homonyms and subsequently assigned to respective earlier homonyms	TAXON	65	659	659	2.907	Deng YF*
110	Two proposals on Recommendation 31B	TAXON	65	417	417	2.907	Deng YF*
111	Proposals to amend Articles 38.5 and 38.6 for valid publication	TAXON	65	417	418	2.907	Wang RJ*
112	Formation of Volatile Tea Constituent Indole During the Oolong Tea Manufacturing Process	JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY	64	5011	5019	2.857	Zeng LT, Zhou Y, Gui JD, Fu XM, Mei X, Zhen YP, Ye TX, Du B, Dong F, Watanabe N, Yang ZY*
113	Interactive effects of rising CO2 and elevated nitrogen and phosphorus on nitrogen allocation in invasive weeds Mikania micrantha and Chromolaena odorata	BIOLOGICAL INVASIONS	18	1391	1407	2.855	Zhang LL, Chen XY, Wen DZ*
114	Oral bioaccessibility and human exposure assessment of cadmium and lead in market vegetables in the Pearl River Delta, South China	ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH	23	24402	24410	2.760	Zhuang P, Li YW, Zou B, Feng Su, Zhang Chaosheng, Mo Hui, Li ZA*

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115	Synergistic improvement of crop physiological status by combination of cadmium immobilization and micronutrient fertilization	ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH	23	6661	6670	2.760	Wu JT, Dumat C, Lu HP, Li YW, Li HQ, Xiao YH, Zhuang P, Li ZA*
116	Further dihydrochalcone C-glycosides from the fruit of Averrhoa carambola	LWT-FOOD SCIENCE AND TECHNOLOGY	65	604	609	2.711	Yang D, Jia XC, Xie HH*, Wei XY
117	Enhanced chilling tolerance of banana fruit treated with malic acid prior to low-temperature storage	POSTHARVEST BIOLOGY AND TECHNOLOGY	111	209	213	2.618	Huang H*, Jian QJ, Jiang YM, Duan XW, Qu HX*
118	Characterization of Novel Microsatellite Loci for Primula poissonii (Primulaceae) Using High-Throughput Sequencing Technology	MOLECULES	21	536		2.465	Liu YJ, Zhang CY, Hao G, Ge XJ, Yan HF*
119	Elucidation of Differential Accumulation of 1-Phenylethanol in Flowers and Leaves of Tea (Camellia sinensis) Plants	MOLECULES	21	1106		2.465	Dong F, Zhou Y, Zeng LN, Peng QY, Chen YY, Zhang L, Su XG*, Watanabe N, Yang ZY*
120	Two New Pentacyclic Triterpene Saponins from the Leaves of Akebia trifoliata	MOLECULES	21	962		2.465	Xu QL, Wang J, Dong LM, Zhang Q, Luo B, Jia YX, Wang HF, Tan JW*
121	Recent Advances in the Emission and Functions of Plant Vegetative Volatiles	MOLECULES	21	124		2.465	Dong F, Fu XM, Watanabe N, Su XG*, Yang ZY*
122	Ethnobotanical study of traditional edible plants used by the Naxi people during droughts	JOURNAL OF ETHNOBIOLOGY AND ETHNOMEDICINE	12	39		2.414	Zhang LL, Chai ZZ, Zhang Y, Geng YF, Wang YH*
123	Acylphloroglucinols from the leaves of Callistemon viminalis	FITOTERAPIA	114	40	44	2.408	Liu HX，Chen YC，Liu Y，Zhang WM，Wu JW，Tan HB*，Qiu SX*
