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South China Botanical Garden,Chinese Academy of Sciences

中国科学院华南植物园
South China Botanical Garden,Chinese Academy of Sciences

2022
ANNUAL REPORT

On January 26th , the Party Group Inspection Team of CAS reported the inspection situation to SCBG

In March, SCBG won the first prize in 2021 Guangdong Provincial Natural Science Award

国务院关于同意在广东省广州市设立华南国家植物园的批复

国函〔2022〕50号

广东省人民政府，自然资源部、住房城乡建设部、中科院、国家林草局：

自然资源部、住房城乡建设部、中科院、广东省人民政府《关于申请批复设立华南国家植物园的请示》收悉。现批复如下：

一、同意在广东省广州市设立华南国家植物园，由国家林草局、住房城乡建设部、中科院、广东省和广州市人民政府合作共建。

二、华南国家植物园建设要以习近平新时代中国特色社会主义思想为指导，全面贯彻党的十九大和十九届历次全会精神，深入贯彻习近平生态文明思想，认真落实党中央、国务院决策部署，坚持人与自然和谐共生，尊重自然、保护第一、惠益分享；坚持以华南地区植物迁地保护为重点，体现国家代表性和社会公益性；坚持对植物类群系统收集、完整保存、高水平研究、可持续利用，统筹发挥多种功能作用；坚持将热带亚热带植物知识和岭南园林文化融合展示，提升科普教育功能，讲好中国植物故事，彰显中华文化和生物多样性魅力，强化自主创新，接轨国际标准，推动构建中国特色、世界一流、万物和谐的国家植物园体系。

三、国家林草局、住房城乡建设部要加强业务指导，会同中科院、广东省和广州市人民政府建立协调机制，密切协作配合，落实工作责任，统筹研究解决重大问题；抓紧组织编制华南国家植物园建设方案，聚焦华南地区植物迁地保护及科研功能，落实粤港澳大湾区建设需要和国土空间规划管控要求，合理控制建设规模，按程序报批后抓好组织实施。中科院与广东省和广州市人民政府共同成立华南国家植物园建设领导小组，强化统筹协调，充分用好现有相关投资渠道，并完善多元化投入机制，加强重点功能区、馆藏设施、科研平台和配套基础设施建设，全面提升科研能力和建设运行管理水平，稳妥有序推进华南国家植物园建设各项任务。

四、国务院各有关部门和有关地方人民政府要按照职责，研究对华南国家植物园的支持举措，按照国家有关规定在规划编制、政策制定、资金投入、项目建设等方面给予指导和支持。重大事项及时向国务院报告。

国务院

2022年5月30日

（此件公开发布）

扫一扫在手机打开当前页

On May 30th , the State Council approved the establishment of SCNBG in Guangzhou, Guangdong Province

On June 16th , group photo of Guangdong branch of the first joint video conference of the Five Party Coordination Mechanism of SCNBG

On September 23rd , SCNBG held the first meeting of the construction leadership group (Online)

On July 11th , group photo of the unveiling ceremony of SCNBG

On October 16th , the Party Committee of SCBG organized to listen to the report at the 20th National Congress of the CPC

On December 15th -20th , Dr. REN Hai, as a member of the Chinese government delegation, participated in the second phase of the Convention on Biological Diversity COP15 meeting

Foreword

2022 is an extremely important year in the history of the Party and the country. The 20th National Congress of the Communist Party of China was successfully held, which mapped out a grand blueprint for building a socialist modern country in an all-round way and comprehensively promoting the great rejuvenation of the Chinese nation to Chinese modernization, and step for a new great journey.

This year, guided by the ideology of socialism with Chinese characteristics of the new era of Xi Jinping, SCBG conscientiously implemented the new deployment and new requirements of the Party Central Committee, the State Council, as well as the Party Group of the Academy and the Guangdong Provincial Party Committee, focused on the main responsibilities and business, and paid close attention to the implementation of work. The application for the establishment of the SCNBG was approved and unveiled by the State Council, and we have constantly promoted the construction of SCNBG. The joint application of the National Key Laboratory of Plant Diversity and Characteristic Economic Crops was reviewed by directors' meeting of the CAS. We have conscientiously implemented the "14th Five-Year Plan" and the "Ten Principles of Basic Research", adjusted the scientific research organization model, and organized big research teams to tackle key problems. Throughout the year, 44 talents were introduced and 42 special researchers were recruited.

This year, even under the impact of the COVID-19, SCBG has still achieved good scientific research results. We have successfully applied 2 national key research and development plan projects, 1 special science and technology basic resources survey project, 1 nationally funded key project, 3 research and development plan projects in key fields of Guangdong Province, the annual new scientific research contract funds and annual scientific research funds in place increased 28% and 29% respectively compared to 2021. SCBG also won one first prize of Guangdong Provincial Natural Science Award in 2021 as the first unit completing the project. 10 monographs and 533 SCI papers were published, in which 64 papers with impact factors are more than 10 in five years (including 35 first / correspondent organization). 74 authorized patents and 18 software copyrights were obtained, 32 new plant varieties were achieved and 1160 species of plants were introduced. SCBG has attracted about 2.405 million visitors throughout the year.

In 2023, we will continuously study and implement the spirit of the 20th National Congress of the Communist Party of China and devote ourselves to the construction of SCNBG in accordance with the requirements of our higher authorities. We will make new contributions to the comprehensive construction of a modern socialist country.

Professor REN Hai

Director of South China Botanical Garden (SCBG),
Chinese Academy of Sciences (CAS) / South China
National Botanical Garden (SCNBG)

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01

About SCBG

South China Botanical Garden (SCBG), Chinese Academy of Sciences (CAS) is one of the oldest botany research institutions in China. SCBG, formerly known as the Institute of Agriculture and Forestry (IAF), Sun Yat-Sen University, was founded in 1929 by renowned botanist Academician CHUN Woon-Young. In 1954, the affiliation of IAF was changed to CAS and was renamed South China Institute of Botany (SCIB), CAS. In 2003, SCIB was renamed to its current name SCBG. In 2022, SCBG was upgraded to South China National Botanical Garden (SCNBG) as one of the first two National Botanical Gardens launched and approved by the State Council of China. During the period of SCIB, China's first national nature reserve--the Dinghushan National Nature Reserve was established in 1956.

As one of the largest comprehensive gardens and one of the top plant germplasm conservation institutions in China, SCBG consists of three divisions:

1.Display zone. Occupying an area of 282.5 ha, it was designed mainly for plant *ex-situ* conservation. So far there are about 17,502 taxa growing in 38 theme gardens including Magnolia garden, Ginger garden, Orchids garden etc. The Longdong Qilin Scenic spot and the conservatory group are two most outstanding landscapes of this garden.

2. Research zone. Covering an area of 36.8 ha. It contains 3 research centers, including Plant Science Center, Ecology & Environmental Science Research Center, and Agriculture & Biotechnology Research Center. The herbarium with more than 1,150,000 plant specimens, a library, the editorial office of *Journal of Tropical and Subtropical Botany*, an information center and a public laboratory with CMA and CNAS dual qualification certification have been supporting the research of this garden and other institutions at home and abroad.

3. Dinghushan National Nature Reserve. With an area of 1,133 ha, it is the first national nature reserve in China and the only nature reserve affiliated to CAS. Currently, over 2,291 plant species are *in situ* conserved in this nature reserve.

In addition, SCBG has some field stations and laboratories to support its research and conservation, including 2 national/CERN field stations (Dinghushan Station and Heshan Station), one CAS/provincial field station (Xiaoliang Station) and one provincial field station; 3 key laboratories of CAS (plant resource conservation and sustainable utilization, vegetation restoration and management of degraded ecosystems, as well as molecular analysis and genetic improvement of agricultural plants in South China), one engineering laboratory of the CAS (vegetation on ecosystem restoration on islands and coastal zones); 2 key laboratories of Guangdong Province (digital botanical garden, applied botany); one Guangdong Engineering Technology Research Center (development of characteristic plant resources),Guangdong Provincial Germplasm Resource Bank, and South China Plant Identification Center.

Meanwhile, SCBG is also the host of some international and local associations, including Botanic Gardens Conservation International (BGCI) China Program Office, Secretariat of International Association of Botanic Gardens (IABG), the World Magnolia Center, Botany Society of Guangdong province, Plant Physiology Society of Guangdong province, and Ecology Society of Guangdong Province.

Since affiliated to CAS in 1954, SCBG has made great achievements in the scientific research, which includes about 500 monographs such as *Flora of China, The Vegetation of Guangdong, Studies on the Tropical and Subtropical Degraded Ecosystem and Its Rehabilitation, Rare Plants of China, and Introduction to Restoration Ecology*, Over 5,300 published SCI papers including highly prestigious journals such as *Nature* and *Science*, more than 460 authorized patents, and more than 260 granted or registered new plant varieties since 1988.

Based on those research achievements, more than 320 prizes have been awarded at various levels, such as the first prize in China's State Natural Science Award and China's State Scientific and Technological Invention Award, and "Top Ten Basic Research News in China" in 2000 and 2006, respectively.

SCBG would not have made so many achievements without talents. By the end of 2022, SCBG has 412 staff members (67 professors and 97 associate professors) and 82 postdoctoral staff, which includes various talents, 3 recipients of National Science Fund for Distinguished Young Scholars,3 recipient of National Outstanding Youth Science Foundation,3 recipients of Young and Middle-aged Science & Technology Innovation Leaders in the Innovation Talent Promotion Program by the Ministry of Science & Technology, 6 National Science & Technology Innovation Leading Talents and Young Top-notch Talents, as well as 10 introduced talents of CAS Talent Introduction Program.

SCBG has paid special attention to the cultivation of the talents in relevant fields. It is one of the first batch of Master's degree training units approved by the Academic Degrees Committee of the State Council. At present, there are 4 authorized Doctor degree disciplines (botany, biochemistry & molecular biology, genetics and ecology), 7 authorized Master degree disciplines (botany, biochemistry & molecular biology, genetics, ecology, ornamental plants & horticulture, wildlife conservation & utilization, biological & medicinal chemistry), 2 postdoctoral research station of first-level disciplines (biology, ecology). By the end of 2022, there are 461 enrolled graduate canditates (295 Master candidates and 166 Doctoral candidates). A great number of awards and honors have been achieved by students each year, including National Excellent PhD Dissertations (2 dissertations) and CAS Excellent PhD Dissertations (7 dissertations).

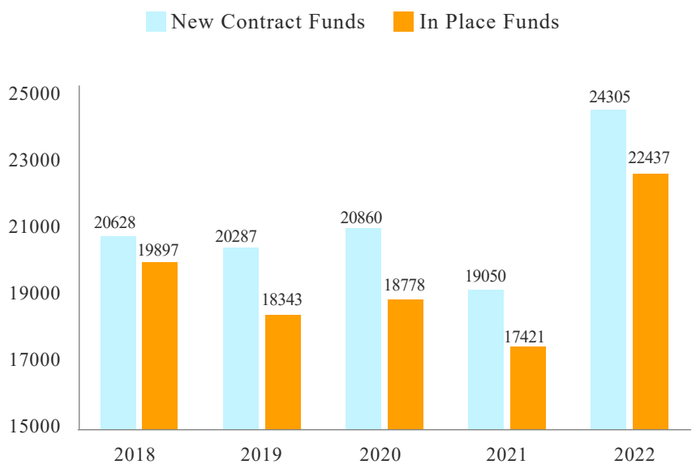
As a National AAAA Tourist Attraction, SCBG receives over one million visitors per year. SCBG has paid great attention to knowledge dissemination and science popularization education. In 1997, SCBG built the first popular science education base in China, "Guangdong Botany Science Popularization Base" was jointly built with the Guangdong Provincial Association for Science and Technology; 36 science popularization bases have been built, including "National Science Popularization Education Base" "National Practice Education Base for Primary and Secondary School Students" and "National Science Popularization Base for Scientific Research"; In 2002, completed "Pugang Natural Education Path", it was the first natural education path in China. Besides, SCBG held various kinds of popular science training and large-scale popular science activities throughout the year, including "Qilin Science Forum" "Nature Observation" "Nature Notes" etc. Dinghushan Nature Reserve has built science and education facilities such as "see Dinghushan" theme exhibition Room, nature education path and 3D model of Ginger flower, and launched exploratory nature education courses such as "natural forest" and "young citizen scientist". SCBG was awarded as National Popular Science Education Base, the Most Popular Base for Popular Science in Guangzhou, and Patriotic Education Base of Guangzhou. SCBG was voted as the best botanical garden of the year 2019.

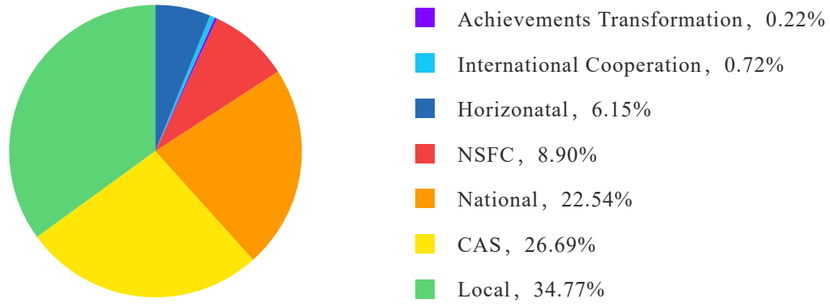
The mission statement of SCBG: to position itself in South China, devoted to plant conservation, scientific research and knowledge dissemination of the tropical and subtropical regions of the world, to build into a high-level research institution in botany, ecology, agricultural science, key technologies for plant resource conservation and utilization, as well as to lead the development of the national botanical garden system in China, so as to provide scientific and technological support for the green development of China.

02

Research projects and achievements

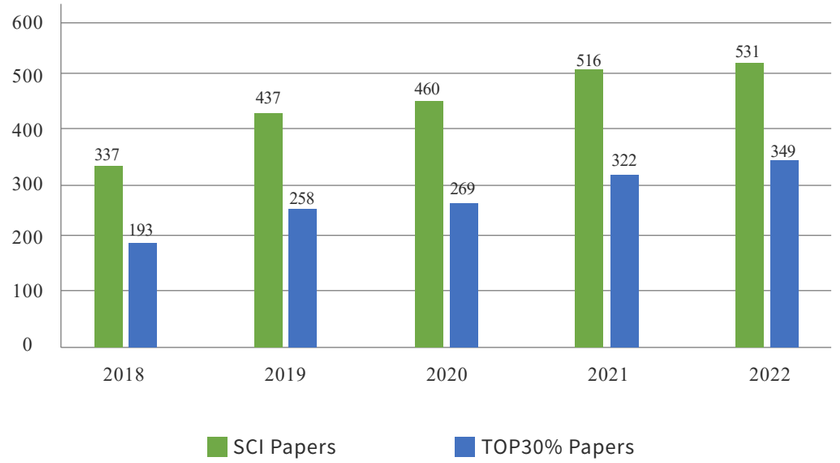
In 2022, there were 376 new scientific research projects, 243.5 million CNY of new scientific research contract funds, and 224.37 million CNY of scientific research funds in place. The number of new contract projects and research contract funds reached the top in recent years, with an increase of 27.58% and 28.79% respectively compared to 2021. Two new national key research and development projects, one special foundation for national science and technology basic research projects, one key program of national natural science foundation, three research and development projects in key fields in Guangdong Province, one "outstanding youth" project in Guangdong Province, and one key research and development project in Guangzhou were supported.





Research Achievements Overview

In 2022, SCBG published 531 SCI papers, of which 63 papers had the 5 year impact factor (IF) over 10. 73 patent applications were granted, 18 computer software copyright registrations were obtained, 32 new cultivars were registered, and 10 volumes of monographs were published.



In 2022, SCBG signed 54 achievement transfer and transformation contracts with 18.78 million CNY, including five patent transfer/licensing contracts of 0.51 million CNY (Table 1).

Table 1. Achievement transfer and transformation contracts from 2019 to 2022

Projects / Year	Achievement transfer		Patent transfer/licensing		Total	
	Number	Contract Value (million CNY)	Number	Contract Value (million CNY)	Number	Contract Value (million CNY)
2019	11	8.06	2	0.31	13	8.37
2020	13	8.84	3	0.06	16	8.90
2021	19	9.84	5	1.20	24	11.04
2022	49	18.27	5	0.51	54	18.78

By implemented six new techniques with a planting area of 1,470 Mu, SCBG has saved 83.10 million CNY. Three plant varieties were cultivated with an area of 2,040 Mu, and gained 22 million CNY. SCBG gained an output of 105.1 million CNY throughout the year.

Table 2. Techniques promotion status in 2022

No.	Name of the Promoted Technique	Applied Area (mu)	Total Cost Savings (million)
1	Low nitrogen cultivation technology and application for *Oryza* 'Zhiyou 710'	200,000	10
2	Asexual cloning technique of tissue culture of *Paphiopedilum*	100	60
3	Techniques of winter planting of red matsutake mushrooms	1000	10
4	Demonstration of efficient cultivation technology of *Glycyrrhiza uralensis*	200	1
5	Demonstration of fine varieties of *Lycium barbarum*	100	2
6	Demonstration of fine varieties of functional vegetables	50	0.10
	Total	1470	83.10

Table 3. Variety Promotion Status for 2022

No.	Name of the promoted variety	Applied Area (mu)	Yearly output value (million)
1	*Paphiopedilum* 'Zhongke Guowang'	20	10
2	*Paphiopedilum* 'Zhongke Huanghou'	20	10
3	Two new varieties of *Lycium chinense* 'Zhongke Lvchuan No.1' 'Zhongke Qihuang'	2000	2
4	Total	40	22

Iris 'Bryced Leigh' (photographed by LI Wenyan)

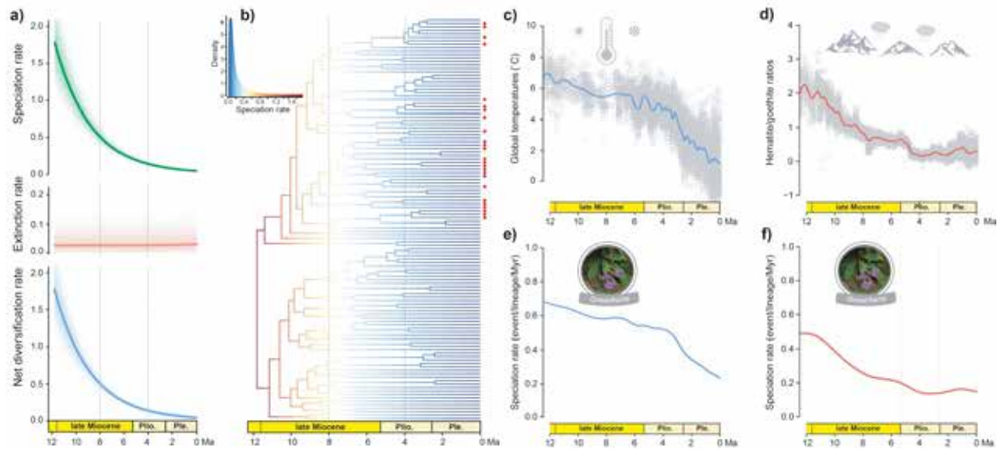
03

Highlighted Research Progress

Historical climate change and plant speciation in mountain systems

Mountain systems harbor a substantial fraction of global biodiversity and provide excellent opportunities to study rapid diversification and to understand the historical processes underlying the assembly of biodiversity hotspots. The rich biodiversity in mountains is widely regarded as having arisen under the influence of geological and climatic processes as well as the complex interactions among them. However, the relative contribution of geology and climate in driving species radiation is seldom explored. Dr. KONG Hanghui and his colleagues from Research Direction of Plant Genetic Resources and Evolution (leader: KANG Ming) studied the evolutionary radiation of *Oreocharis* (Gesneriaceae) using 123 transcriptomic data and a time calibrated phylogeny for 88% (111/126) of all species of the genus. Evidence from 574 orthologous loci suggest that *Oreocharis* underwent an impressive early burst of speciation starting ca. 12 Ma in the Miocene, followed by a drastic decline in speciation toward the present. Although they found no evidence for a shift in diversification rate across the phylogeny of *Oreocharis*, the results showed a difference in diversification dynamics between the HDM and non-HDM lineages, with higher diversification rates in the HDM. The diversification dynamic of *Oreocharis* is most likely positively associated with temperature-dependent speciation and dependency on the Asian monsoons. The scientists suggest that the warm and humid climate of the mid-Miocene was probably the primary driver of the rapid diversification in *Oreocharis*, while mountain building of the HDM might have indirectly affected species diversification of the HDM lineage. This study highlights the importance of past climatic changes, combined with mountain building, in creating strong environmental heterogeneity and driving diversification of mountain plants, and suggests that the biodiversity in the HDM cannot directly be attributed to mountain uplift, contrary to many recent speculations. Future studies may investigate whether the diversification patterns identified here are mirrored by patterns in other plant lineages and/or in other mountain systems.

The study was published in *Systematic Biology* (2022, 71:589–609).



Diversification dynamic and macroevolutionary patterns of *Oreocharis*

07 *Vaccinium pratense* (photographed by SONG Zhuqiu)

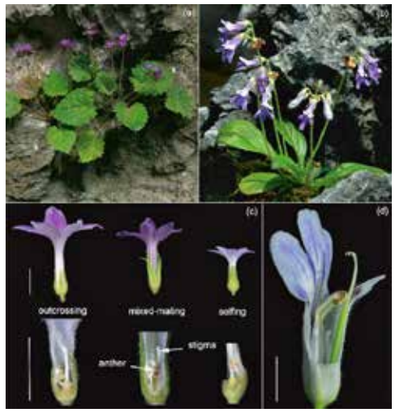
Genomic consequences of mating system shifts in ***Primulina***

The evolution of selfing from outcrossing has occurred frequently and has been recognized as one of the most common evolutionary transitions in flowering plants. Shifts to selfing from outcrossing are expected to produce a series of predictable genomic changes, but empirical evidence of genome selfing syndrome is very few explored.

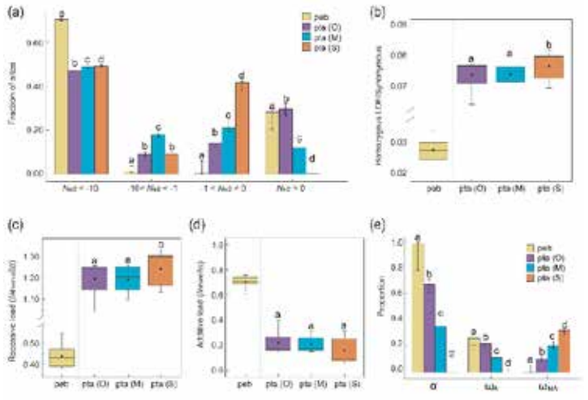
The genus *Primulina* is a speciose group belonging to the African violet family Gesnereacea. *Primulina tabacum* and *P. eburnea* are a closely related species pair with contrasting mating systems, and both species are endemic to karst areas in southern China. *Primulina eburnea* is outcrossing with widespread distribution, whereas *P. tabacum* is narrow distributed with strong intra-species population structure as well as variations of selfing rates. These two species provide an excellent system to investigate the genomic consequences of mating system transitions at the inter- and intra-species levels.