124	Callviminols A-E, new terpenoid-conjugated phloroglucinols from the leaves of Callistemon viminalis	FITOTERAPIA	115	142	147	2.408	Liu HX, Chen K, Liu Y, Li C, Wu JW，Xu ZF, Tan HB*, Qiu SX*
125	Effects of simulated acid rain on soil respiration and its components in a subtropical mixed conifer and broadleaf forest in southern China	ENVIRONMENTAL SCIENCE-PROCESSES & IMPACTS	18	246	255	2.401	Liang GH, Hui DF, Wu XY, Wu JP, Liu JX, Zhou GY, Zhang DQ*
126	Involvement of rice histone deacetylase HDA705 in seed germination and in response to ABA and abiotic stresses	BIOCHEMICAL AND BIOPHYSICAL RESEARCH COMMUNICATIONS	470	439	444	2.371	Zhao JH, Li MZ, Gu DC, Liu XC, Zhang JX, Wu KL, Zhang XH, da Silva JAT, Duan J*
127	Suppression of nighttime sap flux with lower stem photosynthesis in Eucalyptus trees	INTERNATIONAL JOURNAL OF BIOMETEOROLOGY	60	545	556	2.309	Gao JG, Zhou J, Sun ZW, Niu JF, Zhou CM, Gu DX, Huang YQ, Zhao P*
128	Distribution and fractionation of cadmium in soil aggregates affected by earthworms (Eisenia fetida) and manure compost	JOURNAL OF SOILS AND SEDIMENTS	16	2286	2295	2.206	Wu JT, Li HQ, Li F, Zhang YJ, Lu HP, Zhuang P, Mo QF, Li Z*
129	Determinants of the biodiversity patterns of ammonia-oxidizing archaea community in two contrasting forest stands	JOURNAL OF SOILS AND SEDIMENTS	16	878	888	2.206	Chen J, Rui YC, Zhou X, Ye WH, Liu W*
130	Elevational pattern of bird species richness and its causes along a central Himalaya gradient, China	PEERJ	4	e2636		2.183	Pan XY，Ding Z，Hu YM，Liang JC，Wu YJ，Si XF，Guo MF，Hu HJ*，Jin K*
131	Complete plastid genome sequence of Primula sinensis (Primulaceae): structure comparison, sequence variation and evidence for accD transfer to nucleus	PEERJ	4	e2101		2.183	Liu TJ, Zhang CY, Yan HF, Zhang L, Ge XJ*, Hao G*
132	Pollen and seed flow under different predominant winds in wind-pollinated and wind-dispersed species Engelhardia roxburghiana	TREE GENETICS & GENOMES	12	19		2.132	Wang ZF*, Lian JY, Ye WH, Cao HL, Zhang QM, Wang ZM
133	Genome-wide analysis of the terpene synthase gene family in physic nut (Jatropha curcas L.) and functional identification of six terpene synthases	TREE GENETICS & GENOMES	12	97		2.132	Xiong WD, Wu PZ, Jia YX, Wei XY, Xu LX, Yang YF, Qiu DY, Chen YP, Li MR, Jiang HW, Wu GJ*
134	The use of grafted seedlings increases the success of conservation translocations of Manglietia longipedunculata (Magnoliaceae), a Critically Endangered tree	ORYX	50	437	445	2.052	Ren H*, Liu H, Wang J, Yuan LL, Cui XD, Zhang QM, Fu L, Chen HF, Zhong WC, Yang KM, Guo QF
135	Modeling the optimal ecological security pattern for guiding the urban constructed land expansions	URBAN FORESTRY & URBAN GREENING	19	35	46	2.006	Su YX，Chen XZ*，Liao JS，Zhang HO，Wang CJ，Ye YY，Wang Y

Patents Granted in 2016

No.	Patent Name	Patent Type	No.	Granted Date	Inventors
1	A simple light intensity adjustable and automatic ultrasonic atomized plant cuttings box	Utility Model	ZL201620422347.X	30-Nov-2016	Cai Xian、Rao Xinquan、Gong Xuyun、Lin Yongbiao、Zhou lixia、Wang Xiaoling、Liu Zhanfeng
2	A cryptographic system based on random sequence database	Invention	ZL201110364005.9	20-Jan-2016	Zeng Jiqing、Zhang Mingyong
3	A combined plant hanging planting basket	Utility Model	ZL201521015961.6	4-May-2016	Zeng Songjun、Chen Yan、Zheng Feng、Wu Kunlin
4	Plant hanging flower baskets	Exterior Design	ZL201530514785.X	25-May-2016	Zeng Songjun、Chen Yan、Zheng Feng、Wu Kunlin
5	A long-term fertilizing packing device for slow-release fertilizer	Utility Model	ZL201620082837.X	29-Jun-2016	Zeng Songjun、Chen Ying、Wu Kunlin、Zhang Jianxia、Zhang Xinhua、Duan Jun、Ma Guohua
6	Rapid propagation of quality seedling of Butterfly Oncidium	Invention	ZL201110171675.9	8-Jun-2016	Zeng Songjun、Chen Zhilin、Duan Jun、Wu Kunlin、Zhang Jianxia、Li Dongmei
7	A sterile filter device for aseptic seeding of dusty seeds	Utility Model	ZL201620083577.8	29-Jun-2016	Zeng Songjun、Mo Yuanqi、Chen Ying、Wu Kunli、Zhang Jianxia、Zhang Xinhua、Duan Jun、Ma Guohua

No.	Patent Name	Patent Type	No.	Granted Date	Inventors
8	Method for testing the acute toxicity of natural plant extracts using zebrafish embryos	Invention	ZL201410687308.8	14-Sep-2016	Chen Feng
9	A rapid roof greening method	Invention	ZL201410120592.0	11-May-2016	Chen Hongfeng、Li Xuwen、Ye Zihui、Tang Xiaoqing
10	Inversion of physical parameters of surface soil by passive microwave remote sensing	Invention	ZL201410137298.0	29-Jun-2016	Chen Xiuzhi、Li Yong、Su Yongxian
11	The method of aseptic sowing and tissue culture propagation of orchids and the broad-spectrum medium used	Invention	ZL201110171647.7	13-Jan-2016	Duan Jun、Zeng Songjun、Wu Kunlin、Chen Zhilin、Zhang Jianxia
12	A device for determining stemflow	Utility Model	ZL201620383131.7	30-Nov-2016	Lin Yongbiao、Zhou Lang、Han Taotao、Lu Hongfang、Wang Jun
13	Greening method of limestone slope	Invention	ZL201310466082.4	13-Apr-2016	Liu Dongming、Chen Hongfeng、Wang Faguo、Yi Qifei、Xing Fuwu
14	A method for detecting natural hybrids between Actinidia taxa	Invention	ZL201410404558.6	23-Mar-2017	Liu Yifei、Huang Hongwen、Li Dawei、Zhong Caihong
15	A genomic approach for identifying kiwifruit hybrid germplasm	Invention	ZL201510114843.9	17-Aug-2016	Liu Yifei、Li Dawei、Huang Hongwen
16	A preservation method for Cowpea	Invention	ZL201410229439.1	20-Jan-2016	Qu Hongxia、Jiang Yueming、Yao Furong、Huang Zihui、Wang Hui、Duan Xuewu
17	The application of four kaurane diterpenoid compounds in the preparation of glycosidase inhibitors	Invention	ZL201410250717.1	30-Mar-2016	Tan Jianwen、Ren Hui、Zhou Zhongyu、Xu Qiaolin、Dong Limei
18	Preparation of 2 α , 3 β -dihydroxy-30-oleande-12,20 (29) -dien-28-acid and its application in preparing antineoplastic agents	Invention	ZL201310648872.4	30-Mar-2016	Tan Jianwen、Wang Jing、Xu Qiaolin、Luo Ying、Lei Ting
19	Preparation method and application of quinatic acid in the preparation of glycosidase inhibitor medicine	Invention	ZL201310648249.9	3-Aug-2016	Tan Jianwen、Wang Jing、Xu Qiaolin、Ren Hui、Lei Ting
20	Preparation of 2 α , 3 β -dihydroxyolean-8-enoic acid-13 (18) -en-28-acid and its application in preparation of antibacterial agent	Invention	ZL201310379435.7	20-Jan-2016	Tan Jianwen、Wang Jing、Xu Qiaolin、Ren Hui、Luo Ying
21	A 23-noroleanolic acid compound, preparation method and usage in preparing glycosidase inhibitor drug	Invention	ZL201310737187.9	31-Aug-2016	Tan Jianwen、Wang Jing、Zhou Zhongyu、Ren Hui、Xu Qiaolin
22	Preparation of macranthoin G and its application in preparation of antibacterial agents	Invention	ZL201310380347.9	20-Apr-2016	Tan Jianwen、Zhang Mei、Ren Hui、Lei Ting、Wan Fanghao
23	A movable tree planting device for coastal saline - alkali sand	Utility Model	ZL201620177535.0	23-Nov-2016	Wang Faguo、Liang Guanfeng、Yuan Xiaochu、Yi Qifei、Wang Aihua、Liu Dongming、Xing Fuwu
24	An optimum method for genome size measurement in Gesneriaceae	Invention	ZL201410250566.X	20-Apr-2016	Wang Jing、Liu Juan、Kang Ming
25	Polymerization tank	Utility Model	ZL201520696696.6	13-Jan-2016	Wu Tong、Deng Rufang、Xu Xinlan、Jia Yongxia、Xia Kuaifei
26	A method for preparing cinnamantannin B1	Invention	ZL201410204144.9	13-Jan-2016	Yang Bao、Jiang Yueming、Wen Lingrong
27	A method for preparing ring-opened isoparasite 9'-O- β -xyloglucoside	Invention	ZL201410204141.5	3-Feb-2016	Yang Bao、Jiang Yueming、Wen Lingrong
28	A method for triploid induction in Santalum album	Invention	ZL201510058720.8	14-Sep-2016	Zhang Xinhua、Hu Xiu、Xiong Youhua、Liu Nian、Ma Guohua