The doctorate student YI Huiqin from the Research Direction of Plant Genetic Resources and Evolution led by KANG Ming, comprehensively investigated the genomic consequences of mating system shifts in *Primulina* using high-quality genome assembly and whole-genome resequencing data. They found that highly selfing populations of *P. tabacum* display loss of genetic diversity, increased deleterious mutations, higher genomic burden and fewer adaptive substitutions. However, compared with outcrossing populations, mixed- mating populations did not display loss of genetic diversity and accumulation of genetic load. No severe bottlenecks signals were detected associated with transition from outcrossing to highly selfing, indicating that the genetic effects of selfing on Ne and possibly linked selection, rather than demographic history, are the primary drivers of diversity reduction in highly selfing populations. Their research provides a comprehensive empirical study for genomic consequences of mating systems transition in plants, and highlights the importance of distinguishing the relative contribution of mating system and demography on the genomic consequences associated with mating system evolution.

The research article, entitled “Genomic insights into inter- and intraspecific mating system shifts in *Primulina*”, was published in ***Molecular Ecology***.



Morphological comparison between *Primulina tabacum* and *P. eburnea*

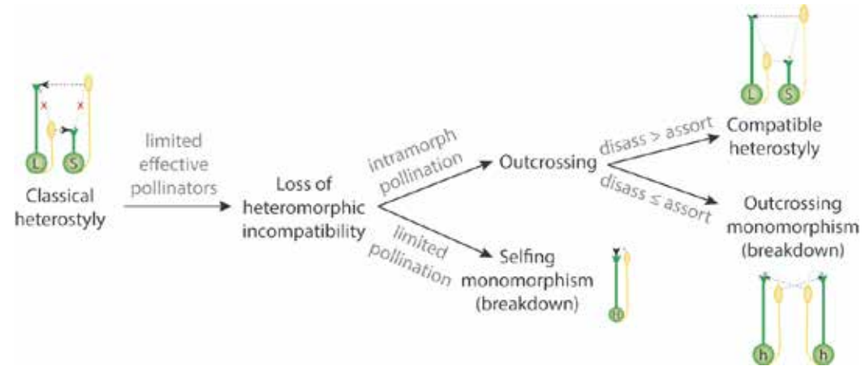


Relaxed purifying selection, mutation burden, and adaptive substitutions in *Primulina eburnea* (peb), and the outcrossing (O), mixed-mating (M) and selfing (S) groups of *P. tabacum* (pta).

Diverse mating consequences of the evolutionary breakdown of the sexual polymorphism heterostyly

Heterostyly is a genetically controlled flower polymorphism with two (distyly) or three (tristyly) floral morphs that differ reciprocally in stigma and anther height. The main function of heterostyly is believed to achieve efficient cross pollination and increase accuracy of pollen transfer. However, heterostyly has repeatedly become destabilized, causing breakdown of the floral polymorphism, which is a classic model for studying the evolution of plant mating systems. Here, YUAN Shuai and his colleagues from the Research Direction of Relationship between Animals and Plants and Ecological Adaptation (leader: LUO Shixiao) employed a distylous species *Primula oreodoxa* and explored the evolutionary breakdown of distyly based on reproductive ecological data and mating diversity. Unexpectedly, individuals mostly outcrossed randomly, not supporting Darwin’s cross-pollen transfer hypothesis for most *P. oreodoxa* populations. From dimorphic populations, mixed populations to monomorphic populations, selfing rates significantly increased. Plants in mixed and monomorphic populations generally outcrossed with fewer mates, indicating the breakdown of distyly. Mating data on variation among individuals provide opportunities to explore the proximate mechanisms governing reproductive success. Self-compatibility, variation of herkogamy and the interaction of plant and pollinators that disturb morph-ratio equilibrium can cause deviations from disassortative mating and frequently set in train processes leading to the breakdown of floral polymorphism and the evolution of alternative floral strategies. By quantifying the earliest changes in mating behavior accompanying these mating system transitions, this study highlights the key role that the mating biology of populations can play in floral divergence and the evolution of reproductive isolation.

This research was published ***in Proceedings of the National Academy of Sciences of the United States of America***, 2023, 120 (2), e2214492120.

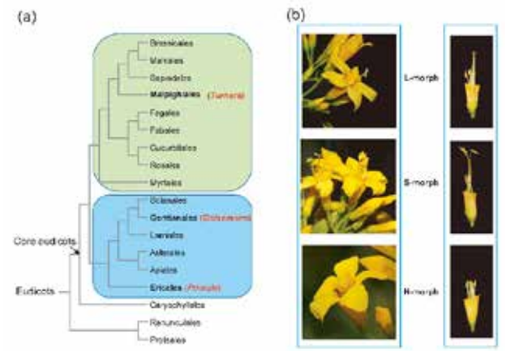


Possible evolutionary trajectories if pollinators capable of effectively mediating disassortative mating in a heterostylous species become chronically infrequent visitors

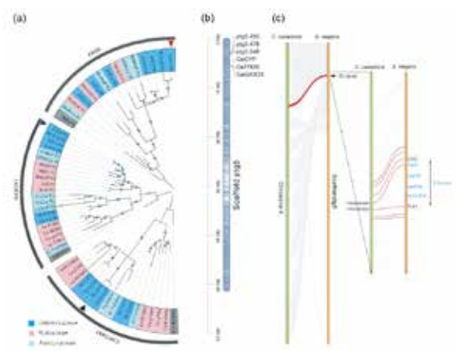
Genomic evidence supports genetic convergence of a supergene controlling the distylous floral syndrome

In plant kingdom, many species with distant phylogenetic relationships exhibited significant convergent evolution under the natural selection. However, it is still unclear whether the underlying molecular convergence has occurred. Distyly, a plant sexual polymorphism controlled by the *S*-locus supergene, has evolved numerous times among angiosperm lineages and represents a classic example of convergent evolution in form and function. Here, ZHAO Zhongtao and his colleagues from the Research Direction of Phylogeny of Reproductive Biology (leader: TU Tieyao) used multiple approaches including anatomical measurements of sex-organ development, transcriptome and whole-genome sequencing, to identify components of the *S*-locus supergene in *Gelsemium elegans*. They showed that the candidate S-locus supergene of *Gelsemium* contained four genes, of which three appear to have originated from gene duplication events within Gelsemiaceae. The style-length genes *GeCYP* in *Gelsemium* and *CYP734A50* in *Primula* likely arose from duplication of the same gene, *CYP734A1*. Three out of four S-locus genes in *G. elegans* were hemizygous, as previously reported in *Primula* and *Turnera*. Their results provide genomic evidence on the genetic convergence of the supergene underlying distyly among distantly related angiosperm lineages and help to illuminate the genetic architecture involved in the evolution of heterostyly.

This research was published in ***New Phytologist***, 2023, 237: 601–614.



Phylogenetic placement and floral morphs of *Gelsemium elegans*

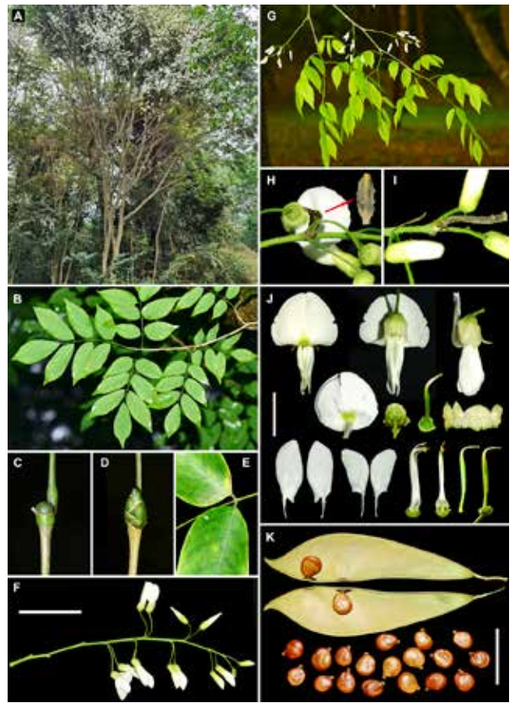


Origin and evolution of candidate *S*-locus genes

Huchimingia, a new legume genus from Asia

The genus *Millettia* Wight & Arn. is a central and heterogeneous group of the tribe Millettieae (Fabaceae/Leguminosae), with about 150–200 species mainly distributed in Asia and Africa. The worldwide revision conducted by Dunn (1912) was the sole one since the genus was first established in 1834, who recognized 16 sections within it. However, the revision of Dunn (1912) is very out-of-date. About 46% of species names were validly published after 1912, and eight distinct genera were subsequently segregated from *Millettia*. Thus, many researchers suggested that *Millettia* is clearly in need of major revision. Here, SONG Zhu-Qiu and his colleagues from the Research Direction of Plant Diversity and Systematic Classification (leader: CHEN Yousheng) found that *Millettia* sect. *Podocarpae* Dunn have a unique combination of characters that distinguishes them from all other species of the genus. The phylogeny based on plastid matK and nuclear ribosomal ITS sequences also indicated the section is clearly monophyletic, separated from other congeneric species, and is closely related to *Antheroporum* Gagnep. and *Ohashia* X.Y. Zhu & R.P. Zhang. Therefore, a new genus, *Huchimingia* Z.Q. Song & Shi J. Li, is proposed to accommodate this distinct section. *Huchimingia* is named in honor of Professor HU Chi-Ming (1935–), and it may be one of ten new legume genera that named by Chinese researchers. The genus includes five tree species from Asia, four of which are distributed in China.

This research was published in ***Phytotaxa***, 2022, 532: 37–56.



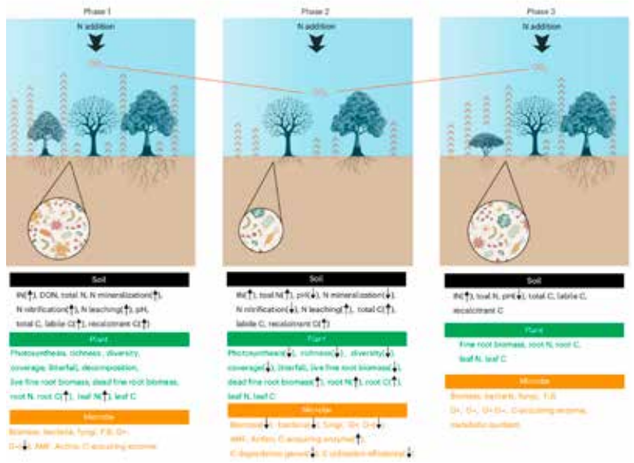
Huchimingia ichthyochtona (Drake) Z.Q. Song

Temporal patterns of soil carbon emission in tropical forests under long-term nitrogen deposition

Human activities have resulted in serious atmospheric nitrogen deposition in large-scale areas of the world. The reactive nitrogen deposited into forest ecosystems provides nutrient available to plants and microbes, which further affects their growth, biomass accumulation, and carbon emission via respiration. Although nitrogen deposition can regulate soil respiration in forest ecosystems, the relevant knowledge is derived mainly from short-term manipulative experiments. It remains unclear how nitrogen deposition affects soil respiration with time in tropical and subtropical forests.

In the earliest nitrogen-deposition research platforms of Chinese forest ecosystems (nitrogen-addition plots in Dinghushan forests), Dr. ZHENG Mianhai and his colleagues discovered three-phase patterns of soil CO_2 emission (insignificant changes - dramatic decline - insignificant changes). In the first phase, they observed less response of plant and microbial carbon and nitrogen variables under nitrogen addition treatments, and soil respiration responses did not change. During the second phase, nitrogen addition caused obvious soil acidification, which led to death of fine roots and decrease of soil microbial biomass, and thus soil respiration dramatically declined. After entering the third phase, plant and microbial communities might reorganize, and they observed less change in fine root biomass, soil microbial biomass, and soil respiration rates under nitrogen addition treatments.

Overall, their results show that the responses of soil respiration to nitrogen deposition do not remain stable but can alter with time in the study forests. This phenomenon cannot be captured by short-term experiment studies, and it advances scientific understanding of soil respiration dynamics and support prediction of soil carbon fluxes under nitrogen deposition scenarios. These findings was published in *Nature Geoscience* (https://www.nature.com/articles/s41561-022-01080-4)



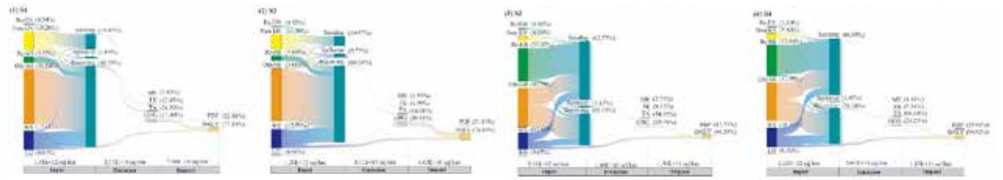
Conceptual framework of soil respiration response to long-term nitrogen addition

A new method to handle the complicated multi-nodal nexus problems of telecoupling activities

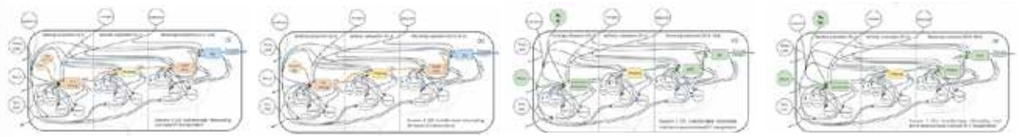
Because ammonia is a renewable energy medium appropriate for distant trading, many countries/regions and companies have already formulated ambitious strategies in developing green ammonia for energy transitions. However, the associated social, economic and environmental impacts of such energy transitions are still a mystery, due to the lack of integrated evaluation methods.

To fill this gap, an life cycle assessment and emergy evaluation (LCA-EME) method was brought up, and applied to quantify the resource depletion, production efficiency, emissions, biotic impacts, and sustainability of the Australia-Japan telecoupling of wind power-based ammonia electric vehicles (EV) and hydrogen fuel cell vehicles (FCV) used for passenger transportation. The results revealed that these energy transitions from fossil fuels (coal and natural gas) to green ammonia can reduce nonrenewable energy consumption by >29.64% and Greenhouse Gas (GHG) emissions by >10.00%, while increasing the emergy demand for resources by >2.03 times and the biotic endpoint impacts by >1.56 times, which all mainly occurred in the sending subsystem of the telecoupling interaction. How to internalize the spatial ‘external’ resource stress and the biotic impacts, increase the utilization efficiency and the recycling rate of minerals and fresh water, and decrease the endpoint impacts need to be fully considered to guarantee the sustainability of these telecoupled energy transitions. The integrated life cycle assessment and emergy evaluation (LCA-EME) is a valuable tool that is under-development to better handle the complicated multi-nodal nexus problems of telecoupling activities.

This work was published in Renewable & Sustainable Energy Review (RSER, IF5year=17.551).



Structure of emergy-based inputs, emissions, and biotic impacts of the four telecoupling scenarios



Conceptual Energy Systems Language diagram of the four telecoupling scenarios

Warming drives sustained plant phosphorus demand in a humid tropical forest

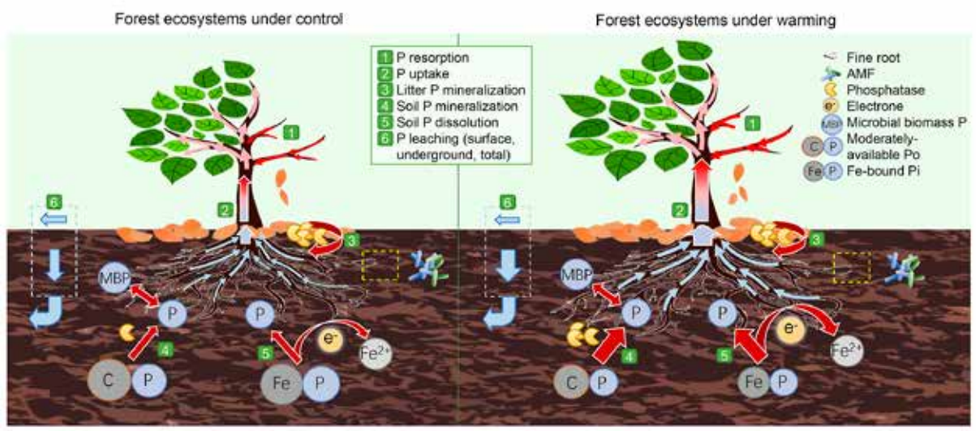
Phosphorus (P) is often one of the most limiting nutrients in highly weathered soils of humid tropical forests and may regulate the responses of carbon (C) feedback to climate warming. However, the response of P to warming at the ecosystem level in tropical forests is not well understood because previous studies have not comprehensively assessed changes in multiple P processes associated with warming.

To address the uncertainty related to P process, researchers from SCBG detected changes in the ecosystem P cycle in response to a 7-year continuous warming experiment by translocating model plant-soil ecosystems across a 600-m elevation gradient, equivalent to a temperature change of 2.1°C.

Results showed that warming increased P content and decreased foliar N:P. Increased plant P content was supplied by multiple processes, including enhanced plant P resorption, soil P mineralization and dissolution, without changing litter P mineralization and leachate P. These findings suggest that warming increased plant-soil biological and soil geochemical controls of plant-soil P-cycle, by “pumping” P from soils to relatively fast-cycling plants.

Our study provides new insights into tropical P cycling and facilitates more accurate modelling of forest P limitation under warming. The findings extend the traditional assessment methodology (i.e., measurement of P supply by available/soluble P) and current paradigm (assessing P conversion only by soil P mineralization). This suggests that previous studies may have overestimated the negative impacts of P limitation on ecosystem C stock, under at least short-term or medium-term future warming.

This work was published online in *Global Change Biology*, entitled "Warming drives sustained plant phosphorus demand in a humid tropical forests".



Schematic diagram illustrating the consequences of warming on P cycle

New research progress on the positive plant-plant interactions over a long-term plant succession

Positive interactions have been hypothesised to influence plant community dynamics and species invasions. However, their prevalence and importance relative to negative interactions remain unclear to understand community change and invasibility.

Assistant Prof. YIN Deyi from SCBG and her collaborators, examined pairwise biotic interactions using over 50 years of successional data of 480 plots to assess the prevalence of positive interactions and their effects on each focal species (either native or exotic). They found that positive interactions were widespread and the relative frequency of positive and negative interactions varied with establishment stage and between native and exotic species. Specifically, positive interactions were more frequent during early establishment and less frequent at later stages (Figure 1). Positive interactions involving native species were more frequent and stronger than those between exotic species (Figure 2), reducing the importance of invasional meltdown on succession. This study highlights the role of positive native interactions in shielding communities from biological invasion and enhancing the potential for long- term resilience.

The research article, entitled “Positive interactions of native species melt invasional meltdown over long- term plant succession” was published online in *Ecology Letters* (IF$_{2021}$:11.274). Please click on the link below to read more: https://onlinelibrary.wiley.com/doi/full/10.1111/ele.14127

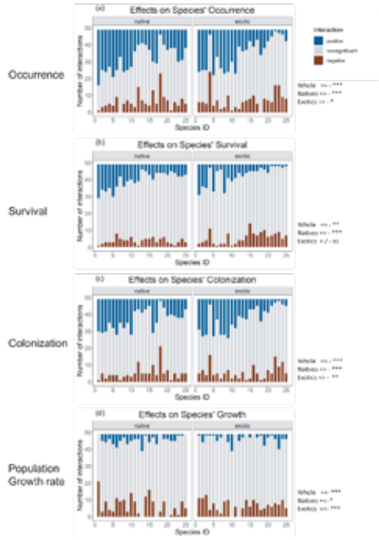


Figure 1. Positive plant-plant interactions were more frequent during early establishment and less frequent at later stages

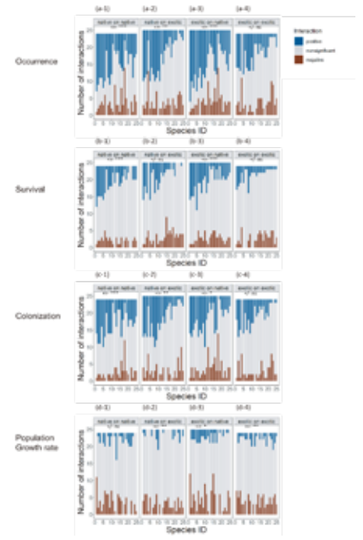


Figure 2. Positive interactions involving native species were more frequent than those between exotic species

Diverse responses of fruit development period

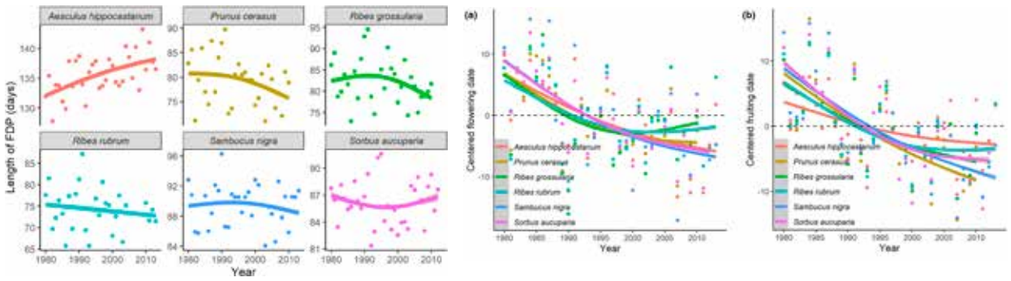
Climate warming has significantly altered the phenology of plants in recent decades. However, in contrast to the widely reported warming-induced extension of vegetative growing season, the response of fruit development period (FDP) from flowering to fruiting remains largely unexplored, particularly for woody plants.

Analyzing >560,000 *in situ* observations of both flowering and fruiting dates for six temperate woody species across 2958 European phenological observations sites during 1980 – 2013, we found that in all species both flowering and fruiting phenology, i.e., the FDP, advanced with climate warming. However, the advancing rates of the two events were not necessarily equal for any given species, resulting in divergent changes in the length of FDP among species with climate warming. During 1980 – 2013, not only the temperature during FDP but also the forcing requirement for fruit development increased, both affecting the length of FDP. The shortened FDP was mainly due to elevated temperature, thus accelerating the accumulation of forcing, whereas the prolonged FDP was primarily caused by the substantial increase of the forcing requirement of fruiting, which could be fulfilled only in a longer time and thus slowed down the advance of fruiting.

This study provides large-scale empirical evidence of warming-induced advances of FDP but divergent changes in its length in temperate woody species. Our findings demonstrate the contrasting reproductive phenological strategies among temperate woody species under the pressure of warming climate, contrary to the lengthening of vegetative growing season, which is by and largely similar with different woody species.