Monographs Published in 2016

No.	Monograph	Authors	Publisher	ISBN
1	Fundamentals of molecular ecology and data analysis	Wang Zhengfeng	Science Press	ISBN 978-7-03-046478-1
2	The Zingiberaceous Resources in China	Wu Delin	Huazhong University of Science and Technology Press	ISBN 978-7-5680-1401-4
3	Flora and Vegetation of Qizhou Islands in Hainan Province	Xing Fuwu	Huazhong University of Science and Technology Press	ISBN 978-7-5680-1304-8
4	Ex Situ Cultivated Flora of China (Magnoliaceae)	Huang Hongwen(Editors in chief: Yang Keming、Chen Xinlan、Gong Xun、Wang Yaling)	Science Press	ISBN 978-7-03-042970-4
5	Chinese Medicinal Plants(6)	Ye Huagu、Zeng Feiyan、Ye Yushi、Yuan Yi	Chemical Industry Press	ISBN 978-7-122-25112-1
6	Chinese Medicinal Plants(7)	Ye Huagu、Zeng Feiyan、Ye Yushi、Zheng Jun	Chemical Industry Press	ISBN 978-7-122-25113-8
7	Chinese Medicinal Plants(8)	Ye Huagu、Zeng Feiyan、Ye Yushi、Fu Lin	Chemical Industry Press	ISBN 978-7-122-25114-5
8	Chinese Medicinal Plants(9)	Ye Huagu、Zeng Feiyan、Ye Yushi、Yuan Yi	Chemical Industry Press	ISBN 978-7-122-25115-2
9	Chinese Medicinal Plants(10)	Ye Huagu、Zeng Feiyan、Ye Yushi、Yuan Yi	Chemical Industry Press	ISBN 978-7-122-25116-9
10	Chinese Medicinal Plants(11)	Ye Huagu、Zeng Feiyan、Ye Yushi、Yuan Yi	Chemical Industry Press	ISBN 978-7-122-26762-7
11	Chinese Medicinal Plants(12)	Ye Huagu、Yi Sirong、Huang Ya、Zeng Feiyan	Chemical Industry Press	ISBN 978-7-122-27415-1
12	Chinese Medicinal Plants(13)	Ye Huagu、Yi Sirong、Huang Ya、Zeng Feiyan	Chemical Industry Press	ISBN 978-7-122-27416-8
13	Chinese Medicinal Plants(14)	Ye Huagu、Yi Sirong、Huang Ya、Zeng Feiyan	Chemical Industry Press	ISBN 978-7-122-27417-5
14	Chinese Medicinal Plants(15)	Ye Huagu、Zhang Lixia、Ma Xiaojun、Guan Yanhong	Chemical Industry Press	ISBN 978-7-122-27418-2
15	Ecological Restoration and Reconstruction Technology and Practice of Highway Slopes in Mountainous Area	Liu Dongming、Li Zuoheng、Wang Bingxing、Zhao Wenzhong	China Communications Press	ISBN 978-7-114-12982-7