This study was published in *Global Change Biology* titled with "Climate warming leads to advanced fruit development period of temperate woody species but divergent changes in its length". Associate Prof. MA Qianqian is the first author of this study, and Prof. HUANG Jian-Guo is the corresponding author.

Read the article: https://onlinelibrary.wiley.com/doi/10.1111/gcb.16357



Flowering date (a), fruiting date (b) and the length of fruit development period during 1980 – 2013

Revealing the evolution model of leaf economic traits and their plasticity under climate change

Plant plastic responses are critical to the adaptation and survival of species under climate change, but whether they are constrained by evolutionary history (phylogeny) is largely unclear. Plant leaf traits are key in determining plants' performance in different environments, and if these traits and their plasticity are phylogenetically dependent, predictions could be made to identify species vulnerable to climate change.

To explore answers for the question "Can evolutionary history predict plant plastic responses to climate change?", researchers from South China Botanical Garden, Chinese Academy of Sciences, compiled data on three leaf traits (photosynthetic rate, specific leaf area, and leaf nitrogen content) of 434 species and their plasticity under four climate change scenarios (warming, drought, elevated CO_2 , or nitrogen addition) from 210 manipulation experiments. They found phylogenetic signals in the three traits but not in their plasticity under the four scenarios (H2 of Figure 1). This indicates that closely related species show similar traits but that their plastic responses could not be predicted from species relatedness under environmental change. Meanwhile, phylogeny weakened but did not change directions of conventional pairwise trait relationships, suggesting the co-evolved leaf trait pairs have consistent responses across contrasting environmental conditions. Overall, phylogeny can identify lineages rich in species showing similar traits and predict their relationships under climate change, but the degree of plant trait plasticity does not vary consistently across evolutionary clades.

This study expanded the knowledge of adaptation and coordination of leaf economic traits under climate change from an evolutionary perspective. Relevant results was published in *New Phytologist*: https://doi.org/10.1111/nph.18194.

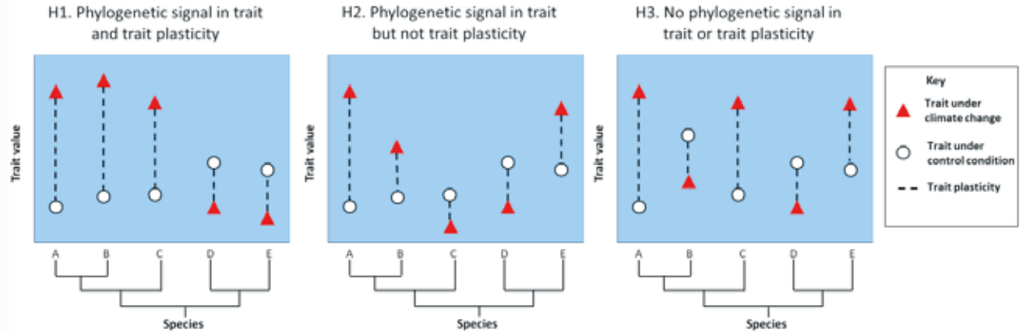


Figure 1. A schematic diagram and hypotheses demonstrating the presence or absence of phylogenetic signal in a hypothetical plant trait under climate change and its plasticity. In hypothesis 1 (evolution-driven trait response), evolutionary history influences the trait of species A-E under control conditions (white circles), and under climate change (red

triangles), as well as the ability to change the trait under different conditions (trait plasticity; the dashed line). Therefore, closely-related species show more similar trait values and trait plasticity than those more distantly-related (i.e., there is phylogenetic signal in the trait and its plasticity). In hypothesis 2 (environment-driven trait response), phylogenetic signal exists in trait values but not in trait plasticity. In hypothesis 3 (random trait response), there is no phylogenetic signal in either the trait or trait plasticity. The phylogeny below each panel shows the evolutionary relationships between the five hypothetical species, with species A most closely related to B, then C, and most distantly-related to D and E.

Echinatin and licochalcone A (LCA) are valuable chalcones preferentially accumulated in roots and rhizomes of licorice (*Glycyrrhiza inflata*). The licorice chalcones (licochalcones) are valued for their anti-inflammatory, antimicrobial, and antioxidant properties and have been widely used in cosmetic, pharmaceutical, and food industries. However, echinatin and LCA are accumulated in low quantities, and the biosynthesis and regulation of licochalcones have not been fully elucidated. In this study, we explored the potential of a R2R3-MYB transcription factor (TF) AtMYB12, a known regulator of flavonoid biosynthesis in Arabidopsis, for metabolic engineering of the bioactive flavonoids in *G. inflata* hairy roots. Overexpression of AtMYB12 in the hairy roots greatly enhanced the production of total flavonoids (threefold), echinatin (twofold), and LCA (fivefold). RNA-seq analysis of AtMYB12-overexpressing hairy roots revealed that expression of phenylpropanoid/flavonoid pathway genes. Transient promoter activity assay indicated that AtMYB12 activates the GiCHS1 promoter in plant cells, and mutation to the MYB-binding motif in the GiCHS1 promoter abolished activation. The transcriptome of AtMYB12-overexpressing hairy roots serves as a valuable source in the identification of potential candidate genes involved in LCA biosynthesis. Taken together, our findings suggest that AtMYB12 is an effective gene for metabolic engineering of valuable bioactive flavonoids in plants. Published Frontiers in Plant Science，2022，13:932594.

SCBG reveals the important mechanisms of natural resistance to pest attack in sweet potato

Sweet potatoes are an important cash crop in the world, and China is the world's largest producer, consumer, and exporter of sweet potatoes. Sweet potato planting areas are mainly distributed in tropical and subtropical regions, and frequent pests have become the main factors restricting sweet potato production. Sweet potato weevils are the most harmful pests in sweet potato cultivation and are also important international quarantine pests, which occur seriously in Asian and African areas and bring great economic losses to sweet potato production. In the sweet potato cultivation region of south China, sweet potato weevils occur for many generations a year and overlap generations, and it has spread to the Yangtze River Basin in recent years due to climate warming, with a trend of expansion year by year.

However, at present, there is no effective resistance resource for sweet potato weevil, and chemical control such as large-scale application of pesticides is mainly adopted, which not only increases production costs but also leads to environmental pollution and food safety. Therefore, exploring insect-resistant resources and carrying out research on the molecular mechanism are also urgent needs of the development of the sweet potato industry.

This study collected sweet potato materials in south China, where sweet potato weevils are prevalent, and performed their resistance evaluation. After three years of field screening, two precious germplasms were obtained with high resistance to sweet potato weevils. Afterward, F1 genetic populations were constructed by using the resistant germplasm. At the same time, a stable and precise evaluation system for detecting resistance in sweet potato weevil was established, and two key genes of sweet potato weevil resistance (*SPWR1* and *SPWR2*) were successfully located and cloned. Subsequently, the sweet potato genetic materials were constructed, which proved the resistance of the two genes to sweet potato weevils. Physiological and biochemical results showed that the induced SPWR1 specifically binds to the W-box element of the promoter DNA from the resistance allele *SPWR2*, thereby activating its expression. Furthermore, SPWR2 activated the biosynthesis of downstream quinate derivatives to resist sweet potato weevil attack. In conclusion, this study first identifies the natural resistance genes of sweet potato weevils and reveals the regulatory mechanism in production of natural resistant substances, providing a potential tool for agricultural control of sweet potato weevils (Figure 1). The paper was published as the cover story in *Nature Plants* (www.nature.com/articles/s41477-022-01272-1) (Figure 2).

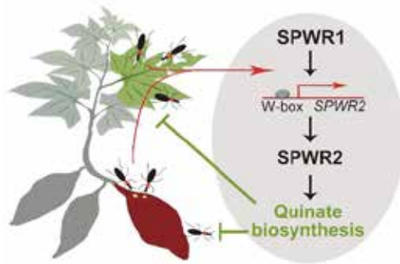
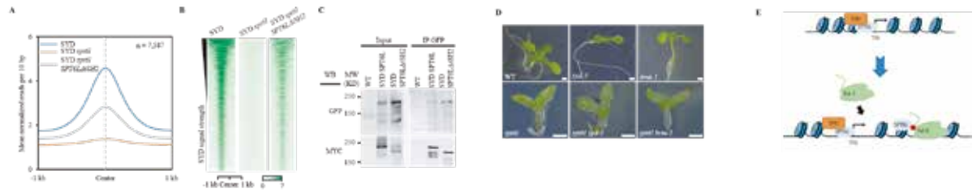


Figure 1. A working model of SPWR1 and SPWR2

Figure 2. Cover of current issue

Transcription elongation factor collaborates with chromatin remodelers during transcription initiation in Plants

Generally, transcription serves as the fundamental step to convert the DNA coded genetic information into RNA molecules, which either directly play functional roles or provide template for protein synthesis. On the other side, DNA is wrapped by nucleosome to form chromatin, which inhibits transcription initiation. Therefore, it is highly interest to examine the mechanism of precise releasing the partial chromatin during transcription. One of the major regulators of chromatin structure is chromatin remodeler, which take advance the released energy to alter the chromatin through histone sliding, replacement, and eviction. However, how to recruit chromatin remodeler in transcription initiation still needs to be illustrated. Here, we found that SWI2/SNF2 chromatin remodelers, SYD and BRM, can form protein complex with transcription elongation factor, SPT6L (suppressor of Ty 6 like), and bound to transcription start sites (TSS). With the deletion of tSH2 domain, a key domain bridging SPT6L and RNA polymerase II (Pol II), we found the recruitment of SYD/BRM to chromatin and its association with SPT6L are not dependent on the present of Pol II, suggesting the TSS recruitment of SPT6L-SYD/BRM may prior to the initiation of transcription. The recruitment of SPT6L-SYD/BRM regulates the nucleosome occupancy around TSS, which pave the way for Pol II entry. Finally, induction assay demonstrated that SPT6L is sufficient to recruit SYD/BRM to TSS and regulate arrangement of nucleosomes. These findings revealed the close linkage between chromatin remodelers and core transcription subunit during transcription initiation. It also demonstrates that how chromatin remodelers recognize the transcription start sites and coordinate transcription initiation and nucleosome occupancy during transcription. This work is supported by National Natural Science Foundation of China.



The working model of the role of SYD and SPT6L in transcription initiation

A: The genome-wide occupancy of SYD depends on SPT6L and SPT6LΔtSH2 can partially rescue the loss of SYD. B: Heatmap shown the dependency of SYD on SPT6L and SPT6LΔtSH2. C: Co-IP shown the interaction of SYD to SPT6L and SPT6LΔtSH2. D: morphological phenotypes of WT, syd-5, brm-1, spt6l, spt6l syd-5, and spt6l brm-1 seedlings. E: Working model of this work: During transcription initiation, SPT6L binds to transcription starting site (TSS) and recruits chromatin remodeler SYD to form a protein complex. And then, the TSS associated chromatin remodelers can improve the accessibility of Pol II and promote the assemble of transcription machinery by altering the local chromatin/nucleosome arrangement. Finally, activated Pol II will be phosphorylated and recruits SPT6L to form a transcription complex for following transcription.

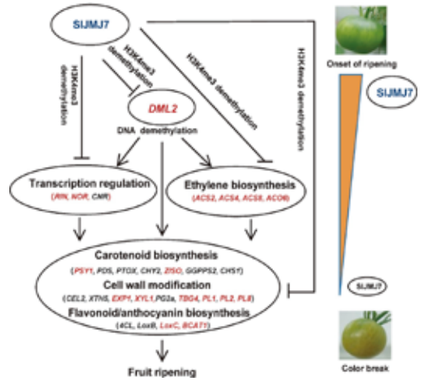
SlJMJ7 orchestrates tomato fruit ripening via crosstalk between H3K4me3 and DML2-mediated DNA demethylation

The ripening of fleshy fruits is a unique developmental process that Arabidopsis and rice lack. This process is driven by hormones and transcription factors. However, the critical and early regulators of fruit ripening are still poorly understood.

Here, we revealed that SlJMJ7, an H3K4 demethylase, is a critical negative regulator of fruit ripening in tomato. Combined genome-wide transcription, binding sites, histone H3K4me3 and DNA methylation analyses demonstrated that SlJMJ7 regulates a key group of ripening-related genes, including ethylene biosynthesis (*ACS2, ACS4* and *ACO6*), transcriptional regulation (*RIN* and *NOR*) and DNA demethylation (DML2) genes, by H3K4me3 demethylation. Moreover, loss of *SlJMJ7* function leads to increased H3K4me3 levels, which directly activates ripening-related genes, and to global DML2-mediated DNA hypomethylation in fruit, which indirectly prompts expression of ripening-related genes. Together, these effects lead to accelerated fruit ripening in *sljmj7* mutant.

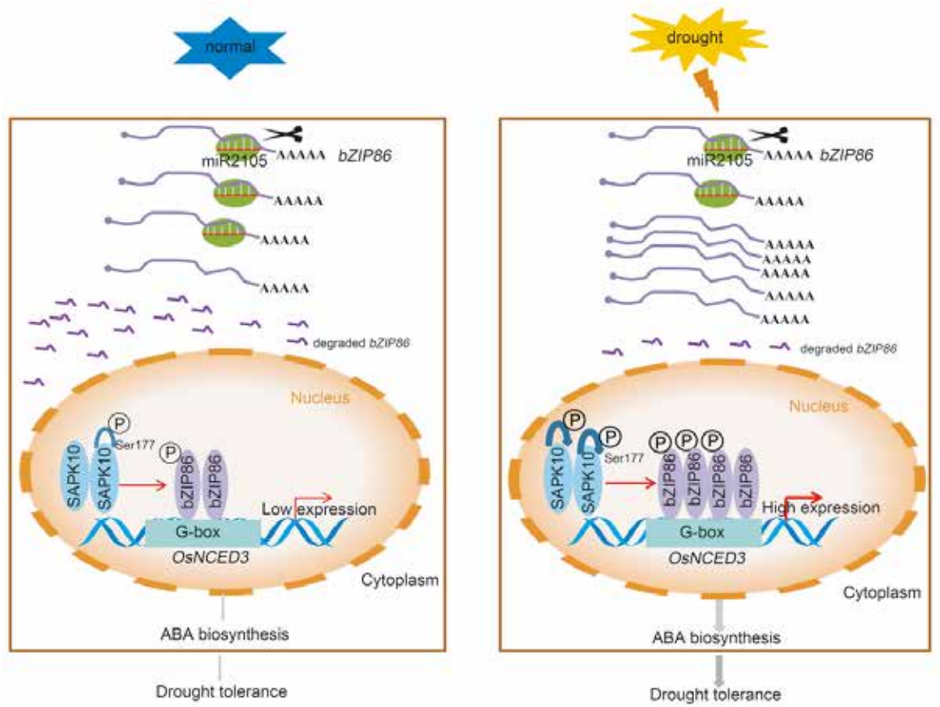
Our findings demonstrate that SlJMJ7 acts as a master negative regulator of fruit ripening through not only direct removal of H3K4me3 from multiple key ripening-related factors, but also crosstalk between histone and DNA demethylation. These findings reveal a novel cross-talk between histone methylaiton and DNA methylation to regulate gene expression in plant developmental processes.

Proposed mechanism of SlJMJ7 in the regulation of fruit ripening in tomato. During the onset of ripening, SlJMJ7 is highly accumulated in fruits and directly represses ethylene biosynthesis genes, key ripening transcription factors, and ripening-related metabolism genes via H3K4me3 demethylation. Simultaneously, SlJMJ7 directly represses DML2 expression, thus repressing the transcription of ripening-related genes via DNA methylation. The direct and indirect suppression of ripening-related gene expression by SlJMJ7 leads to inhibited fruit ripening. At the color break stage, the protein abundance of SlJMJ7 is diminished, resulting in the release of the inhibitory effects, thus initiating the ripening of tomato fruit. In this figure, all the indicated genes are direct targets of SlJMJ7 and the genes labeled in red are common direct targets of SlJMJ7 and DML2. Arrows indicate activation, whereas blunt-ended arrows indicate inhibition.



The miR2105/OsbZIP86 module regulates drought-induced ABA synthesis and participates in drought tolerance of rice

Drought is one of the most important abiotic stresses threatening plant growth, and affects the high and stable yield of rice. ABA is involved in regulating many stress responses of plants, but the mechanism of ABA synthetic regulation is still less known. We found that drought regulated the expression of rice miR2105 and *OsbZIP86*, and then regulated the expression of *OsNCED3*, a key enzyme gene for ABA synthesis. At the same time, SnRK2 protein kinase can promote the phosphorylation of OsbZIP86 and activate the activity of OsbZIP86 under drought conditions, thereby enhancing its transcriptional activation of OsNCED3. This study revealed the molecular mechanism that miR2105 -(OsSAPK10) - *OsbZIP86-OsNCED3* molecular module participates in rice drought stress response by regulating ABA synthesis, and this regulation pathway does not affect rice agronomic traits under normal growth conditions, thus providing a new way for genetic improvement of rice drought resistance. The research was published in *Plant Physiology* (2022189:889-905).

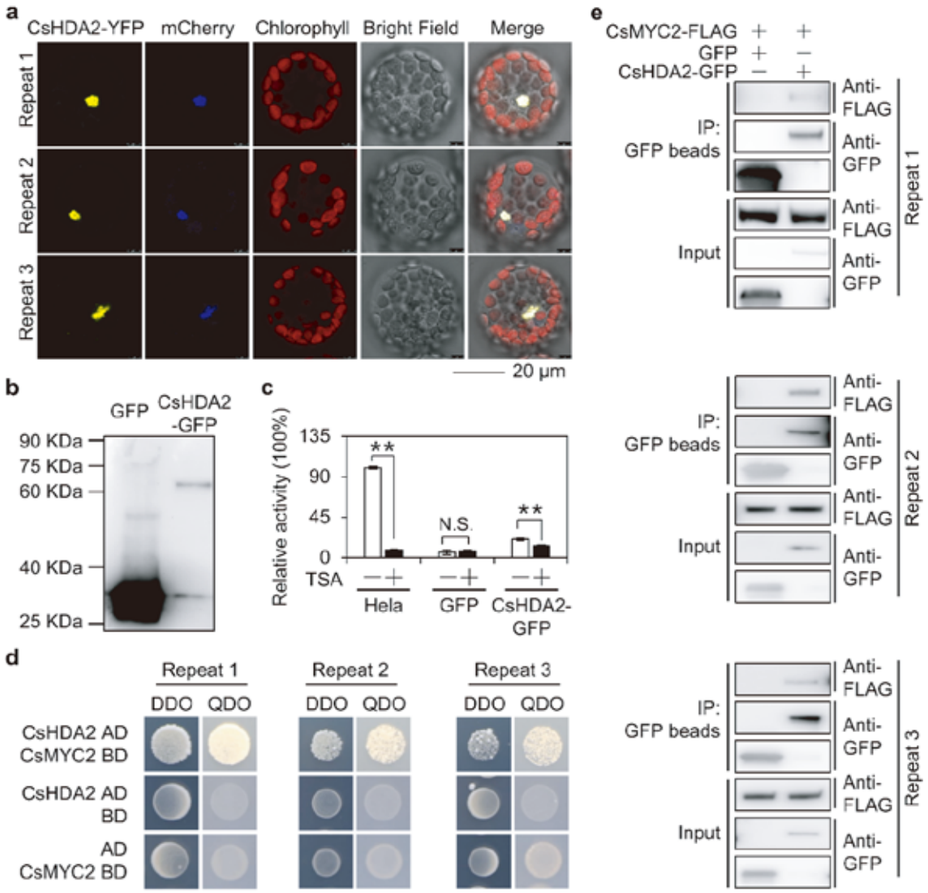


Working model of 'miR2105-(OsSAPK10) *OsbZIP86-OsNCED3*' module functions in regulating drought tolerance

Epigenetic regulation mechanism of tea volatile formation induced by tea green leafhopper infestation

Insect infestation induces the production of plant secondary metabolites, especially herbivore-induced plant volatiles (HIPVs). On the one hand, these volatiles can help plants resist environmental stress, on the other hand, they can also be used as important quality components of agricultural plants. Tea green leafhopper is a widely distributed pest in tea gardens. Its invasion can reduce the yield of tea. Meanwhile, the invasion of tea green leafhopper can also induce a large amount of volatiles in tea leaves, some of these volatile substances help to enhance the tea aroma quality. For example, the honey-scented oolong tea "Oriental Beauty Tea" is made from the fresh tea leaves infested by tea green leafhopper. Therefore, it is of great significance to study the biosynthesis and regulation of these volatile compounds. However, the upstream mechanism regulating the herbivore-induced expression of volatile biosynthesis genes is unclear, especially at the level of epigenetic regulation. The Tea Plant Secondary Metabolism and Resource Utilization Research Group (PI: Prof. YANG Ziyin) revealed an important role for epigenetic regulation in the formation of tea HIPVs, and involvement of histone deacetylase 2 (CsHDA2) in regulating (*E*)-nerolidol formation in tea exposed to tea green leafhopper infestation was investigated. In this study, similar to the effects of a tea green leafhopper infestation, treatments with exogenous jasmonic acid (JA) and histone deacetylase inhibitors significantly increased the (*E*)-nerolidol content in tea and induced the expression of the associated biosynthesis gene *CsNES*. Furthermore, a key transcription factor related to JA signaling, myelocytomatosis 2 (CsMYC2), interacted with the CsHDA2 *in vitro* and *in vivo* (Figure 1). A tea green leafhopper infestation inhibited *CsHDA2* expression and decreased CsHDA2 abundance. Moreover, the tea green leafhopper infestation increased the H3 and H4 acetylation levels in the promoter region of *CsNES*, which in turn up-regulated the expression of *CsNES* and increased the (*E*)-nerolidol content. In this study, we revealed the effects of histone acetylations on the accumulation of HIPVs, while also confirming that CsHDA2-CsMYC2 is an important transcriptional regulatory module for the accumulation of (*E*)-nerolidol induced by tea green leafhoppers. The results of this study may be useful for characterizing plant aromatic compounds and the main upstream stress-responsive signaling molecules. Furthermore, the study findings will assist researchers clarify the epigenetic regulation influencing plant secondary metabolism in response to external stress.

This research was published in *Horticulture Research*, 2022, 9: uhac158.



Subcellular localization and functional validation of CsHDA2 and protein interactions of CsHDA2 and CsMYC2 in vivo and in vitro

South China Botanical Garden made progress in the regulation of the flowering of *Paphiopedilum*

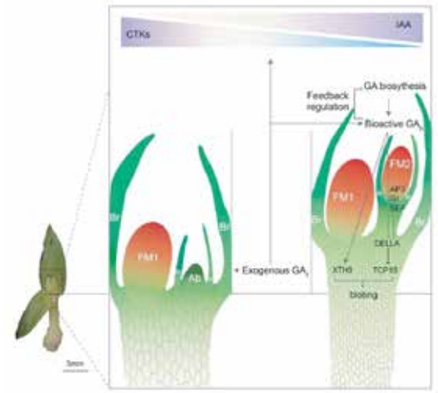
Paphiopedilum orchids have a high ornamental value. However, studies on flower development regulation and the molecular mechanism behind are lacking. Most popular species of *Paphiopedilum* sold on the market will display one flower. All such one-flowered species have an additional flower bud in the apical bract that fails to develop further once the dominant flower is opened. Presently, the flowering of most of *Paphiopedilum* species is non-uniform and uncontrollable. Flower abundance and timing are two key horticultural traits that substantially affect the economic and ornamental value of orchids. Therefore, by better understanding the flowering regulation mechanism, we could precisely control flowering time and increase flower productivity to greatly increase their economic value.