No.	Monograph	Authors	Publisher	ISBN
16	Encyclopedia of Chinese Garden Flora (Begoniaceae~Cactaceae)	Huang Hongwen	Science Press	ISBN 978-7-03-045969-5
17	Encyclopedia of Chinese Garden Flora (Pteridophytes Gymnosperms)	Huang Hongwen	Science Press	ISBN 978-7-03-045961-9
18	Conservation and Study of Rare and Endangered Plants in Guangdong Province	Ren Hai、Zhang Qianmei、Wang Ruijiang	China Forestry Press	ISBN 978-7-5038-8657-7

New Plant Varieties Registered and Approved in 2016

Name of New Varieties	Registration or Approval Orgenization	Breeders
Hybrid rice “Zhiyou523”	Plant Variety Protection Office of China’s Minitry of Agricuture	Zhang Mingyong、Xia Kuaifei、Liang Chengye、Liao Shouxiang、Zou Xinyuan、Duan Jun
Raphiopedilum “Lvfeicui”	Guangdong Provincial Crops Variety Approval Committee	Zeng Songjun、Wu Kunlin、Chen Yan、Zheng Feng、Zhang Jianxia、Zhang Xinhua、Ma Guohua、Duan Jun
Dendrobium officinale “Zhongke 3”	Guangdong Provincial Crops Variety Approval Committee	Zhang Jianxia、Wu Kunlin、Duan Jun、Zeng Songjun、Zhang Xinhua、Duan Aili、Deng Xingxiao、Wang Yuwen
Dendrobium officinale “Zhongke 4”	Guangdong Provincal Crops Variety Approval Committee	Duan Jun、Zhang Jianxia、Wu Kunlin、Zeng Songjun、Zhang Xinhua、Duan Aili、Deng Xingxiao、Wang Yuwen
Raphiopedilum “Yingchun”	Guangdong Provincial Crops Variety Approval Committee	Zeng Songjun、Chen Yan、Wu Kunlin、Zheng Feng、Yu Yuhua、Zhang Jianxia、Zhang Xinhua、Ma Guohua、Duan Jun
Dendrobium SCBG Orange Firebird	Royal Horticultural Society	Zeng Songjun、Chen Zhilin
Dendrobium SCBG Shijing		Xia Kuaifei、Zeng Songjun
Paphiopedilum SCBG Chalhill		Zheng Feng、Zeng Songjun
Paphiopedilum SCBG Dream		Zeng Songjun、Duan Jun
Paphiopedilum SCBG Fantasy Jewel		Zhang Jianxia、Zeng Songjun
Paphiopedilum SCBG Lvlun		Wu Kunlin、Zeng Songjun
Paphiopedilum SCBG Pulchritude		Zhang Xinhua、Zeng Songjun

Appendix II. Organizational Structure

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Members: Ren Hai, Zhang Fusheng, Huang Hongwen, Zhou Guoyi, Xia Hanping, Fan Dequan, Liao Jingping

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Scientific Research and Foreign Affairs Management Division
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Deputy Director: Prof. Dr. Luo Shixiao

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Members: Xu Fengxia, Zou Pu, Liu Huanfang, Kuang Yanfeng

Research Group of Plant Molecular Systematics and Molecular Evolution
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Members: Yuan Qiong, Ren Chen

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Chairman: Zhou Guoyi
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Secretariat of International Association of Botanic Gardens (IABG)
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