A blossom inflorescence with two flowers resulting from GA treatment

Researchers from SCBG found an exogenous GA_3 application promoted flowering of *P. callosum* by inducing its early bolting instead of the floral transition of dominant flowers. Applying GA_3 effectively promoted lateral flower differentiation, resulting in a two-flowered inflorescence.

Exogenous GA_3 application stimulates the synthesis of endogenous GA_3 and is accompanied by a decreasing level of CTKs level and an increasing level of IAA. Endogenous levels of GA_3 are fine-tuned via feedback control of GA-synthesis and GA-degradation genes. More bioactive GAs up-regulate *PcXTH9* expression and thereby affect the binding activity of DELLA-TCP proteins with cell-cycle genes, thus promote the bolting process. The low CTK/IAA ratio and high GA level, in combination with the greater expression of *PcAP3, PcPI,* and *PcSEP*, induce floral meristem formation that contributes to lateral flowering in the *P. callosum*. This study provides insight into mechanisms regulating flower development of *P. callosum*.

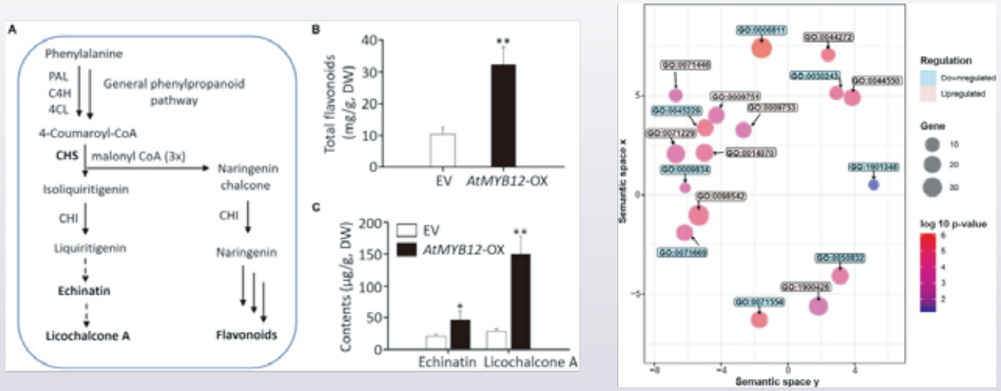
This work has been published online in *Horticulture Research*, entitled “Exogenous GA_3 promotes flowering in *Paphiopedilum callosum* (Orchidaceae) through bolting and lateral flower development regulation”. Ph.D student YIN Yuying from SCBG, is the first author of the paper, Prof. FANG Lin and Prof. ZENG Songjun are the co-corresponding authors of the paper. Article link: https://academic.oup.com/hr/advance-article/doi/10.1093/hr/uhac091/6572268?guestAccessKey=b24130c1-a929-4c94-b716-147ffb6e0a8f



Proposed working model for the role of GA3 in promoting lateral flower formation and bolting in *P. callosum*

AtMYB12 regulates the biosynthesis of flavonoids in licorice

Echinatin and licochalcone A (LCA) are valuable chalcones preferentially accumulated in roots and rhizomes of licorice (Glycyrrhiza inflata). The licorice chalcones (licochalcones) are valued for their anti-inflammatory, antimicrobial, and antioxidant properties and have been widely used in cosmetic, pharmaceutical, and food industries. However, echinatin and LCA are accumulated in low quantities, and the biosynthesis and regulation of licochalcones have not been fully elucidated. In this study, we explored the potential of a R2R3-MYB transcription factor (TF) AtMYB12, a known regulator of flavonoid biosynthesis in Arabidopsis, for metabolic engineering of the bioactive flavonoids in G. inflata hairy roots. Overexpression of AtMYB12 in the hairy roots greatly enhanced the production of total flavonoids (threefold), echinatin (twofold), and LCA (fivefold). RNA-seq analysis of AtMYB12-overexpressing hairy roots revealed that expression of phenylpropanoid/flavonoid pathway genes. Transient promoter activity assay indicated that AtMYB12 activates the GiCHS1 promoter in plant cells, and mutation to the MYB-binding motif in the GiCHS1 promoter abolished activation. The transcriptome of AtMYB12-overexpressing hairy roots serves as a valuable source in the identification of potential candidate genes involved in LCA biosynthesis. Taken together, our findings suggest that AtMYB12 is an effective gene for metabolic engineering of valuable bioactive flavonoids in plants. Published Frontiers in Plant Science，2022，13:932594.



AtMYB12 regulates the biosynthesis of flavonoids in licorice

04

Talent Team Construction

Billbergia amoena (photographed by SU Jianzhong)

Comprehensive Introduction

In 2022, centering on the "14th five-year plan" of SCBG, taking the construction of national botanical garden and national key laboratory as the guidance, SCBG earnestly promoted the human resource plan and strengthened the training of high-level talents. 40 new employees joined SCBG. By the end of December, there were 1484 documented staff, including 412 registered employees, 304 retirees, 461 graduate students, 82 postdocs, and 225 other employees (including temporary staffing).

Brief Achievements

1. Re-organized regulations and solved problems

Firstly, we focused on the abolishment, reform and establishment of rules and regulations on personnel and talents to standardize personnel management. In 2022, totally six regulations were revised, including *the Implementation Rules of Post Management, the Implementation measures of Talent Introduction and Management, the Implementation Measures for the Employment Management of Non-Institution Staff, the Implementation Measures of the "Bole Award" for Talent Introduction*, etc. Six new regulations were issued, including *the Management Rules for the Employment of Visiting Research Fellows, the Training Plan for Excellent Young Talents and the Management Rules for Dispatched Personnel*, etc. Nine old regulations were abandoned. Secondly, we solved several problems that proposed by staff.

Inspection and rectification work meeting

2. Recruitments

A total of 23 authorized strength positions (including 3 management positions, 10 support positions and 10 doctoral positions for horticulture center), 22 other positions (including 3 for construction Office and 16 for scientific and technological research assistances) were recruited.

Post competition defense review meeting

3. Talent training

In 2022, SCBG introduced one young top talent, one selected candidate of CAS Talent Introduction Plan. Three new members of the Youth Promotion Association have been selected, one Young Talent of CAST, two top Young Talents of Guangdong Province's Pearl River Talent Plan, one distinguished Young Scholars of Guangdong Province, eight new SCBG Excellent Young Talent Programs has been awarded. Completed the selection of the first and second batch of special research posts of CAS,13 core research posts and 29 backbone research posts have been appointed. *SCBG Interim Measures for Stabilizing and Encourage Outstanding Scientific and Technological Backbone Talents* were revised.

Talent Work Seminar

4. Strengthen postdoctoral training

By the end of December, there were 82 postdocs in station. Totally 72 SCI papers were published (as the first affiliation of SCBG or the first author). The number and quality of papers were significantly improved compared to previous years. SCBG postdocs obtained 9 Second class key support of post-doctoral fund, one Special Program of China Postdoctoral Science Foundation,11 National Fund for Youth, one Postdoctoral International Exchange Program and two CSC grants.

Postdoctoral funded project recommendation and defense review meeting

5. Steadily promote Dispatch Personnel

The Administrative Measures for Dispatch Personnel of SCBG (Provisional) and *The Administrative Measures for Temporary Workers of SCBG were formulated to strengthen the system construction* were issued. In 2022, 78 dispatched workers were hired.

6.New progress in continuing education

The completion rate of staff continuing education and training hours reached a new high with 97.13% in 2022. We successfully get funding from MOHRSS (Ministry of Human Resources and Social Security) and released the first nation-level advanced research class in SCBG.

Director REN Hai gave a report for continuing education

WEI ping gave a report for continuing education

05

Postgraduate Training

Asclepias curassavica (photographed by LI Wenyan)

In 2022, 461 postgraduates studied in SCBG, reaching record high. There were 166 doctoral students (including 11 foreigners) and 295 master students (including 15 foreigners, 12 students jointly trained by SCBG and Zhongkai University of Agriculture and Engineering, and 16 jointly trained by SCBG and Gannan Normal University). There were 121 postgraduate supervisors in SCBG, with 61 PhD supervisors and 56 Master supervisors.

Group photo of 2022 graduate students

In 2022, 44 doctoral students (including 6 foreigners) and 94 master students (including 2 ethnic minority cadres, 1 veteran and 4 foreigners) were enrolled in SCBG. Among them, 17 were Recommending Exam-Free Post-graduate students. SCBG supervisors serve as the first supervisor and jointly recruited 7 master students with other universities. The total number of new students enrolled reached a record high. In 2022, 112 students graduated and 120 students received the degree (51 received doctoral degree and 69 received master degree).

In 2022, Three doctoral students won the Dean's Excellence Award, two doctoral students were rewarded the ZHU LI Yuehua Excellent Doctor Scholarship of CAS, three doctoral students won the Di'ao Scholarship, three doctoral students and three master students won the National Graduate Scholarship, One doctoral student won Syngenta Mary-Dell Chilton Graduate Scholarship from Chinese Society for Plant Biology(15 nationwide).Organized government-sponsored overseas education programs for students and 2 students were recruited. Besides, 2 students were recruited by UCAS-sponsored overseas education program.


证书

胡芃柳 同学荣获 2022 年度中国科学院院长优秀奖，特发此证，以资鼓励。


证书

梁艺婷 同学荣获 2022 年度中国科学院院长优秀奖，特发此证，以资鼓励。


证书

毛香花 同学荣获 2022 年度中国科学院院长优秀奖，特发此证，以资鼓励。

In order to attract more outstanding students, the 10th Summer Glamor Camp of SCBG was successfully organized online for the first time. Director in charge of education, heads of various centers / field stations and platforms, as well as the representatives of supervisor, carried out 17 special reports, introducing relevant information in detail. This Camp attracted more than 4700 online visitors. We also successfully held the 2022 CAS Student Practice Training Program, with 27 undergraduates enrolled from 16 teams of 12 universities including Sun Yat-sen University， Nanjing University and Xiamen University, etc.

In terms of construction of disciplines, SCBG played a leading role in construction work of the forestry discipline of UCAS and responsible for the periodic qualification assessment from 2020-2025,and completed the update of the additional materials for the new doctoral degree program in horticulture, and has been presented by UCAS to the Ministry of Education.

As to strengthen the construction of supervisor team, especially young supervisor, SCBG revised the rules for the selection and appointment of graduate supervisors and the selection conditions was further simplified. In 2022, 6 new PhD supervisors and 11 new master supervisor joined SCBG.

A number of recreational and sports activities have been launched to improve the humanistic quality and cultural life of postgraduates, including ball matches, Psychological salon, Graduates sharing meeting and Volunteer activities.

Ideological & Political Training and Safety Management Conference for Graduate Students

06
International Cooperation and Academic Exchanges

Rhodanthe manglesii (photographed by CHEN Yousheng)

Although COVID-19 pandemic has brought devastating impacts of International Cooperation and Academic Exchanges in 2022, SCBG still made some good achievements.

International Cooperation

1.International Cooperation network

As a member of the Chinese government delegation, Dr. REN Hai participated the Fifteenth meeting of the Conference of the Parties to the Convention on Biological Diversity (CBD COP15) held in Canada in December. Dr. REN Hai was appointed as the director of the BGCI Board of directors.

SCBG signed an extended cooperation agreement with the University of San Marcos in Peru.SCBG also signed cooperation and exchange agreement with the University of Hawaii.

Dr. REN Hai attended CBD COP15

2. International Talents program

In 2022，four international talents programs cooperated with SCBG were approved.

3. International Conference

From August 17th to 18th, the International Symposium on Plant Diversity in China and the New Tropical Zone was held online, with about 200 domestic and 300 foreign scientists participating. The conference promoted the exchange between scientists.

International Symposium on Plant Diversity in China and the New Tropical Zone

4. Won award of 2022 International Scientific Cooperation of CAS

Recommended by SCBG, Professor Betty Gaby Millan Salazar from the University of San Marcos in Peru won the "Award of 2022 International Scientific Cooperation of CAS".

Academic Exchanges and Academic Society Activities

1. Academic Exchanges

CHUN Woon-young Lectures Series (WCLS) was initiated in 2009 and became a critical academic exchange platform in SCBG. In 2022, 4 famous scientists were invited to share their research progress and scientific experience in WCLS. Besides, SCBG organized annual academic meeting, to share reports gave by directors and researchers from 3 SCBG Research Centers.

Annual academic meeting of 2022

2. Academic Society Activities

Guangdong Society of Plant Physiology (GDSPP). The 3rd Joint Annual Conference of Plant Physiological Society from five provinces was held from Dec 17th to 18th, (5SPPC 2022). The conference was successfully held online, attracted more than one million visitors.

The 3rd Joint Annual Conference of Plant Physiological Society from five provinces

3.Guangdong Botanical Society (GBS)

On Sep 3rd , the 2022 academic exchange meeting hosted was held in SCBG. About 60 representatives from scientific research institutes, colleges and universities, landscape enterprises and other institutions attended the meeting.

2022 Academic Exchange Meeting of Guangdong Botanical Society

07
Publicity and Security

Strophanthus divaricatus (photographed by XU Yechun)

Publicity

More than 100 interviews were conducted throughout the year, and more than 80 media reports were reprinted.

The news of unveiling ceremony of SCNBG was reprinted by more than 170 media and published in full on the Chinese government website. Major news columns such as CCTV News, News Studio, Oriental Space Time, News 30 Minutes and Common Concern on CCTV channels reported 34 times; Xinhua News Agency reported on the unveiling ceremony in six languages, including Chinese, English, Portuguese, Spanish, Russian and Italian.

As of July 31st , there were 42934 pieces of information related to "the State Council agreed to set up SCNBG in Guangzhou". Among them, there are 35060 pieces of information related to the opening ceremony of SCNBG.

People's Daily reported the opening ceremony of SCNBG

Guangzhou Tower recorded the setup of SCNBG

Security

There are 14 security guides and 75 laboratory security part-time staff in the research section, 24 security guides in the Horticulture Center, and 21 forest guards in Dinghushan national natural reserve.

Formulated and signed safety responsibility letters at all levels, and clarified the responsibility lists. Revised systems related to safety management, the "Emergency Response Measures for Emergencies in SCBG" was newly formulated to strengthen emergency response capabilities; Revised the "Management Measures for Official Vehicles" to improve the management standards for official vehicles, implemented designated refueling, maintenance, and warranty for official vehicles, and strengthened daily use registration.

The exhaust system of the experimental building in the research area has been fully renovated, achieving full coverage of the smoke alarm system, and the centralized implementation of 24-hour personnel on duty for fire alarm signals. The monitoring of the dormitory area in the exhibition area and the warehouse in herbarium were newly added, and the installation of the pipeline gas in the canteen was completed. The centralized Charging station and 36 outdoor fire hydrants in the exhibition area were newly built. The office buildings and residential areas were equipped with fire extinguishers, Gas mask, fire balls, micro fire stations, fire blankets and other fire-fighting facilities. The office building in the research area is equipped with emergency medicine boxes and AED (Automatic External Defibrillator).

Electric vehicle charging station and monitoring system were added in the exhibition area

Analyzed safety incidents in the past decade, completed the identification of hazard sources in over 200 laboratories and key areas of SCBG, and added more than 20 types of safety signs in laboratories, totaling over 1200. Established a risk source ledger and key location registration ledger for SCBG. Removed the accumulated waste chemical reagents and highly toxic chemicals, and improved the facilities and equipment of hazardous chemical warehouses.

Organized nine safety education and training sessions throughout the year with more than 600 participants. Received one funding (900,000 CNY) project of CAS.

In 2022, SCBG analyzed safety incidents in the past decade, completed identification of hazards in over 200 laboratories and key areas of SCBG, and established a risk source ledger and key area registration ledger for SCBG. Besides, nine safety education trainings were launched with more than 600 participants.

08
Horticultural center

Strongylodon macrobotrys (photographed by ZOU Lijuan)

Ex situ conservation

Focusing on the *ex situ* conservation mission of SCNBG, the comprehensive protection plans of 3E plants (Endangered, Endemic and Economic Plants) were formulated. The systematic collection and complete conservation of living plants was carried out continuously, and the priority protection of national key protected wild plants and threatened plants was strengthened. Overall, the Horticultural center made new progress in species conservation in 2022.

A total of 2206 new accessions were introduced in the whole year, including 1160 species and 220 cultivars, belonging to 187 families and 675 genera, among which 48 national key protected wild plants and 170 threatened plants were added. *Lepisanthes unilocularis*, *Ottelia cordata* and *Hydrocera triflora*, which were listed as regionally extinct species, were introduced in field investigation. Totally 106 species of Gesneriaceae and more than 100 species of Orchidaceae were collected, and a new species of Bambusoideae, *Bambusa liangzhiana*, was published. A total of 180 species of plants were propagated, 301 species of plants were identified, and the phenological periods of 751 species of plants were recorded. Seedlings in 9303 pots were repotted into lager pots, and 4422 new seedlings (including sowing seedlings, cuttage seedlings and tissue cultured seedlings) were potted. A total of 137 pots/clusters of 40 taxa were field planted, and 1388 pots of plants were grown outdoor. Currently, 17502 taxa (including 10602 species and 6900 cultivars) are conserved, with 813 rare & endangered species and 385 national key protected species.

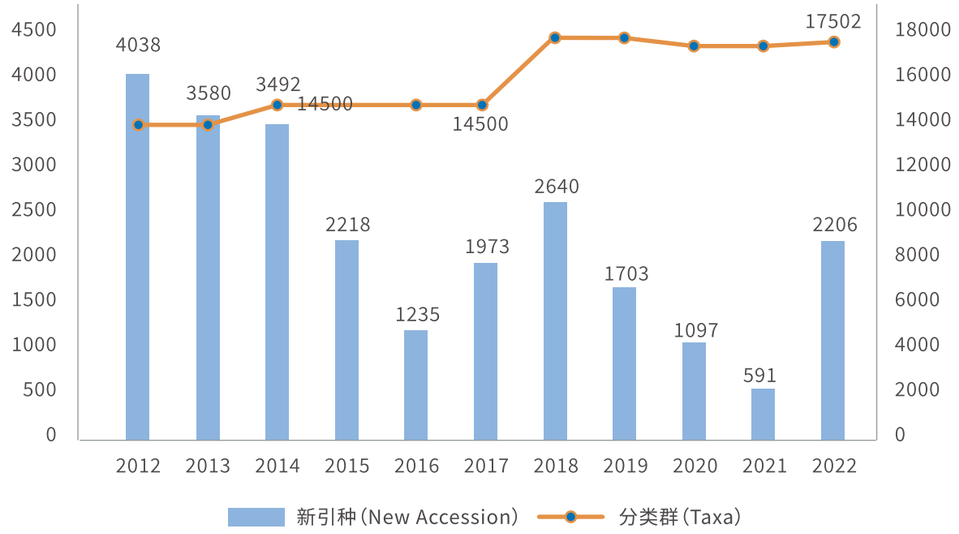


Figure 1. Statistics of Living Plants Collections in SCBG from 2012 to 2022

Figure 2. *Phaius wenshanensis*

Figure 3. *Bambusa liangzhiana*

Figure 4. *Cordia subcordata*

Figur 5. *Peristeria elata*

Figure 5. *Nephelaphyllum tenuiflorum*

Figure 6. *Hydrocera triflora*

Horticulture

In order to achieve professional, standardized and innovative horticultural work, the management system and reward system of landscape and horticulture department were newly developed. Duty task was cleared for each staff and the garden patrol system was implemented. The supporting management system was established including mechanical maintenance, hydropower maintenance, and cleaning maintenance. Moreover, a professional technical training and exchange platform was established to offer horticulture training courses “Fenghuai Training Course”. Tree inventories and risk assessments were carried out in the garden. Four forums of landscape and horticulture were held in 2022.

Biodiversity-themed flower shows were held during major festivals. A series of special plant exhibitions and public education activities were carried out in greenhouse and theme gardens, among which professional guiding nature tours and exotic plant searching campaign were especially popular. Meanwhile, more than 10 special flower shows (*Hippeastrum, Bougainvillea, Paphiopedilum*, Chinese orchids, carnivorous plants, anti-aging plants, plants utilized during the long march of red army) were held.

Landscape promotion in the garden was included in the annual routine tasks, and landscape transformation was completed in more than 80 key sites. And cherry blossom collection was newly built. About 500 new great cultivars were introduced and displayed in the garden.

Figure 1. Flower show: Integration of city and botanical garden

Figure 2. Flower

Figure 3. *Hippeastrum* flower show

Figure 4. Anti-aging plant show

Figure 5. *Paphiopedilum* flower show

Figure 6. *Bougainvillea* flower show

Figure 7. Viewing area of cherry blossom

Figure 8. Rare and endangered plant show

Figure 9. Waterscape reconstruction

Figure 10. Arboriculture training course

Figure 11. Natural science guided tours

Resource Utilization

The comprehensive protection plans of 3E plants were implemented and plant resources evaluating, cataloging and utilizing were carried out continuously. Propagation and conservation techniques of rare & endangered plants and economic plants (*Merrillanthus hainanensis, Ormosia henryi, Cibotium barometz, Plagiopteron suaveolens, Primulina fengkaiensis, Primulina huaijiensis, Ardisia dasyrhizomatica, Cedrela odorata, Quillaja saponaria*, etc.) were studied. Evaluation of *ex situ* conservation status of endangered plants and national protected key wild plants in SCBG was completed. The operating procedures for cultivation and conservation of 12 species, including *Nymphaea gigantean, Magnolia liliifera, Bambusa variostriata, Aristolochia grandiflora*, *Primulina fengkaiensis* and *Hibiscus rosa-sinensis*, etc., were developed successfully. A total of 13 new cultivars were bred and one patent was authorized. Moreover, *Botanical Painting of Orchid, My First Book of Orchid* and two volumes of *Ex situ Flora of China* were published. For domestic collaborations, plant materials of 17 batches of 98 species were provided for other universities or research institutes.

Figure 1. *Ericaceae of Ex Situ Flora of China*

Figure 2. *Hoya of Ex Situ Flora of China*

Figure 3. *Botanical paintings of Orchid*

Figure 4. *My First Book of the Orchid*

Figure 5. *Hibiscus* 'SCBG Your Smiling Face'

Figure 6. *Hibiscus* 'SCBG Rose Girl'

Figure 7. *Hibiscus*'SCBG Pink Purple Gege'

Figure 8. *Hibiscus* 'SCBG Army Boot

Public education and customer service

In the past year, the horticulture center received 1.6902 million tourists, with about 100,000 teenagers. The income from tickets and various tourism services was 24.2326 million CNY.

The horticulture center held or participated in 194 popular science activities (including 148 courses) of CAS, Guangdong Province and Guangzhou City, attracting more than 3 million online and offline audiences. And 1340 batches of science popularization guides were carried out.

In 2022, plant knowledge and activities were reported by newspapers, television and radio station for 106 times, and propagated by various network new media for 189 times. 498 tweets were posted in Wechat with 341163 followers, 138 tweets were released in Micro-blog with 222 thousand followers, and 46 videos were published in Tiktok with 2713 followers.

In 2022, the horticulture center got seven projects of science popularization with 1.76 million CNY funding. SCBG was awarded as “The new prominent activity institution of the 18th CAS Public Science Day” “Excellent institution of the 3rd Guangdong, Hong Kong and Macao natural educational season” “Excellent institution in science popularization activity of China Plant Physiology Society” “Guangzhou’s most popular institution in science popularization and tourism resources” “The best partner of Guangzhou Qiqiao Culture Festival” and “New-type science popularization cooperation alliance institution in Tianhe District”.

Prof. WANG Ying was appointed as the first batch of science communication ambassadors of Guangzhou Science and Technology Communication Alliance. Prof. LIAO Jingping was appointed as the first batch of experts of Guangzhou Science Popularization Research Think Tank. Ms. TAN Rubing was awarded as the outstanding popular science worker of Guangzhou (2022). Ms. SU Jiayi was awarded as the outstand individual of the 3rd Guangdong, Hong Kong and Macao natural educational season.

In the second popular science interpretation contest of the Guangzhou branch of CAS, ZENG Lanting (researcher) won the second prize, Wang Tong and LIANG Minting (researcher) won the third prize. In the Guangzhou “Science and Popularization Show” competition, WANG Yan (volunteer) won the second prize, and SCBG was awarded as “Outstanding science popularization envoy of Tianhe District (2022)”.

LIU Jiayi (volunteer) was awarded as “The most beautiful cultural tourism volunteer in Guangzhou (2022)”. The volunteer service of Horticulture center in SCBG was rated as “Guangzhou cultural tourism volunteer service project (2022)” and “Guangzhou cultural tourism volunteer service team (2022)”.

2022 Guangzhou Research and Learning Season Launch Ceremony, Research and Tourism Open Day of SCNBG

Honeybee Course Program

CCTV News Recorded Programs at the Rare and Endangered Center

SCBG was awarded as "National Science Popularization Education Base"

Blossom live Broadcast by Guangzhou Daily

09

Dinghushan National Nature Reserve

Rhododendron tingwuense (photographed by SONG Zhuqiu)

In 2022, Dinghushan National Nature Reserve (DNNR), made good achievements on resource management, scientific monitoring, natural education, platform management and service.

LI Xi, member of the Political Bureau of the CPC Central Committee and secretary of Guangdong Provincial Party Committee visited DNNR. He highly appreciated the effective work of DNNR.

LI Xi visited DNNR

Arboretum Party Branch Jointly Conducts Friendship Activities with Volunteers

Nature Conservation and Resource Management

DNNR advocated the concept of "the forest fire prevention is always the first priority of Dinghushan", and especially focused on safety consciousness. DNNR formulated and issued the "Management Measures for Forest Rangers" and other related systems, improved the attendance and assessment of forest rangers. DNNR held fire drills and training for many times, established a joint prevention and control system with members of the mountain fire prevention units; signed the "Forest Fire Safety Responsibility Letter", and implemented the process supervision. Furthermore, DNNR strengthened the technical and material defense, with purchasing a large number of fire-fighting facilities, such as unmanned aerial vehicle and other pertinent equipment. In addition, 80 batches of 300 backpackers and stowaways were drive away from the preserved area; major forestry pests were prevented and controlled, with 849 dead pine trees were cleared covering an area of 345 hectares.

Forest fire drills and training

Scientific Research Monitoring and Platform Services

DNNR carried out animal and plant survey and monitoring work, and found 31 new recorded species of wild animals in 2022, including 4 species of birds and 27 species of insects (including 4 species of butterflies), which increased the number of bird species in Dinghushan to 272, and the number of identified insect species to 740. The

species of wild animals under state key protection has been up to 65 in DNNR. DNNR provided supports for various institutions and teams to conduct scientific research in Dinghushan. There were at least 63 research papers relative to Dinghushan published in 2022, including 42 SCI papers and 21 CSCD papers. Among them, 6 papers are IF > 10, and 12 are IF5-10.

Field Monitoring

Nature education trail

Nature Education and Publicity

Two nature education trails with a total length of 5.7 km was completed, including an experience trail and an exploration trail; the renovation and upgrading of the nature education exhibition hall was completed, 12 nature education and activities were launched, with 180,000 attendances. Five online public nature education classes were held, with 6000 attendances. Six live science popularization activities were held on themes such as Arbor Day, Biodiversity Day, Nature Education Season and Forest Culture Week, attracted 1000 attendances. 22 popular science articles and one video were published in the column of the new media “CAS’s voice”, which has been viewed 180,000 times. 125 pieces of information were released on the official Wechat, with an increase of nearly 6,000 followers compared with 2021. DNNR participated in various popular science works creation contests and popular science explanation contests and won many awards in 2022. In this year, Dinghushan was recognized as "National Science Popularization Education Base (2021-2025)" by China Association for Science and Technology, and recognized as "Demonstration Unit of Guangdong Environmental Education Base" (first batch) by Guangdong Department of Ecology and Environment.

Other Achievements

Since the beginning of 2022, SCBG and Zhaoqing Municipal Government jointly started the project of "Dinghushan Ecological Civilization Demonstration Zone". A leading group of co-construction was established and the first meeting was held; work related to demarcation beacon, forestry pest control and forest fire fighting was launched.

After nearly one year’s hard negotiations and multi-party coordination, the land leased (0.46 hectares) by Guangfuzhao highway construction was finally reclaimed (0.48 hectares), and a themed garden has been initially established.

Enkianthus quinqueflorus (photographed by PENG Lifang)

10 Party Building and Innovation Culture

SCBG deeply studied and implemented of XI Jinping Thought on Socialism with Chinese Characteristics for a New Era and the spirit of the 20th Party Congress, conscientiously organize and carry out the "Effective construction of grass-roots organizations" activities, and did a solid job of late part of the inspection. SCBG also comprehensively improved the quality of Party building work, and strived to promote the deep integration of Party building work and business work, to provide strong political assurance for central works such as the implementation of the 14th Five-Year Plan and the construction of the SCNBG.

In 2022, SCBG had 19 Party branches with 523 Party members, including 16 new members of CPC, and 20 probationary members were recruited. In 2022, SCBG won 20 honors from CAS, Guangzhou Branch of CAS and Guangzhou City.

Implemented the major decisions and deployments of the Party Central Committee, the State Council and the Party Group. The Party committee made the study and implemented the important instructions and instructions of General Secretary XI Jinping as the “First issue”, and held 32 Party committee meetings throughout the year. Nine times of theoretical learning center group meetings (expanded) were held with 319participants, mainly focused on XI

Jinping's critical discourse spirit of science and technology innovation, as well as *XI Jinping Ecological and Civilization Thought Learning Outline*. Researched and formulated the "Work Plan" to promote the study and propaganda to implement the spirit of the 20th Party Congress in a deep and practical manner. The Party committee, theoretical learning center group, CPC Party branches, democratic parties, etc. carry out thematic learning at different levels to achieve full participation in learning. Thematic study seminars were held to implement XI Jinping's thought on Ecological Civilization in the practical action of promoting the reform and innovation development of SCBG. Organized CPC Party members, cadres and scientific and technological backbone to conduct in-depth study and discussion on the deployment and requirements of CAS 2022 work conference, the summer CPC Party group expansion meeting, the CAS talent work, etc. Accurately grasped of the new deployment and new requirements of the Central Committee and the leading party group of CAS on scientific and technological innovation, clarified the responsibilities and missions, objectives and tasks ideas and measures of SCBG in the new era, promoted the implementation of the 14th Five-Year Plan, the construction of the SCNBG, the declaration of the national key laboratories, the construction of the talent team, and other central work etc. , to ensure the successful completion of the key tasks throughout the year.

Inspection and rectification briefing

Completed the stage of inspection and rectification work, and continue to do a good job in the "second half of the article" of inspection. The leading groups of the Party committee thoroughly studied and analyzed the rectification problems and work requirements, clarified the work ideas and work priorities, and formulated the work plan. Strengthen the political role and taken the lead in implementing the responsibility of rectification. For 53 rectification problems from inspection feedback, SCBG made sure that everything has a response or implementation, the inspection rectification has been approved by the inspection leading Group of the Party Leadership Group of CAS. Continued to promote the establishment of rules and regulations, 20 new regulations, 40 revised regulations and 49 repealed regulations were adopted and put into effect. Properly resolved difficult issues and got high satisfaction with inspection and rectification assessment.

Solidly carried out "Effective construction of grassroots organizations" activities, improve the quality of Party building work. SCBG Planned and implemented the "Three-year action plan to improve the quality of Party building work", promoted the construction of Party branches, gave full play to the exemplary leading role of Party branches and Party members. Each year a Party building theme will be determined and 20 key tasks around five major projects (soul casting, consolidation, standardization, integrity, security) will be identified, so as to continually promote the study and education of Party history in a regular and long-term way. In 2022, 12 key tasks have been completed. The Party branch created Party building brands such as "Leading-Convoying- Benchmarking", and condensed some struggle vows, such as "Turn Wasteland into Oasis and creating an ecological island with skillful hands"; set up six commando teams such as "CHUN Woon-Young plant resources protection scientific research commando team". Jointly organized the Party day activity themed "Contribute to the construction of the National Botanical Garden" and other thematic Party days. The first Party branch of the Ecology Center was awarded the title of "Four Strong" standard Party branch of CAS; the research team of rapid construction of vegetation ecosystem on Coral Island was nominated as the 2021 Team of the Year by CAS. The Party building seminar was jointly organized by Xishuangbanna Tropical Botanical Garden and Wuhan Botanical Garden to promote the integration of Party building and business work by exchanging and mutual learning. Party committee members and branch secretaries had "one-to-one" talks with key cultivation targets, and one associate researcher under 35years has submitted the application to join the Party.

Participants of "Three Gardens" seminar on Party building work

SCBG unceasingly promoted the comprehensive and strict management of the Party and made solid progress in improving Party self-discipline and fighting corruption. The Party committee studied the work about Party self-discipline and fighting corruption for 10 times, and timely solved difficult and painful problems such as audits and complaint reporting. Strictly implemented the responsibility system requirements for Party self-discipline, so that make the system process and process tabular. All the leadership group members have completed the annual integrity Party classes. Implemented the Central Committee's "Eight-point Regulation" and the requirements of the

implementation rules, 77 responsibility letters for Party self-discipline/ integrity construction were signed at all levels. Conducted self-discipline talks and reminders for 98 people. Organized Discipline Education Month activities, focusing on 9 areas of work, including education on discipline and rules awareness integrity reminders for key positions, supervision of key areas, and publicity and education on research integrity, and held six warning education meetings. Strengthened the supervision and enforcement of discipline and accountability refunded the irregularities and applied the “Four Forms” to the violators.

Sign the responsibility letters for Party self-discipline / integrity construction

Vigorously promoted the spirit of scientists and created honest research environment. Planed the implementation of the “SCBG Strivers” cultural creation activity, made clear “Strivers” cultural creation goals and requirements, and advocated the innovation culture of "I be responsible, I be pioneer, I be growing, I be with you". Promoted the “Inheritance of the spirit of old scientists and carry forward the spirit of scientists in the new era in action” special work to go deep and practical. SCBG organized a series of activities to promote the spirit of scientists, each Party branch carried out "Rooted in South China • Home Country and the World" series of presentations, invited scientists to give speeches. The Women Workers’ Committee produced the "Promoting the Red Family Style and Carrying on the Red Gene" video propaganda film. Actively applied for the CAS demonstration base of carrying forward the spirit of scientists, as well as the provincial civilization unit. The *KE YUAN DANG JIAN* published the advanced deeds of the research team of rapid construction of vegetation on Coral Island. The advanced deeds of the research team and the stories of 3 old scientists were submitted to CAS. SCBG formulated the “Implementation Measures on Strengthening Scientific Research Integrity Construction (for trial implementation)”, carried out the construction of the academic style of "rigorous expression and modest governance" and the verification of scientific research papers, continually promoted the work of "Correcting the four winds and cultivating a new style".

Advanced deeds of excellent team published in "Party Building of Science Garden"

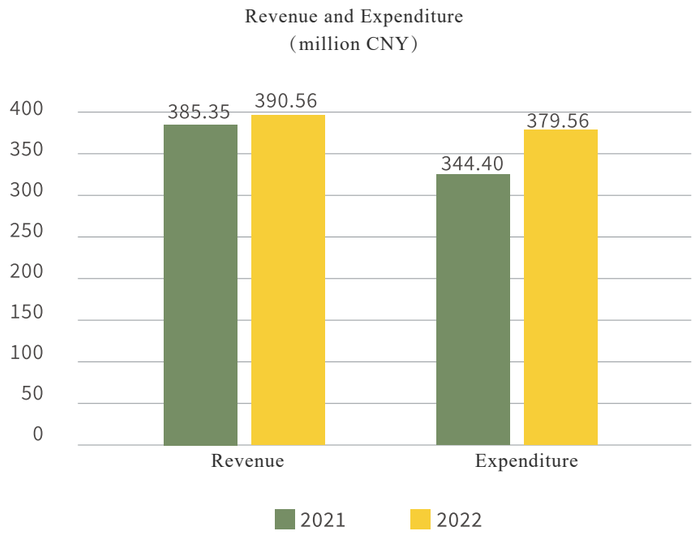
Strengthen the leadership of the United Front Mass Organization and improved their work ability. SCBG held the 2022 United Front Work Conference to study and implement the new deployment and new requirements of the Central Committee's United Front Work, listen carefully to opinions and suggestions, and strengthen political leadership. Recommended Prof. REN Hai and other comrades as candidates for deputies to the National People's Congress and the Provincial People’s Congress. Organized members of democratic parties to participate in the training course for returned overseas students in the province. Improved the mechanism of labor union system and integrated the employed staff into the unified management of labor union. The staff congress considered 11 decision-making matters. Invested nearly 300,000 CNY to repair and renovate the soccer field, and supported the associations to carry out physical and cultural activities. SCBG completed the renewal of the Youth League Committee and organized a series of activities to celebrate the 100th anniversary of the founding of the league. Encouraged old comrades to actively contribute to the construction of the SCNBG and added positive energy to the reform and development of SCBG. Carried out help work on "Party’s Day”, the Spring Festival and other festivals, visiting the sick and needy staffs.

SCBG United Front Work Conference

Pseudogynoxys chenopodioides (photographed by LI Wenyan)

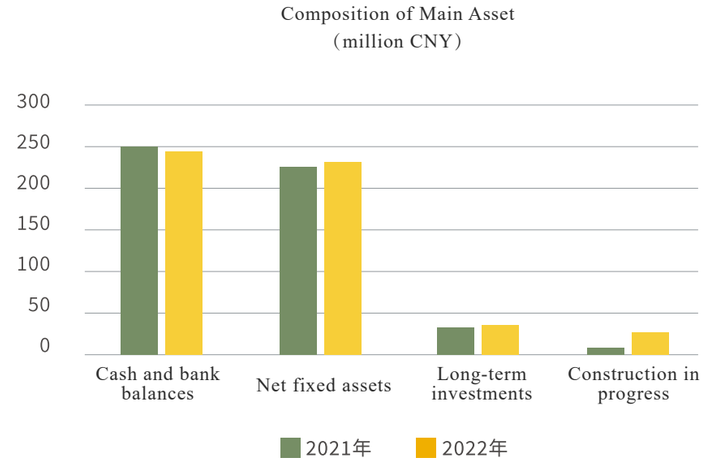
11 Revenue & Expenditure

The total revenue in 2022 was 390.56 million CNY, a slight increase compared to last year. The total expenditure was 379.56 million CNY with an increase of 10%.



Assets

At the end of 2022, total assets amounted to 630.81 million CNY with 5% increase compared to 2021; Net fixed assets were 231.29 million CNY with an increase of 2%.



Infrastructure construction

The main building of the 13th Five-Year Plan-"Rare plant introduction and domestication and artificial climate regulation experimental center" was completed. The 14th Five-Year Plan-"Science and Education Infrastructure Project (South China Biological Resources Research and development platform) was preparing the feasibility study report. The project of improving scientific research conditions in 2022 was progressing smoothly and the first phase of infrastructure renovation project in scientific research zone for the next year had been applied successfully. The renovation project supported by government in 2020 & 2021 had been completed.

Rare plant introduction and domestication and artificial climate regulation experimental center

12 Research Platform

Zephyranthes candida (photographed by LI Wenyan)

Key Laboratories

Key Laboratory of Plant Resources Conservation and Sustainable Utilization, CAS

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

The director of the laboratory is KANG Ming, the deputy directors are Professors LUO Shixiao, CHEN Hongfeng and WANG Baosheng, while the chair of the academic committee is Prof. HUANG Hongwen. At present, the laboratory has one Innovative Talent Team, three Major Task Teams, 15 research directions / groups with 55 full-time scientists and one foreign scientist, including 18 professors, two scientists funded by CAS, one Distinguished Young Scholar of Guangdong Provincial Natural Science Foundation and four members of Youth Innovation Promotion Association CAS.

In 2022, the key laboratory obtained 49 research projects with a total budget of 32.6 million CNY, published 148 SCI papers, in which five were published in journals with high Impact Factor (IF > 10), such as *Systematic Biology, Proceedings of the National Academy of Sciences of the United States of America* and *New Phytologist*. In addition, the laboratory published 6 monographs and obtained 11 authorized invention patents. At present, the laboratory supervised 31 Ph.D candidates and 74 MSc Candidates, and 9 Ph.D and 14 MSc were awarded in 2022.

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

The Key Laboratory of Vegetation Restoration and Management of Degraded Ecosystems, CAS (2009DP173224) was approved by CAS in December 2009.

Facing the international frontier and national strategic needs, based on the social, economic, and environmental reality in South China, and aiming at the coexistence of various ecosystems (such as forests, urban, grasslands, islands, etc.) in South China, the laboratory researches vegetation reestablishment, restoration, and ecosystem management, to provide a scientific basis for evaluating ecosystem health, managing the regional ecological environment, improving ecosystem productivity, coping with and mitigating the ecological consequences of global environmental changes, and providing optimized model demonstration for regional sustainable development.

Based on the advantages of restoration ecology research in the SCBG and the construction of the innovation system of the National Botanical Garden, the laboratory focuses on the integration of ecosystem structure, function and process, ecosystem degradation mechanism and health evaluation, and integration and model optimization of vegetation restoration technology of degraded ecosystems around various ecological environments in tropical and subtropical regions of China.

The Key Laboratory has 79 permanent staff, of which 65 have doctoral degrees, including 24 professors and 16 associate professors. In 2022, 7 new staff were recruited. In 2022, 59 doctoral students and 89 master students are studying in the lab, and 16 doctoral students and 29 master's students graduated.

In 2022, the laboratory was funded by 52 new scientific research projects, including 2 national key research and development projects, 17 projects of the National Natural Science Foundation of China, 1 project of the National Development and Reform Commission, 1 ANSO project,3 postdoctoral funds, and 6 projects of Academy of Sciences. The total contract budget is 75.12 million CNY.

In 2022, 24 scientific papers (IF>10) were published in high-quality level journals including *Nature Geoscience, Global Change Biology, Ecology Letters and New Phytologist.* 4 national invention patents were authorized, and 2 projects were qualified to defend the first class Award of Guangdong Science and Technology.

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

The laboratory aims to carry out basic theoretical research and technical development on molecular analysis and genetic improvement of featured agricultural plants in South China, and to promote germplasm innovation and breeding that meet the regional demands in South China. Our studies connect basic research and molecular breeding with application and extension, impelling a healthy development of intelligent agriculture in South China.

The director of the laboratory is Prof. HOU Xingliang, and the deputy directors are Prof. YANG Ziyin, DUAN Xuewu, and YANG Bao. The chairman of academic board is the CAS member prof. ZHANG Qifa. At present, the laboratory has 71 researchers, including 24 professors, 30 associate professors, 13 assistant professors, 2 senior engineers, 1 engineer and 1 technician. Over the past year, one person was awarded the " Guangdong Natural Science Outstanding Youth Fund", one person awarded the "Excellent Science and Technology Workers of China Tea Science Society", two person were elected as the members of "CAS Youth Innovation Promotion Association", and two person were awarded "Young Top Talents of Guangdong Peal River Talent Project". There are 32 post-doctors, 66 enrolled doctoral students, and 116 enrolled master students. 17 Ph.D students and 28 MSc students graduated in 2022.

In 2022, the key laboratory obtained 60 scientific research projects with funds of 37.40 million CNY in total. Among these projects, 23 projects were from Ministry of Science and Technology or National Natural Science Foundation of China, 4 projects from CAS, 20 grants from local government of Guangdong province, and 13 grants from other sources.154 papers had been published in SCI journals (65, 15 and 63 of the papers were published in the journals of the top 10%, with an impact factor> 10, and with an impact factor>7, respectively). In addition, the laboratory obtained 52 national invention patents, 46 were approved as National or Provincial new varieties, 17 evaluation of new varieties, 22 new international varieties, as well as 3 prizes of science and technology. The lab were developed 2 industry technical standards, and had 19 scientific and technical achievements, with commercial value of 5.77 million CNY.

- **Engineering Laboratory for Vegetation Ecosystem Restoration on Islands and Coastal Zones, CAS**

The Engineering Laboratory for Vegetation Ecosystem Restoration on Islands and Coastal Zones of CAS aims to strengthen the research and development of technologies related to the protection and ecological restoration of vegetation ecosystems on the islands and coastal zones in China, to promote the protection, restoration and sustainable maintenance of the coral island vegetation ecosystems with special ecological environment, and to ensure the health, safety and sustainable development of ecosystems on the islands and coastal zones in China. Under the guidance and support of CAS, the relevant national and JD departments and the local governments, the laboratory organizes and coordinates the relevant personnel and efforts of CAS, JD and local governments, exploits the advantages of multi-disciplinary intersection, science-enterprise cooperation and civil-military integration, focuses on improving the biodiversity and ecosystem service functions of China's islands and coastal zones, and promotes the healthy and sustainable development of the islands and coastal ecosystems. The laboratory carries out theoretical and technical researches on the collection, development and utilization of special germplasm resources on islands and coastal zones, the vegetation ecosystem monitoring and ecological planning, the improvement technology of coral sand, the ecological restoration and sustainable utilization of vegetation ecosystems on islands and coastal zones, and establishment of relevant demonstration areas. All the above work provide scientific and technological supports for ecological restoration on the islands and coastal zones in China, and strategic consultation and decision-making for the country and relevant departments.

The goal of the laboratory construction is: facing the national needs and based on the protection and restoration of the special ecological environment and vegetation ecosystem of the islands and coastal zones, to build an open research and development platform and demonstration base for island and coastal zone ecological restoration project with global influence, to carry out research on the theories and technologies on island and coastal zone ecological restoration, to enrich and develop the theories of restoration ecology, to improve the technologies related to ecological restoration of islands and coastal zones, to provide strategic advice and decision-making for the country and relevant departments, and to cultivate a team of high-level technical personnel.

The laboratory currently has 27 permanent staffs, including 18 professors, 4 associate professors and 22 members with Doctoral degree. In 2022, the laboratory applied for 2 National Key Research and Development projects and 3 general projects of the National Natural Science Foundation, published 3 monographs and more than 30 scientific research papers (including 29 papers published in international journals), authorized 5 patents and 2 software copyrights, and constructed 5000m^2 demonstration green space to drive away birds on coral island. One of the laboratory members was enrolled in the Youth Innovation Association of CAS.

The research team of Rapid Construction of Coral Island Vegetation won the award of "nomination of the annual team of CAS in 2021".

- **The Guangdong Provincial Key Laboratory of Applied Botany**

The Key Laboratory was approved by Guangdong Provincial Department of Science and Technology in 2013. The laboratory establishes three research priorities: plant resource conservation and germplasm innovation, exploration and utilization of functional biomaterials, and vegetation ecosystem and ecological environment management, including 125 permanent staff with 42 professors and 45 associate professors. The management director of the laboratory is Prof. JIANG Yueming, while the director of the academic committee is academician LIU Yaoguang. During 2022, the laboratory obtained 136 scientific research projects, with a total budget of 12.86 million CNY, publish 208 SCI papers and 6 monographs, and achieved 66 authorized invention patents, 18 software copyrights, 28 new plant varieties and 1 award of the first prize of Guangdong Provincial Science and Technology. In the field of talent development, one of the National "Top Young Talents", one outstanding member of the Association for the Youth Promotion of CAS, two winners of outstanding youth projects from Guangdong Province, three members of the Association for the Youth Promotion of CAS, two winners of the excellent award of the president of CAS, and one winner of the excellent doctoral student award of ZHU LI Yuehua were obtained. In terms of evaluation, operation and management, the laboratory continued to gain an excellent achievement.

2022 Annual and academic committee meetings

- **Guangdong Provincial Key Laboratory of Digital Botanical Garden**

Guangdong Provincial Key Laboratory of Digital Botanical Garden was established in 2004, which is the first key laboratory in China with the main research direction of digital botanical garden. The director of the laboratory is Prof. WANG Ying, and the chairman of the academic committee is Academician HONG Deyuan.

The main research directions of the laboratory include: Sharing and co-building of plant science data; Digital botanical garden and science communication; Protection, innovation and utilization of plant resources. There are 96 full-time staffs in this laboratory, including 55 with senior professional title.

The laboratory has 61 on-going research projects with more than 26.11 million CNY funding. Among these projects, seven were from national departments, eight were from National Natural Science Foundation of China, nine were from CAS, 25 were from local government and 12 were from other sources. In 2022, a total of 164 SCI papers and eight monographs were published, and 27 invention patents were authorized. Moreover, 14 computer software copyright registrations were obtained and 16 new plant cultivars were developed.

In 2022, the laboratory actively promoted the digital construction in the botanical garden and developed the botanical garden management intelligent application with independent intellectual property rights, as well as comprehensively improvement of the scientific data management and service capabilities. Based on “PIMS” operation system, the botanic garden plant inventory and phenology record WeChat collection applet have been developed. "Tropical and Subtropical Botany Basic Database" and "Plant Science Data Center of CAS" were developed to participate in the construction of the National Basic Science Data Sharing Service Platform. In 2022, the scientific database of SCBG has operated well and achieved 7×24-hour online service, data volume, access volume and data download volume have increased dramatically.

Filed Research Stations

- **Dinghushan National Field Research Station of Forest Ecosystem**

Dinghushan National Field Research Station of Forest Ecosystem (hereafter referred to as Dinghushan station) is a member of both the Chinese Ecosystem Research Network (CERN) and the Chinese National Ecosystem Research Network (CNERN). All previous net evaluations have been awarded as an excellent open field station. It has become a member of the Guangdong Forestry Ecological Monitoring Technology Innovation Association (GDF-ECO) since 2020. Aims for observation, research, demonstration and service, and oriented to the study of pattern, process, structure and function of zonal forest ecosystems, Dinghushan station has been exploring responses, adaptations and mechanisms of vital ecological processes (e.g., carbon, nitrogen, phosphorus and water to global change in subtropical forests). Dinghushan station aims to build a well-known, innovative, long-term ecological research station at home and abroad for conducting fundamental scientific research, talent training and education outreach, as well as providing scientific support for policymakers on environment protection and sustainable development.

Dinghushan forest vegetation is a typical representative nature of natural ecosystems including a series of forest succession types in lower subtropical China. A series of sites have been set up among all these forest types. Dinghushan station has 1 meteorological observation field site, 1 comprehensive and 5 auxiliary observation field sites, 3 water vapor flux towers, 2 catchments, 3 large runoff observation field sites and nearly 50 long-term experimental (observation) sample plots. More than 150 sets of monitoring and analysis instruments such as atmospheric background observation, root scanning, water isotope analyzers, and greenhouse gas analyzers are available at Dinghushan station, providing perfect experimental conditions for comprehensive ecological research.

There are 28 researchers, 6 technicians, 20 postdocs, 21 project employees, and 81 graduate students at Dinghushan station. About 25 graduate students completed their doctoral or master's degree programs, and 10 post-doctors completed their jobs in 2022.

In 2022, the research at Dinghushan station achieved a new height in project application, paper publication, and patent filing. One research achievement "Research on the regulation and control mechanism of climate change and underlying surface change on water resources" won the first prize of the Natural Science Award in Guangdong Province in 2022, and another one won second prize of the South Guangdong Forestry Science and Technology Award. Meanwhile, the Dinghushan station won the information construction and sharing service excellent station selected by the National Ecological Science Data Center for the first time, and the meteorological data set won the first excellent sharing open remote sensing data set. Based on Dinghushan station, 47 projects were approved, including National and Guangdong key R&D projects, science and education infrastructure projects in the "14th Five-Year Plan", etc., with the financial support of 116 million Yuan. By the end of December 2022, 97 scientific articles were published, including 87 articles published in the Science Citation Index (SCI) top journals. 26 articles published in high-impact factor SCI journals with IF>10 (see Table 1 for details). Participated in the editing of two monographs. Dinghushan station also got two authorized patents, six software copyrights, one consulting report, and 2 industry standardizations.

Regarding talent training, Prof. MO Jiangming was listed among the top 100,000 scientists in the world, ranking third in the field of forestry in China and the top scientist in plant science and agriculture in China (60/111). A graduate student received the National Scholarship, and a postdoctoral student was awarded the Special Research Assistant Program of CAS. In addition, there are two outstanding graduates of CAS, one pacesetter of the three good students, eight students of the three good students, three Dean's Excellence Awards, three Fenghua Scholarships, and one Zhu Li Yuehua Award.

In 2022, based on Dinghushan station nitrogen deposition, acid deposition, vertical displacement warming, carbon flux monitoring, and other experimental platforms, it was found that the impact of long-term nitrogen deposition on soil

carbon emissions in subtropical forests showed three phase changes; it is demonstrated that the response of soil phosphorus transformation to acid rain has seasonal differences; it is found that rising temperature can maintain the phosphorus demand for accelerated growth of plants; it is found that distinct patterns of soil bacterial and fungal community assemblages in subtropical forest ecosystems under warming. Long-term carbon flux monitoring research showed that the frequency and intensity of drought are increasing, and the seasonal drought in Dinghushan leads to an increase in forest carbon sequestration.

Regarding station development planning, the "Dinghushan Station-Wuhan University Water Safety Joint Research Center" (Figure 1) was established, and academician Xia Jun was flexibly hired as an academic leader. Substantial progress has been made in the multi-point layout of one station. Two open station projects were set up for the first time and established artificial forest transformation demonstration platforms and key technology research demonstration platforms for forest function improvement at four Guangdong provincial and state-owned forest farms (Figure 2).

The comprehensive management system developed by the Dinghushan Station has taken the lead in data collecting, ca. 16GB every year. The number of visitors to the external website reached 840,000, and the size of the download reached 151GB. 24 data sets were released on the sharing service platform of the National Ecological Science Data Center, all ranking high among all stations. Dinghushan station has offered scientific platforms for related institutes and universities for long-term scientific research. In 2022, Dinghushan station provided field sites, research facilities, observation data, as well as staff assistance for scientists from more than 30 scientific research institutions, universities, and SCBG. All these research activities embodied the strongest supporting function of Dinghushan station.

Table 1. Papers published as the first or corresponding authors for the last five years (2018-2022)

Year	Total number of paper	CSCD	SCI	Total impact factor (IF)*	Total number of paper (IF>5)	IF>5 Total	Total number of paper (IF>10)
2018	26	8	18	96	6	49	0
2019	43	14	29	126	8	65	2
2020	38	7	31	157	14	111	1
2021	63	16	47	263	18	167	6
2022	60	8	52	386	29	310	17

Note: IF was the annual impact factor of the journal when the paper was published.

Figure 1. Group photo of the Dinghushan Station-Wuhan University Water Safety Joint Research Center opening ceremony and the workshop

Figure 2. Layout of the research and demonstration platform of key technologies for function improvement of mature *Acacia* forests in Longyandong Forest Farm, Guangdong Province

Heshan National Field Research Station of Forest Ecosystem

Heshan National Field Research Station of Forest Ecosystem (referred to Heshan station) is the member station of the Chinese Ecosystem Research Network (CERN) and the Chinese National Ecosystem Research Network (CNERN) and forestry ecological station alliance in Guangdong province. The station is located in the Hilly red soil region of southern China and interlaced with the Pearl River Delta area with a dense population and rapid economic development. It represents the man-made and secondary evergreen broad-leaved forest ecosystems in the red earth hilly lands in the southern China provinces such as Guangdong, Guangxi and Fujian. Long-term observational and experimental studies have been performed in Heshan station to understand the mechanisms of ecosystem degradation and restoration in south subtropical China. Main research areas include global change and plant functional traits, restoration ecology, environmental ecology, global change ecology and soil ecology and ecosystem physiology. At present, there are 31 researchers, including eleven professors, eleven associate professors, nine research assistants, four technical support staffs and four technicians in Heshan station. There are six long-term field experimental platforms for domestic and foreign scholars to visit or carry out their researches.

Undertake projects: In 2022, 27 research projects were carried out in Heshan Station including a National key research and development program，a National Science Fund for Distinguished Young Scholars, a Key projects of the National Natural Science Foundation for Regional Innovation and Development Joint Fund, an Excellent Member Program of CAS youth Promotion Association, a Member Programs of CAS youth Promotion Association, eight general projects and eight youth projects of national natural science foundation of China and six local projects. The total contract funds for all research projects was 46.43 million CNY. There were 17 newly increased projects in 2022 with funds of 4.48 million CNY.

Achievement outputs: 55 papers were published including 37 SCI papers, ten papers of which with the impact factor over ten. In addition, one patent was authorized and one patent was applied in 2022.

Postgraduate students and staffs development: In 2022, twenty graduate students from Heshan Station completed their theses and graduated from CAS, including 7 doctoral students and 13 master students. There are 47 postgraduate students, including 21 doctoral students and 26 master students.

Communication and service: The total number of independent IP visits to the Heshan Data Sharing Website (http://hsf.cern.ac.cn) reached 61,282. The station laboratory provided sample test and analysis services for several domestic institutions, with a total of 8,360 data items.

Statistical table of 2018-2022 achievements of Heshan Station

Year	SCI papers	IF>4.0 SCI	Monographs	Patents	Research funds (Ten thousand CNY)	New increased funds(Ten thousand CNY)	Research projects	Newly increased projects
2018	29	12	0	0	1917	323	25	9
2019	29	10	0	2	1507	221	28	9
2020	53	30	2	3	1551	1002	31	23
2021	83	45	0	8	1772	3468	22	16
2022	37	34	0	2	4643	448	27	17

Experimental demonstration of simulating wild *Ganoderma lucidum* planting under the forest at Heshan Station

Xiaoliang Research Station of Tropical Coastal Ecosystem, CAS

The progress of various work at the Xiaoliang Station in 2022 was smooth. This year, more than 12 new research projects were added, with a total of 63 research projects and a total contract funding of over 90 million CNY, of which over 23 million CNY was received in the year. Some of the major projects include: the National Key R&D Plan led by Prof. REN Hai on the vegetation restoration of tropical coral reefs, approved by the Ministry of Science and Technology, with a total funding of 20 million CNY, and the Key R&D project led by Prof. JIAN Shu-guang, with a total funding of more than 20 million CNY. In addition, this year, our station was supported by the SCNBG Environmental Monitoring Platform project, which will carry out environmental quality monitoring in SCNBG and obtain soil property distribution maps, providing basic research data and environmental monitoring support for the further improvement of SCNBG. At the same time, the Alliance of International Science Organization (ANSO) also funded Xiaoliang station to carry out research on the blue carbon sink of coastal zones in Belt and Road countries and regions.

This year, Xiaoliang station published over 70 papers in various academic journals, including top journals such as *Nature Communications* and *Global Change Biology*. Prof. LU Hong-fang published a review paper in the top-level journal *Renewable and Sustainable Energy Reviews,* developing an integrated research method for life cycle assessment-energy value evaluation (LCA-EME) that evaluates various resource consumption, emissions and environmental impacts, and applied it to a case study of resource and environmental impact assessment of the Australia-Japan passenger transportation green ammonia remote coupling system.

This year, Xiaoliang station's talent cultivation was fruitful. Prof. LUO Ming was supported by the Guangdong Province Excellent Youth Project and selected as the Excellent Members of Youth Innovation Promotion Association of CAS. Station Director, Prof. WANG Faming joined the Youth Team of Basic Research of CAS: "Precise Accounting of Vegetation, Soil and Wetland Carbon Sinks". In addition, the station has carried out various training and exchange activities, providing a strong support for the growth of young researchers.

Teachers and students of Guangdong University of Finance and Economics conducted field internships at Xiaoliang Station

Professor AN Taicheng (second from left), Director of the Institute of Environmental Health and Pollution Control at Guangdong University of Technology, Visited Xiaoliang Station

Institutional Center for Shared Technologies and Facilities

With 34 sets of instruments, the institutional center for shared technologies and Facilities (ICSTF) provided analysis and testing services for 599 subjects and 802 researchers inside and outside SCBG in 2022. The average utilization rate of these instruments in the whole laboratory was 124%, and the total sharing efficiency was 89%, the total effective working time was 99,045 hours, and 138,736 samples were measured altogether. The number of samples analyzed increased by 39% year-over-year, the number of users increased by 20%, the revenue of testing inside SCBG increased by 28%, and testing revenue outside SCBG increased by 51%. ICSTF gained high praise during the open and sharing evaluation of the national major scientific research infrastructure and large scientific research equipment organized by the Ministry of Science and Technology and the Ministry of Finance.

ICSTF directed seven large instrument functional development projects of CAS and two open projects of Guangzhou Life Science Regional Center for Instruments, published 15 papers, and applied for five patents. There were 264 person times attended the management training, and participated in 175 online and on-site technical exchange activities, with a total of 2,511 online hours and 2,297 on site hours and awarded 14 certificates. ICSTF organized 7 topics of technical lectures and 7 items including sample preparation technology and machine operation skills trainings for 236 students which lasted four days. ICSTF also hosted 12 training sessions on laboratory qualification certification management with 96 participants.

The laboratory accreditation activities are well managed and have passed the re-evaluation and expansion review of the China National Accreditation Service for Conformity Assessment.

Figure 1. Technical training

Molecular structure and functional analysis platform for biological resources accomplished the installation and commissioning of “gas chromatography-single quadrupole mass spectrometer” and “multifunctional automatic sample pretreatment and collection-gas chromatography-sniff-triple quadrupole tandem mass spectrometry instrument”, and ready for technical acceptance.

Figure 2. GC-MS installation and technical training

The environmental assessment of the nuclear utilization technology of the "plant tomography” supported by the 2021 special funds on renovations project “biological resources microstructure and function analysis platform" has been successfully completed, and the laboratory is undergoing renovation. Successfully completed the second phase of the "biological resources ecological protection experimental platform" supported by the 2022 special funds on renovations project, and signed the bidding and contract for the proposed purchase of the instrument "X-ray fluorescence spectrometer". Self-financed 461,000 CNY to purchase continuous flow analyzer, completed bidding and contract signing.

The elemental analysis platform won the Excellent Technical Collective of 2021 Guangzhou life science large instrument regional center, and Engineer YUAN Yunfei won the second prize of 2021 Annual Technical Expert.

Herbarium

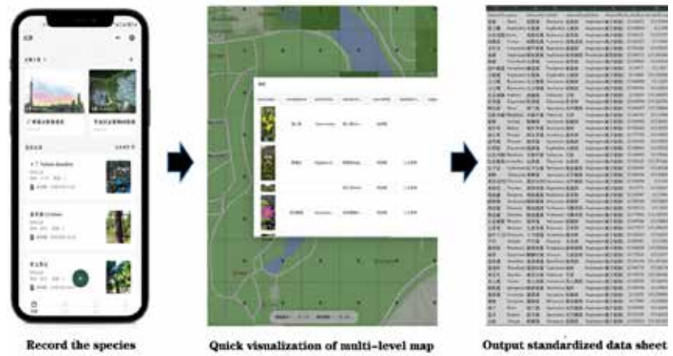
The Herbarium IBSC was founded in 1928, formerly known as the Herbarium of Agriculture and Forestry laboratory of Sun Yat-Sen University. At the beginning of its establishment, a set of specimen management methods were formulated scientifically and three sets of retrieval systems have been established. All specimens are arranged by families, genera, species, different countries and regions according to the name, collector, specimen’s number and distribution area of collections. The specimens are also attached with a large number of original records, important monographs and other relevant documents so on.

After more than 90 years of development, the collection has increased to 1.18 million, covering over 49,000 species and including more than 7,700 type specimens. IBSC have collaborated with the herbaria of above 80 countries and regions on specimen exchange, and the collections out of China accounts for about 8% of the total. In particular, IBSC have well preserved a batch of duplicate specimens exchanged from the Philippines during the Second World War by transferring them to Hong Kong, while the original copies preserved in the Philippines were destroyed during the war.

The Herbarium IBSC, focusing on southern China, is committed to the collection, preservation and scientific research services of plants in tropical and subtropical regions all over the world, and has built a world-class bank of strategic biological resource and a platform of science, technology and social service in botany, ecology and plant diversity protection, so as to provide scientific and technological support for the construction of national ecological civilization and biodiversity protection.

Supplementary collection and routine maintenance of specimens: In 2022, IBSC collected 10,600 specimens, mounted and stored 14,128 specimens, and digitized 9,209 specimens from 11 provinces of China respectively. IBSC exchanged 1,897 specimens in four times, received 467 specimens as gifts, and loaned 190 specimens in 11 times. 449 researchers visited the herbarium for specimen studying. 35 scientific illustrations were completed.

WeChat applet‘BioGrid’: This is a WeChat applet developed by the Herbarium IBSC, which can provide convenient biodiversity recording and management services for various resource banks, scientific research or scientific and educational teams.



WeChat applet‘BioGrid’

Training course of botanical scientific illustration: It is a highlight of herbarium IBSC, which has been passed down to the fourth generation. This year, IBSC held a series of training courses on it for the front-line staff of nature reserves such as Nanling National Park (proposed). It was the first time to hold the training course with Guangdong Provincial Forestry Bureau jointly. In the future, the course will also become a high-quality training course in natural education and biodiversity.

Training course of botanical scientific illustration

Popularization and publicity of science: SCNBG was officially established this year and so the displays in exhibition halls were updated. IBSC was reported by 23 media including Xinhua News, China News, People's Daily and so on. Some reports were adopted by Xuexiqiangguo. The launch of "Uncover the Plant Matchmaker under the Night Sky" at the Gezhi Doctrine Forum received more than 200,000 hits. Several media have special reports on botanical scientific illustration and gained much public attention. And the report from Xinhua News got more than 500,000 hits. On December 28th , the exhibition of botanical scientific illustration was officially opened at the Guangzhou Museum of Art. 47 paintings from SCBG in the past century were displayed. It was a part of the Lingnan Painting Exhibition and jointly hosted by SCBG, Guangzhou Museum of Art and the Memorial Museum of Generalissimo Sun Yat-sen Mansion.

Popularization and publicity of science

Library and Archive

In 2022, the Archive received a funding of 30,000 CNY from the Archives of CAS, and launched activities on International Archives Day. Collaborated with libraries, researchers, and retirees to edit the booklet of SCBG guestbook album of 1955-1966. Selected stories from Marshal ZHU De's message book and produced the micro video 'National Power'. Collaborate with the library to create a simulation of *First Five Year Report of the Institute of Agriculture, Forestry and Botany, National Sun Yat-sen University* in 1934. The archive provided archival support for the publicity work of the unveiling series of the SCNBG. Organized and planned the preliminary work of promoting videos for academicians CHEN Huanyong and ZHANG Zhaoqian. Preside over the preliminary design work of the exhibition board for the planning and development process of SCBG. Participated in the video production of CCTV's Decoding the History of Science and Technology - New China's Science and Technology in Archives, included *Naming the Pearls of Forest - Silver Cedar* and *Proposal for Opening the prelude to the Establishment of Nature Reserves in China*.

SCBG Archive Day Promotion Poster

Video from the program 'Decoding the History of Technology - New China's Technology in Archives'

Completed the second phase of archive entry work, with a total of 121,778 archives and 6,154 catalogs, and completed the digitization of archives from 1980 to 1990. The number of borrowing and utilizing archives this year is approximately 237, involving 3,769 volumes of archives. The documentary video of Prof. CHEN Fenghuai won the second prize of CAS Archive Micro Video.

The documentary video of Prof. CHEN Fenghuai won the second prize of CAS Archive Micro Video

In 2022, the library participated in the database procurement work of CAS Group on time, and optimized resource allocation to reduce the procurement volume of printed books according to the requirements of the Library Management Committee. The library added volunteer services, and utilize the resources from CAS Literature Center, Guangdong Provincial Science and Technology Library, and sister units of CAS.

On the premise of ensuring the work of the library, assist the Comprehensive Archives in completing the printing of the simulation copy of the "First Five Year Report of the Institute of Agriculture, Forestry and Botany, National Sun Yat-sen University".

Table 1. Statistics of literature resources

Items	Kinds	Volumes	Expense（CNY）	Remarks
Database by purchase	10		789836.31	
Online Foreign books by purchase	4	4	2013.32	
Chinese books by purchase	10		2824.33	
Foreign periodicals through exchange	26	42		
Chinese periodicals through exchange	25	78		
Foreign books from donation	6	8		
Chinese books from donation	26	32		

Table 2. Library Service

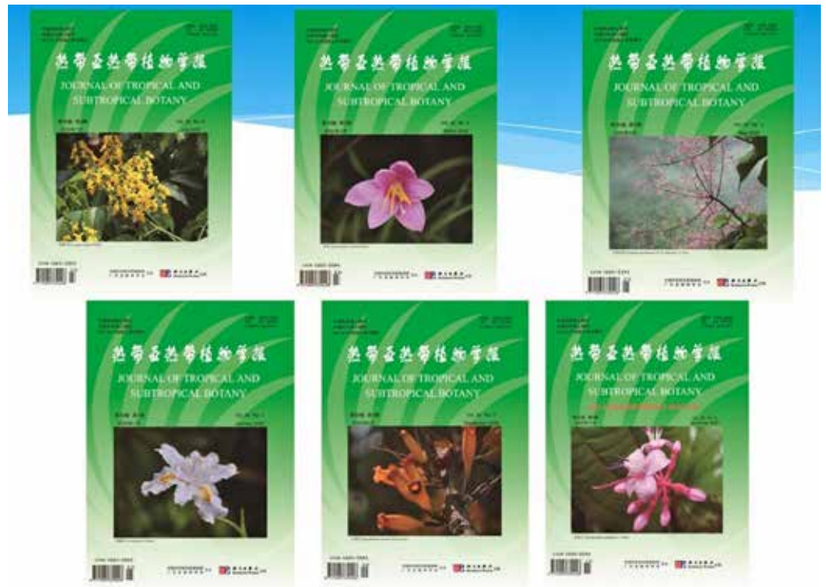
Items	Total served readers	Visitors	Interlibrary loan	consulting service	applying for retrieval	literature help	retrieval reports	documents delivered
No.	839	321	52	77	35	35	378	425

The editorial office of *Journal of Tropical and Subtropical Botany*

In 2022, the editorial office published 30 volumes of *Journal of Tropical and Subtropical Botany* (issue 1-6). Total 345 manuscripts were received and 102 papers with 2.1 million words altogether were selected for publication after peer review. Among them, 100 papers were supported by research funds, which accounting for 98% of the total; and 57 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 1.740, with total 2044 citations and 79.5 thousand internet downloads.

Table 3.The statistics data of periodical from 2019-2022

Year	Published papers	Fund subsidy rate	Journal Impact Factor	Total citations	Ranking of domestic Biological Journals
2019	92	99.0%	1.125	1448	34/94
2020	86	99.0%	1.098	1519	34/94
2021	90	99.5%	1.740	2044	27/93
2022	102	98%			



Journal of Tropical and Subtropical Plants

Information Center

On the basis of ranking 15th in the information technology evaluation work of CAS in 2021, the Information Center continued to steadily promote the completion of network security and information technology work in 2022, and implemented various key tasks. There were no major network security accidents throughout the year.

(1) Carried out network security level protection evaluation work, optimized and strengthened information technology software and hardware facilities, completed computer room renovation, network environment optimization, system revision, and comprehensively strengthened network security guarantee capabilities.

(2) With the support of the Network Center of CAS, the ARP system had been upgraded from version 3.35 to version 3.5 to ensure smooth operation throughout the year; Actively participating in the pilot of the new ARP system module of CAS, the data quality of the ARP system was continuously improving, and the modules of official documents and archives, human resources, comprehensive finance, and scientific research conditions were all among the top in CAS, especially the official documents and archives module, which remains the first in CAS throughout the year; Received the "ARP Twenty Year Innovation Practice Award" and played a positive demonstration role in empowering information management and entering a new digital era.

Mr. TAN Huitong was awarded the "ARP Twenty Year Innovation Practice Award"

(3) During the normalization management period of the epidemic, in response to the demand for video conferencing and online office, five sets of large-scale remote conference and office collaboration equipment were added in 2022, providing strong technical support for online scientific communication, academic exchange, and business work coordination.

(4) Regularly cleaned up deactivated websites, information systems, and email accounts, strengthened the main responsibility, and implemented security tasks. In response to the frequent occurrence of phishing email attacks, timely released of information on preventing phishing email attacks through various forms such as intranet and email, and improved employees' awareness of network security.

BGCI China Office

Botanic Gardens Conservation International (BGCI) is a membership organisation, representing botanic gardens in more than 100 countries around the world. It is an independent UK charity established in 1987 to link the botanic gardens of the world in a global network for plant conservation. BGCI's mission is to mobilise botanic gardens and engage partners in securing plant diversity for the well-being of people and the planet. In 2007, BGCI established China Office hosted by SCBG.

- **Actively participating the development and promotion of policies related to plant conservation**

(1)Actively participating the 2nd phase of the COP15 of Convention on Biological Diversity (CBD) and promoting the related work of China's National Botanical Garden and BGCI

The 2nd phase of CBD COP 15 was successfully held at Montreal, Canada, from 7th to 20th December 2022, with the theme "Ecological Civilization: Building a Shared Future for All Life on Earth", aiming to adopt the "Post-2020 Global Biodiversity Framework (GBF)". About 18000 people from 194 parties and stakeholders attended the meeting. BGCI China office attended the meeting, and promoted Chinese botanical gardens and Global Strategy for Plant Conservation (GSPC 2021-2030) led by BGCI. This Strategy will be revised based on the adopted GBF at this meeting and would be adopted by Parties on CBD COP 16 held in Turkey in 2024. To strengthen the relationship between Chinese botanical gardens and Montreal Botanical Garden, the head of BGCI China office organized part of Chinese botanical gardens and some governmental agencies delegation visiting Montreal Botanical Garden.

Fig.1 Display of promotional materials of SCBG and BGCI at COP15

Fig.2 Chinese Delegation visiting Montreal Botanical Garden

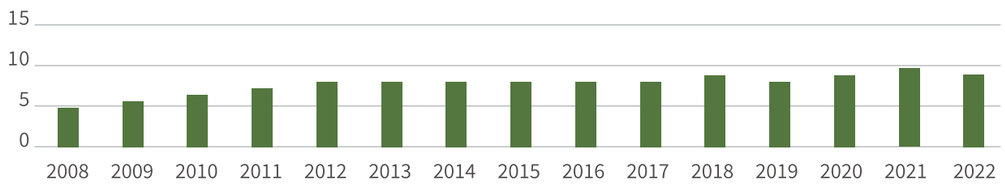
Actively involved in the development of *China's Strategy for Plant Conservation* (CSPC 2021-2030)

As a country with abundant plant diversity and the first batch of signatories to CBD, China actively responded to the Global Strategy for Plant Conservation (GSPC 2021-2030) under the CBD framework, and organized the compilation of the *China's Strategy for Plant Conservation* (CSPC 2021-2030). The China Office was responsible for the compilation of Target 22 (on awareness raising) and participating in the compilation of Target 9 (on mitigating climate change) of the total 23 Targets of the strategy.

- **Assisted in the implementation of CSPC**

（1） Conservation action of threaten plants (the implementation of CSPC targets 1,7,8)

Working with its Chinese botanical gardens members and other conservation organizations to save endangered Chinese plants is the core mission of BGCI China Office. Since the establishment of the office in 2008, BGCI has funded over 50 conservation and restoration projects for threatened woody plants in China (with a duration of 3-8 years for each project), with more than 70 threatened tree species protected, and established a scientific conservation model for rare and endangered woody plants in China. In 2022, BGCI funded 11 practical conservation projects in China with about 100,000 GBP, involved with 11 threatened tree species. All of those projects have made great progress even in the case of pandemic. Several new populations of some targeted threatened species were discovered through comprehensive field surveys; some nurseries were set up and tens of thousands of seedlings were raised by local people through the provision of trainings on propagation techniques by the projects; *in situ* conservation, *ex situ* conservation and reinforcement activities were initiated. The 15 years of practical conservation experience has proved that the integrated conservation model established can not only effectively protect species, but also play an important role in strengthening the exchange and cooperation between the botanical garden and local institutions, improving the awareness of plant conservation and conservation techniques of local communities. The relative paper *Safeguarding China's native trees – A review of integrated conservation practices between 2008 and 2020* was published in the internationally renowned journal *Global Ecology and Conservation*.



Tab.1 The amount of conservation projects in China funded by BGCI between 2008 and 2022

Fig.3 Field investigation of threatened plants

（2） Science communication and capacity building (the implementation of CSPC targets 14,15)

The awareness raising and capacity building activities are merged into practical conservation activities. The office and its partners provided trainings for more than 200 technicians from over 20 institutions and local communities, including the techniques of propagation, cultivation, and reintroduction/reinforcement. This office also organized a series of educational activities in local primary and middle schools for about 500 students, 1,000 outreach materials and training materials were distributed. These activities improved the awareness and capacity of plant conservation of stakeholders and students.

The China office was actively involved in many meetings related to plant conservation and botanical garden development and management. The office tried to promote the important role of botanical gardens in *ex situ* conservation through various media and platforms including China News Weekly etc. The paper *Botanical gardens and ex situ conservation of the wild plant species* was published in the domestic core journal *Biodiversity Science*.with Xiangying Wen serving as the first and corrsponding author.

The office has been promoting the background and development of GSPC for the plant conservation and research community in China, so as to improve their awareness of plant conservation. And also introduced the achievements of plant conservation in China during the 7th Global Botanical Gardens Congress (7th GBGC), which further promoted the international influence of China.

Fig.4 Lecture on the botanical garden and media interview on the integrated conservation of endangered trees

Fig.5 Presenting at online academic meeting and interviewed by media

（3）Strengthening the development of Chinese botanical gardens and plant conservation network (The implementation of CSPC target16)

The office made full use of BGCI platform and resources to help many botanical gardens in China, especially the "weak" botanical gardens, and encouraged Chinese experts to actively join the expert database created by BGCI to play their role in the construction and management of global botanical gardens, including 11 fields such as plant conservation, botanical garden construction and public education, as well as encouraged Chinese botanical gardens to apply for BGCI Global Botanical Garden Accreditation to develop into world-class botanical gardens. The office also played an important role in the opening ceremony of SCNBG, including assisting the media to interview internationally renowned Academician Stephen Blackmore, Chairman of BGCI, and Dr. Peter Wysejackson, Director of the Missouri Botanical Garden, and invited them to send their handwritten congratulatory messages, which further promoted the internationalization of SCNBG.

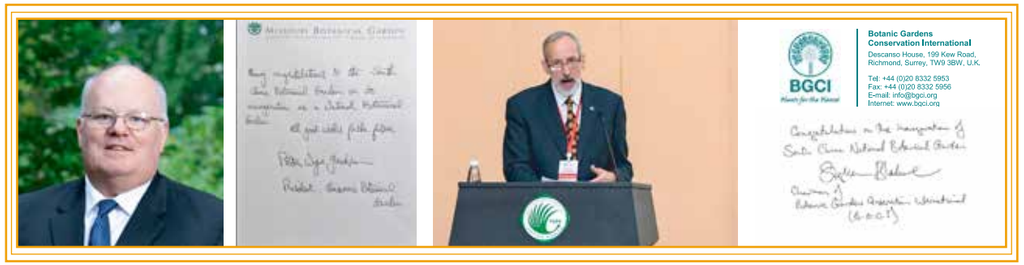
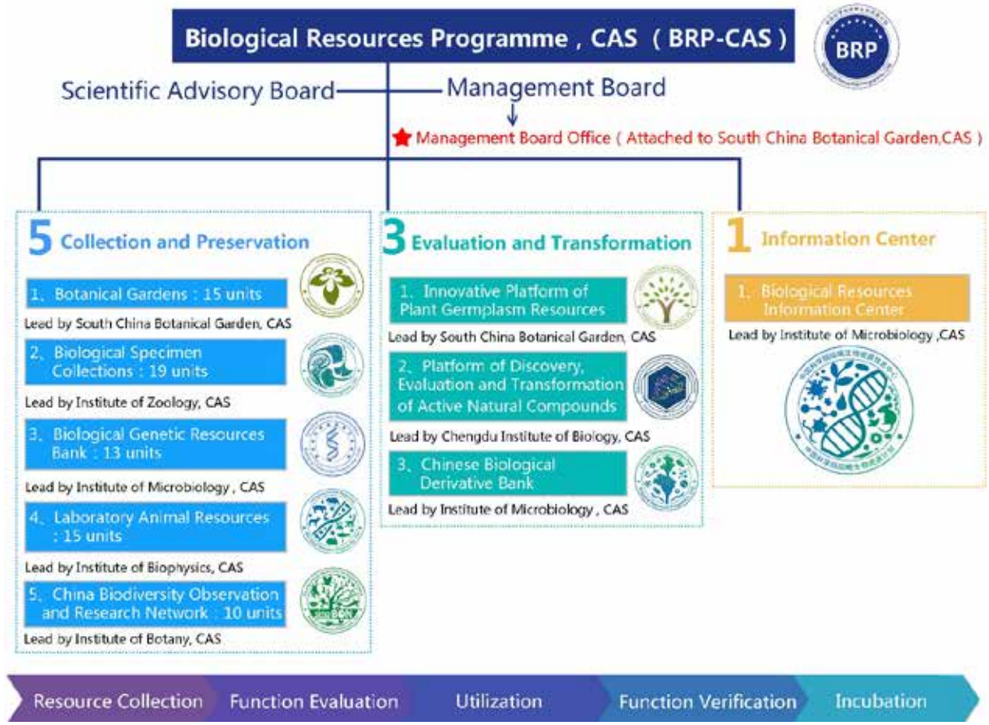


Fig.6 Handwritten congratulatory messages from Stephen Blackmore and Peter Wysejackson

Biological Resources Programme, CAS

Facing the new demand of rapid economic and social development, the Chinese Academy of Sciences launched the Biological Resources Programme (BRP-CAS) in 2016. BRP-CAS integrates the Botanical Gardens, Biological Specimen Collections, Biological Genetic Resource Bank, Laboratory Animal Resources and China Biodiversity Observation and Research Network. On the basis of persisting in the long-term collection and preservation of biological resources, BRP-CAS aims to realize the analysis, evaluation and utilization of resources and promote the digitalization and informatization, and provide resource, talent and technical support for the completion of important scientific researches.



Organization structure of BRP

- **Compiled the Management Rules of BRP**

  In order to improve the management efficiency and the collection and preservation level of BRP, enhance the ability to protect biodiversity, support scientific research, serve the industry and economic development, we reorganized the current situation and future development trend and completed the management rules of BRP.

- **Compiled the 2021 Annual Reports of the Five Resource Collection and Preservation Platforms**

  The data collection, typesetting, printing and publicity of the annual reports of the five collections and preservation platforms were completed. The annual reports introduced the general situation and the work progress of five collection and preservation platforms of CAS. The annual reports were popularly accepted by the institutes of biological field, which effectively improved the publicity of BRP. At the same time, the electronic version of the annual reports were reprinted and quoted by several official accounts. According to the statistics of the annual report, BRP had preserved more than 128,000 species of living plant species (accounting for more than 90% of China), 22.836 million specimens (accounting for more than 60% of China), nearly 800,000 copies of biological genetic resources, nearly 4,000 strains of experimental animals and more than 1 million pieces of biodiversity monitoring data.

Annual reports

- **Compiled *BRP Observation***

BRP Observation is a thematic briefing on domestic and foreign scientific and technological developments in the biological resources field, which is compiled by BRP CAS. The briefing tracks and analyzes developments of biological resources and biodiversity at home and abroad in the biological field, and promotes the content and research progress of BRP CAS. SHAO Yunyun participated in compiling the six issues of *BRP Observation* in 2022 and delivered them to relevant platforms of CAS.

BRP Observation

- **Held the working meeting of the Botanical Garden Working Committee of CAS**

On June 22th , the working meeting of the Botanical Garden Working Committee of CAS was held in Ili Kazakh Autonomous Prefecture, with 39 participants from 11 botanical gardens of CAS attended in the meeting. The meeting approved the new allocation plan of the annual funds, and determined the preparation of the *Chinese Strategy for Plant Conservation (2021-2030)* and the topics of the botanical garden industry standards. At the same time, experts from botanical gardens of CAS highly approved the construction plan of "Ili-Turpan National Botanical Garden" led by Xinjiang Institute of Ecology and Geography, CAS, put forward the requirements of botanical garden construction of "government satisfaction, scientists satisfaction and people satisfaction", and set up the botanical garden with a construction goal of "World-class, Harmony of Nature and Human".

Working meeting of the Botanical Garden Working Committee of CAS

- **Completed the writing of *the Chinese Strategy for Plant Conservation (2021-2030)***

We completed the writing of *the Chinese Strategy for Plant Conservation (2021-2030)*. *The Chinese Strategy for Plant Conservation (2021-2030)* is a conservation strategy formulated to promote the protection, restoration and sustainable utilization of plant diversity. The strategy includes 23 objectives such as *all land important for the conservation of plant species diversity is included in spatial planning* to support its conservation and restoration to support protection and restoration of plants. At present, the strategy has completed two rounds of revision and will be formally submitted to the China Wild Plant Conservation Association and the National Forestry and Grassland Administration for review.

13

Appendix

85 *Isotrema kwangsiense*（photographed by CHEN Yousheng）

MAIN PAPERS
(SORTED IN DESCENDING ORDER BY IMPACT FACTORS)"

No.	Title	Journal	Issue Volume	Start Page	End Page	Impact Factor	Authors
1	MicroRNAs: emerging regulators in horticultural crops	TRENDS IN PLANT SCIENCE	27	936	951	23.116	He MY, Kong XJ, Jiang YM, Qu HX*, Zhu H*
2	Temporal patterns of soil carbon emission in tropical forests under long-term nitrogen deposition	NATURE GEOSCIENCE	15	1002	+	20.473	Zheng MH, Zhang T, Luo YQ, Liu JX, Lu XK, Ye Q, Wang SH, Huang J, Mao QG, Mo JM*,Zhang W*
3	Natural allelic variation confers high resistance to sweet potato weevils in sweet potato	NATURE PLANTS	8	1233	+	19.328	Liu X, Wang YR, Zhu HB, Mei GG, Liao YY, Rao SF, Li SQ, Chen A, Liu HJ, Zeng LT, Xiao YY, Li XM, Yang ZY, Hou XL*
4	Advances in chilling injury of postharvest fruit and vegetable: Extracellular ATP aspects	COMPREHENSIVE REVIEWS IN FOOD SCIENCE AND FOOD SAFETY	21	4251	4273	18.335	Shan YX, Zhang DD, Luo ZS, Li TT, Qu HX, Duan XW, Jiang YM*
5	Phylogenomic analyses highlight innovation and introgression in the continental radiations of Fagaceae across the Northern Hemisphere	NATURE COMMUNICATIONS	13	1320		17.764	Zhou BF, Yuan S, Crowl AA, Liang YY, Shi Y, Chen XY, An QQ, Kang M, Manos PS*, Wang BS*
6	Australia-Japan telecoupling of wind power-based green ammonia for passenger transportation: Efficiency, impacts, and sustainability	RENEWABLE & SUSTAINABLE ENERGY REVIEWS	168	112884		17.551	Lu HF, Lin BL*, Campbell DE, Wang YJ, Duan WQ, Han TT, Wang J, Ren H*
7	Transcription elongator SPT6L regulates the occupancies of the SWI2/SNF2 chromatin remodelers SYD/BRM and nucleosomes at transcription start sites in Arabidopsis	NUCLEIC ACIDS RESEARCH	50	12754	12767	17.21	Shu J, Ding N, Liu J, Cui YH, Chen C*
8	Phylogenomic and Macroevolutionary Evidence for an Explosive Radiation of a Plant Genus in the Miocene	SYSTEMATIC BIOLOGY	71	589	609	14.478	Kong HH, Condamine FL, Yang LH, Harris AJ, Feng C, Wen F, Kang M*
9	Climate warming leads to advanced fruit development period of temperate woody species but divergent changes in its length	GLOBAL CHANGE BIOLOGY	28	6021	6032	13.112	Ma QQ, Hanninen H, Berninger F, Li XB, Huang JG*
10	Unexpected high retention of N-15-labeled nitrogen in a tropical legume forest under long-term nitrogen enrichment	GLOBAL CHANGE BIOLOGY	28	1529	1543	13.112	Mao JH, Mao QG, Gundersen P, Gurmesa GA, Zhang W, Huang J, Wang SH, Li AD, Wang YF, Guo YB, Liu RZ, Mo JM*, Zheng MH*
11	Mycorrhizal fungi alleviate acidification-induced phosphorus limitation: Evidence from a decade-long field experiment of simulated acid deposition in a tropical forest in south China	GLOBAL CHANGE BIOLOGY	28	3605	3619	13.112	Hu YL, Chen J, Hui DF, Wang YP, Li JL, Chen JW, Chen GY, Zhu YR, Zhang LY, Zhang DQ, Deng Q*
12	Warming drives sustained plant phosphorus demand in a humid tropical forest	GLOBAL CHANGE BIOLOGY	28	4085	4096	13.112	Lie ZY, Zhou GY, Huang WJ, Kadowaki K, Tissue DT, Ya JH, Penuelas J, Sardans J, Li YL, Liu SZ, Chu GW, Meng Z, He XH, Liu JX*

No.	Title	Journal	Issue Volume	Start Page	End Page	Impact Factor	Authors
13	Drivers of foliar N-15 trends in southern China over the last century	GLOBAL CHANGE BIOLOGY	28	5441	5452	13.112	Tang SB, Liu JF, Gilliam FS, Hietz P*, Wang ZH, Lu XK, Zeng FY, Wen DZ, Hou EQ, Lai Y, Fang YT, Tu Y, Xi D, Huang ZQ, Zhang DX*, Wang R, Kuang YW*
14	Dual diffusive gradients in the thin films (DGT) probes provide insights into speciation and mobility of sediment chromium (Cr) from the Xizhi River basin, South China	JOURNAL OF HAZARDOUS MATERIALS	436	129229		12.984	Gao L*, Li R, Liang ZB, Wu QR, Hou L, Chen JY, Zhao P
15	Joint approaches to reduce cadmium exposure risk from rice consumption	JOURNAL OF HAZARDOUS MATERIALS	429	128263		12.984	Mao P, Wu JT, Li F, Sun S, Huang R, Zhang LL, Mo JM, Li ZA*, Zhuang P*
16	Prenylated flavonoids in foods and their applications on cancer prevention	CRITICAL REVIEWS IN FOOD SCIENCE AND NUTRITION	62	5067	5080	12.104	Wen LR, Zhou T, Jiang YM, Chang SK, Yang B*
17	How does tea (Camellia sinensis) produce specialized metabolites which determine its unique quality and function: a review	CRITICAL REVIEWS IN FOOD SCIENCE AND NUTRITION	62	3751	3767	12.104	Liao YY, Zhou XC, Zeng LT*
18	Strategies for studying in vivo biochemical formation pathways and multilevel distributions of quality or function-related specialized metabolites in tea (Camellia sinensis)	CRITICAL REVIEWS IN FOOD SCIENCE AND NUTRITION	62	429	442	12.104	Liao YY, Fu XM, Zeng LT, Yang ZY*
19	Positive interactions of native species melt invasional meltdown over long-term plant succession	ECOLOGY LETTERS	25	2584	2596	11.866	Yin DY, Meiners SJ, Ni M, Ye Q, He FL, Cadotte MW*
20	Proteome-wide identification of non-histone lysine methylation in tomato during fruit ripening	JOURNAL OF ADVANCED RESEARCH	42	177	188	11.664	Xiao L, Liang HZ, Jiang GX, Ding XC, Liu XC, Sun J, Jiang YM, Song LL*, Duan XW*
21	Structure, stability and bioaccessibility of icaritin-loaded pectin nanoparticle	FOOD HYDROCOLLOIDS	129	107663		11.357	Chen YP, Jiang YM, Wen LR*, Yang B*
22	ed biomass energy storage economic value implications in the Dinghushan Biosphere Reserve	JOURNAL OF CLEANER PRODUCTION	376	134274		11.016	Njoroge B, Li YL , Liu JX, Otieno D, Li RZ, Yu MX, Chen Z, Meng Z Tenhunen J
23	SlJMJ7 orchestrates tomato fruit ripening via crosstalk between H3K4me3 and DML2-mediated DNA demethylation	NEW PHYTOLOGIST	233	1202	1219	10.768	Ding XC, Liu XC, Jiang GX, Li ZW Song YB, Zhang DD, Jiang YM* Duan XW*
24	Linked selection shapes the landscape of genomic variation in	NEW PHYTOLOGIST	233	555	568	10.768	Liang YY, Shi Y, Yuan S, Zhou BF Chen XY, An QQ, Ingvarsson PK

No.	Title	Journal	Issue Volume	Start Page	End Page	Impact Factor	Authors
25	Can evolutionary history predict plant plastic responses to climate change?	NEW PHYTOLOGIST	235	1260	1271	10.768	Liu H, Ye Q*, Simpson KJ, Cui EQ, Xia JY
26	The ecology of palm genomes: repeat-associated genome size expansion is constrained by aridity	NEW PHYTOLOGIST	236	433	446	10.768	Schley RJ, Pellicer J, Ge XJ, Barrett C, Bellot S, Guignard MS, Novak P, Suda J, Fraser D, Baker WJ, Dodsworth S, Macas J, Leitch AR, Leitch IJ
27	Toxicokinetics of metals in the soil invertebrate Enchytraeus crypticus exposed to field-contaminated soils from a mining area	ENVIRONMENTAL POLLUTION	300	118874		10.366	Zhang LL*, Van Gestel CAM, Li ZA
28	Biosynthesis, regulation, and biological significance of fumonisins in fungi: current status and prospects	CRITICAL REVIEWS IN MICROBIOLOGY	48	450	462	10.269	Li TT, Su XG, Qu HX, Duan XW, Jiang YM*
29	Contrasting responses in growth, photosynthesis and hydraulics of two subtropical tree species to cadmium contamination as affected by elevated CO2 and nitrogen addition	SCIENCE OF THE TOTAL ENVIRONMENT	837	155858		10.237	Zhang XF, Liu H, Luo XZ, Xiao MJ, Xiang P, Chen MH, Zhang XQ, Zhang LL, Ye Q, Wen DZ*
30	Divergent responses of soil microbial functional groups to long-term high nitrogen presence in the tropical forests	SCIENCE OF THE TOTAL ENVIRONMENT	821	153251		10.237	Chen WB, Su FL, Nie YX, Zhong BQ, Zheng Y, Mo JM, Xiong BH, Lu XK*
31	Conurbation size drives antibiotic resistance along the river	SCIENCE OF THE TOTAL ENVIRONMENT	823	153822		10.237	Zhou SYD, Huang FY*, Zhou XY, Lin CS, Jin MK, Neilson R, Li H, Su JQ
32	Nitrogen and phosphorus addition exerted different influences on litter and soil carbon release in a tropical forest	SCIENCE OF THE TOTAL ENVIRONMENT	832	155049		10.237	Zhang JF, Zhou JG, Lambers H, Li YW, Li YX, Qin GM, Wang M, Wang J, Li ZA, Wang FM*
33	Nitrogen budgets of a lower subtropical forest as affected by 6 years of over-canopy and understory nitrogen additions	SCIENCE OF THE TOTAL ENVIRONMENT	852	158546		10.237	Tian Y, Wang J, Zhou L, Tao LB, Lin YB, Hui DF, Ren H*, Lu HF*
34	Tree species richness as an important biotic factor regulates the soil phosphorus density in China's mature natural forests	SCIENCE OF THE TOTAL ENVIRONMENT	845	157277		10.237	Liu XJ, Tang XL, Lie ZY, He XH, Zhou GY, Yan JH, Ma KP, Du S, Li SG, Han SJ, Ma YX, Wang GX, Liu JX*
35	net N mineralization in a seasonally dry tropical forest	SCIENCE OF THE TOTAL ENVIRONMENT	823	153314		10.237	y Wang M, Li YW, Li YX, Xu GL, Hu ZM, Wang FM*
36	Structure identification of a polysaccharide in mushroom Lingzhi spore and its immunomodulatory activity	CARBOHYDRATE POLYMERS	278	118939		9.964	Sheng ZL, Wen LR, Yang B*

No.	Title	Journal	Issue Volume	Start Page	End Page	Impact Factor	Authors
37	nature connectedness on mental well-being and ill-being in a general Chinese population	LANDSCAPE AND URBAN PLANNING	222	104397		9.409	Liu HX, Nong HF, Ren H*, Liu K
38	Recombinase-mediated gene stacking in cotton	PLANT PHYSIOLOGY	188	1852	1865	9.115	Li YM, Li RY, Han ZG, Wang HT, Zhou SX, Li YQ, Wang YM, Qi JS, Ow DW*
39	miR2105 and the kinase OsSAPK10 co-regulate OsbZIP86 to mediate drought-induced ABA biosynthesis in rice	PLANT PHYSIOLOGY	189	889	905	9.115	Gao WW, Li MK, Yang SG, Gao CZ, Su Y, Zeng X, Jiao ZL, Xu WJ, Zhang MY*, Xia KF*
40	Plastome-based phylogeny improves community phylogenetics of subtropical forests in China	MOLECULAR ECOLOGY RESOURCES	22	319	333	8.984	Jin L, Liu JJ, Xiao TW, Li QM, Lin LX, Shao XN, Ma CX, Li BH, Mi XC, Ren HB, Qiao XJ, Lian JY, Hao G*, Ge XJ*
41	Heterologous biosynthesis of prenylated resveratrol and evaluation of antioxidant activity	FOOD CHEMISTRY	378	132118		8.795	Bo ST, Chang SK, Zhou T, Zhu H, Jiang YM, Yang B*
42	The role of hydrogen water in delaying ripening of banana fruit during postharvest storage	FOOD CHEMISTRY	373	131590		8.795	Yun Z, Gao HJ, Chen X, Duan XW, Jiang YM*
43	Structure of water-soluble polysaccharides in spore of Ganoderma lucidum and their anti-inflammatory activity	FOOD CHEMISTRY	373	131374		8.795	Wen LR, Sheng ZL, Wang JP, Jiang YM, Yang B*
44	Structure characterization of soybean peptides and their protective activity against intestinal inflammation	FOOD CHEMISTRY	387	132868		8.795	Wen LR, Bi HM, Zhou XS, Jiang YM, Zhu H, Fu X, Yang B*
45	Light synergistically promotes the tea green leafhopper infestation-induced accumulation of linalool oxides and their glucosides in tea (Camellia sinensis)	FOOD CHEMISTRY	394	133460		8.795	Xiao YY, Tan HB, Huang HT, Yu JZ, Zeng LT, Liao YY, Wu P, Yang ZY*
46	Structure identification of walnut peptides and evaluation of cellular antioxidant activity	FOOD CHEMISTRY	388	132943		8.795	Wang JP, Liu JM, John A, Jiang YM, Zhu H, Yang B, Wen LR*
47	Effect of lactobacteria fermentation on structure and physicochemical properties of Chinese yam starch (Dioscorea opposita Thunb.)	FOOD CHEMISTRY	387	132873		8.795	Xu MJ, Zou J, Zhao XD, Feng YT, Duan RY, Yang B*
48	Insights into metabolomics in quality attributes of postharvest fruit	CURRENT OPINION IN FOOD SCIENCE	45	100836		8.65	Yun Z, Gao HJ, Jiang YM*

No.	Title	Journal	Issue Volume	Start Page	End Page	Impact Factor	Authors
49	Editorial overview: Foodomics focusing on food nutrition and health	CURRENT OPINION IN FOOD SCIENCE	45	100950		8.65	Yun Z*, Geng F
50	The cadmium decontamination and disposal of the harvested cadmium accumulator Amaranthus hypochondriacus L.	CHEMOSPHERE	286	131684		8.52	Lei L, Cui XY, Li C, Dong ML, Huang R, Li YX, Li YW, Li ZA*, Wu JT*
51	A chromosome-level reference genome of Ensete glaucum gives insight into diversity and chromosomal and repetitive sequence evolution in the Musaceae	GIGASCIENCE	11	giac027		8.439	Wang ZW, Rouard M, Biswas MK, Droc G, Cui DL, Roux N, Baurens FC, Ge XJ, Schwarzacher T, Heslop-Harrison PJS*, Liu Q*
52	Do long-term high nitrogen inputs change the composition of soil dissolved organic matter in a primary tropical forest?	ENVIRONMENTAL RESEARCH LETTERS	17	95015		8.414	Niu GX, Yin GG, Mo XH, Mao QG, Mo JM, Wang JJ, Lu XK*
53	A D-pinitol transporter, LjPLT11, regulates plant growth and nodule development in Lotus japonicus	JOURNAL OF EXPERIMENTAL BOTANY	73	351	365	8.331	Tian L, Liu LR, Xu SM, Deng RF, Wu PZ, Jiang HW, Wu GJ*, Chen YP*
54	The chromatin remodelling ATPase BRAHMA interacts with GATA-family transcription factor GNC to regulate flowering time in Arabidopsis	JOURNAL OF EXPERIMENTAL BOTANY	73	835	847	8.331	Yang J, Xu YC, Wang JH, Gao SJ, Huang YS, Hung FY, Li T, Li Q, Yue L, Wu KQ*, Yang SG*
55	Energy homeostasis mediated by the LcSnRK1 alpha-LcbZIP1/3 signaling pathway modulates litchi fruit senescence	PLANT JOURNAL	111	698	712	8.028	Zhou YJ, Li ZW, Zhu H, Jiang YM, Jiang GX*, Qu HX*
56	Ceramides regulate defense response by binding to RbohD in Arabidopsis	PLANT JOURNAL	109	1427	1440	8.028	Li J, Yin J, Wu JX, Wang LY, Liu Y, Huang LQ, Wang RH, Yao N*
57	MSI1 and HDA6 function interdependently to control flowering time via chromatin modifications	PLANT JOURNAL	109	831	843	8.028	Xu YC, Li Q, Yuan LY, Huang YS, Hung FY, Wu KQ*, Yang SG*
58	Decrease in soil pH has greater effects than increase in above-ground carbon inputs on soil organic carbon in terrestrial ecosystems of China under nitrogen enrichment	JOURNAL OF APPLIED ECOLOGY	59	768	778	7.822	Lu XF, Gilliam FS, Guo JY, Hou EQ, Kuang YW*
59	Erosion and covered zones altered by surface coverage effects on soil nitrogen and carbon loss from an agricultural slope under laboratory-simulated rainfall events	INTERNATIONAL SOIL AND WATER CONSERVATION RESEARCH	10	382	392	7.803	Wang LH, Yen H, Huang CH, Wang YF*
60	The bioactivity of prenylated stilbenoids and their structure-activity relationship	FOOD RESEARCH INTERNATIONAL	157	111275		7.716	Bo ST, Chang SK, Shan YX, Chen YP, Liu H, Li BL, Jiang YM, Zhu H, Yang B*

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61	Effects of temperature and light on quality-related metabolites in tea [Camellia sinensis (L.) Kuntze] leaves	FOOD RESEARCH INTERNATIONAL	161	111882		7.716	Wang M, Yang J, Li JL, Zhou XC, Xiao YY, Liao YY, Tang JC, Dong F*, Zeng LT*
62	Histone Deacetylase HDA15 Restrains PHYB-Dependent Seed Germination via Directly Repressing GA20ox1/2 Gene Expression	CELLS	11	3788		7.677	Zheng F, Wang YH, Gu DC, Liu XC*
63	Prediction of effector proteins and their implications in pathogenicity of phytopathogenic filamentous fungi: A review	INTERNATIONAL JOURNAL OF BIOLOGICAL MACROMOLECULES	206	188	202	7.626	Wu YF, Xie LH, Jiang YM, Li TT*
64	Genome-wide identification and characterization of bZIP transcription factors in relation to litchi (Litchi chinensis Sonn.) fruit ripening and postharvest storage	INTERNATIONAL JOURNAL OF BIOLOGICAL MACROMOLECULES	222	2176	2189	7.626	Hou HY, Kong XJ, Zhou YJ, Yin CX, Jiang YM, Qu HX, Li TT*
65	The histone H3K27 demethylase SlJMJ4 promotes dark- and ABA-induced leaf senescence in tomato	HORTICULTURE RESEARCH	9	uhab077		7.487	Ding XC, Zhang DD, Gu DC, Li ZW, Liang HZ, Zhu H, Jiang YM*, Duan XW*
66	Involvement of histone deacetylase CsHDA2 in regulating (E)-nerolidol formation in tea (Camellia sinensis) exposed to tea green leafhopper infestation	HORTICULTURE RESEARCH	9	uhac158		7.487	Gu DC, Wu SH, Yu ZM, Zeng LT, Qian JJ, Zhou XC, Yang ZY*
67	Genomic population structure and local adaptation of the wild strawberry Fragaria nilgerrensis	HORTICULTURE RESEARCH	9	uhab059		7.487	Hu YX, Feng C, Yang LH, Edger PP, Kang M*
68	Exogenous GA(3) promotes flowering in Paphiopedilum callosum (Orchidaceae) through bolting and lateral flower development regulation	HORTICULTURE RESEARCH	9	uhac091		7.487	Yin YY, Li J, Guo BY, Li L, Ma GH, Wu KL, Yang FX, Zhu GF, Fang L*, Zeng SJ*
69	Jackfr+B563:B575uit genome and population genomics provide insights into fruit evolution and domestication history in China	HORTICULTURE RESEARCH	9	uhac173		7.487	Xinggu Lin, Chao Feng, Tao Lin, A.J. Harris1, Yingzhi Li*, Ming Kang*
70	Root microbiome changes associated with cadmium exposure and/or overexpression of a transgene that reduces Cd content in rice	ECOTOXICOLOGY AND ENVIRONMENTAL SAFETY	237	113530		7.284	Li KJ, Wang CH*, Ow DW*
71	Physiological and proteomic analyses reveal the effects of exogenous nitrogen in diminishing Cd detoxification in Acacia auriculiformis	ECOTOXICOLOGY AND ENVIRONMENTAL SAFETY	229	113057		7.284	Zhang GH, Yu ZM, Zhang LL*, Yao B, Luo XZ, Xiao MJ, Wen DZ*
72	Pfaffia glomerata is a hyperaccumulator candidate: Cd and Zn tolerance, absorption, transfer, and distribution	ECOTOXICOLOGY AND ENVIRONMENTAL SAFETY	246	114196		7.284	Huang R, Wu ZM, Zhao XL, Li F, Wang WD, Guo Y*, Li ZA, Wu JT*

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73	Site-Specific Sequence Exchange Between Homologous and Non-homologous Chromosomes	FRONTIERS IN PLANT SCIENCE	13	828960		7.255	Yin Q, Li RY*, Ow DW*
74	Physiological Measurements and Transcriptome Survey Reveal How Semi-mangrove Clerodendrum inerme Tolerates Saline Adversity	FRONTIERS IN PLANT SCIENCE	13	882884		7.255	Liang MT, Hu F, Xie DS, Chen ZB, Zheng QZ, Xie QY, Zheng F, Liu DM, Jian SG, Chen HF, Liu XC*, Wang FG*
75	Comparative Transcriptomic and Metabolic Analyses Reveal the Molecular Mechanism of Ovule Development in the Orchid, Cymbidium sinense	FRONTIERS IN PLANT SCIENCE	12	814275		7.255	Zeng DQ, Que CX, da Silva JTA, Xu ST, Li DM*
76	Multi-omics analysis the differences of VOCs terpenoid synthesis pathway in maintaining obligate mutualism between Ficus hirta Vahl and its pollinators	FRONTIERS IN PLANT SCIENCE	13	1006291		7.255	Fan SL, Jia YX, Wang R, Chen XY, Liu WZ, Yu H*
77	Metabolic engineering to enhance the accumulation of bioactive flavonoids licochalcone A and echinatin in Glycyrrhiza inflata (Licorice) hairy roots	FRONTIERS IN PLANT SCIENCE	13	932594		7.255	Wu ZG, Singh SK, Lyu R, Pattanaik S, Wang Y, Li YQ, Yuan L*, Liu YL*
78	AcMYB1 Interacts With AcbHLH1 to Regulate Anthocyanin Biosynthesis in Aglaonema commutatum	FRONTIERS IN PLANT SCIENCE	13	886313		7.255	Li J, Wu KL, Li L, Ma GH, Fang L*, Zeng SJ*
79	Editorial: Interactions Between Biochemical Pathways Producing Plant Colors and Scents	FRONTIERS IN PLANT SCIENCE	13	955431		7.255	Fu XM*, Gomez-Gomez L*, Rivera-Madrid R*
80	Inorganic Nitrogen Enhances the Drought Tolerance of Evergreen Broad-Leaved Tree Species in the Short-Term, but May Aggravate Their Water Shortage in the Mid-Term	FRONTIERS IN PLANT SCIENCE	13	875293		7.255	Liu FY, Zhou YH, Zhang SK, Liu N*
81	Sphagnum capillifolium holobiont from a subarctic palsa bog aggravates the potential of nitrous oxide emissions	FRONTIERS IN PLANT SCIENCE	13	974251		7.255	Nie YX*, Lau SYL, Tan XP, Lu XK, Liu SP, Tahvanainen T, Isoda R, Ye Q, Hashidoko Y
82	Molecular and metabolic insights into floral scent biosynthesis during flowering in Dendrobium chrysotoxum	FRONTIERS IN PLANT SCIENCE	13	1030492		7.255	Du ZH, Jin YX, Wang WZ, Xia K*, hen ZL*
83	Physiological and transcriptomic analysis uncovers salinity stress mechanisms in a facultative crassulacean acid metabolism plant Dendrobium officinale	FRONTIERS IN PLANT SCIENCE	13	1028245		7.255	Zhang MZ, Liu N, da Silva JTA, Liu XC, Deng RF, Yao YX, Duan J, He CM*
84	Common-garden experiment reveals clinal trends of bud phenology in black spruce populations from a latitudinal gradient in the boreal forest	JOURNAL OF ECOLOGY	110	1043	1053	7.164	Guo XL, Klisz M, Puchalka R, Silvestro R, Faubert P, Belien E, Huang JG*, Rossi S

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85	Proteomic and physiological analysis provides an elucidation of Fusarium proliferatum infection causing crown rot on banana fruit	MICROBIOLOGICAL RESEARCH	256	126952		7.103	Xie LH, Wu YF, Duan XW, Li TT*, Jiang YM*
86	Temperature dependence of ecosystem carbon, nitrogen and phosphorus residence times differs between subtropical and temperate forests in China	AGRICULTURAL AND FOREST METEOROLOGY	326	109165		7.021	Chen Y, Wang YP, Huang YY, Tang XL, Zhou GY, Wang C, Chang ZB, Yan JH*
87	Atmospheric factors outweigh species traits and soil properties in explaining spatiotemporal variation in water-use efficiency of tropical and subtropical forest species	AGRICULTURAL AND FOREST METEOROLOGY	323	109056		7.021	Tang SB, Dawson HR, Silva LCR, Penuelas J, Sardans J, Lambers H, Zeng FY, Lai Y, Jia YL, Zhou GY, Fang YT, Tu Y, Xi D, Zhang DX*, Kuang YW*
88	Metabolome, transcriptome and physiological analyses provide insight into the color transition of litchi pericarp	POSTHARVEST BIOLOGY AND TECHNOLOGY	192	112031		7.001	He MY, Zhou YJ, Zhu H, Jiang YM, Qu HX*
89	Genome-wide identification, characterization and function analysis of PRMT family in relation to fruit ripening in banana	POSTHARVEST BIOLOGY AND TECHNOLOGY	188	111900		7.001	Liang HZ, Lai HM, Zeng J, Sun J, Kong XJ, Jiang YM, Dua XW*
90	Role of apyrase-mediated eATP signal in chilling injury of postharvest banana fruit during storage	POSTHARVEST BIOLOGY AND TECHNOLOGY	187	111874		7.001	Shan YX, Li FJ, Lian QQ, Xie LH, Zhu H, Li TT, Zhang J*, Duan XW, Jiang YM*
91	Characterization of miRNA-mediated auxin signaling during banana (Musa spp.) fruit ripening	POSTHARVEST BIOLOGY AND TECHNOLOGY	193	112045		7.001	Kong XJ, Zeng J, Yun Z, Hu CH, Yang B, Qu HX,Jiang YM, Zhu H*
92	Specific binding of NTP to MaDORN1.19 enhances cold tolerance of postharvest banana fruit during storage	POSTHARVEST BIOLOGY AND TECHNOLOGY	188	111883		7.001	Shan YX, Li FJ, Xie LH, Lian QQ, Zhu H, Li TT, Zhang J*, Jiang YM*
93	Hydrogen-rich water maintains the color quality of fresh-cut Chinese water chestnut	POSTHARVEST BIOLOGY AND TECHNOLOGY	183	111743		7.001	Li FJ, Hu Y, Shan YX, Liu J, Ding XC, Duan XW, Zeng JQ*, Jiang YM*
94	Fluopyram inhibits tricarboxylic acid cycle but induces gamma-aminobutyric acid-shunt pathway to prolong postharvest shelf life of litchi fruit	POSTHARVEST BIOLOGY AND TECHNOLOGY	192	112036		7.001	He MY, Xie LH, Wu YF, Hong M, Jiang YM*, Li TT*
95	Antifungal activities of a natural trisaccharide ester against sour rot in mandarin fruit	POSTHARVEST BIOLOGY AND TECHNOLOGY	191	111981		7.001	Xu LX, Feng LY, Sun J, Mao LT, Li XJ, Jiang YM, Duan XW*, Li TT*
96	Genomic insights into inter- and intraspecific mating system shifts in Primulina	MOLECULAR ECOLOGY	31	5699	5713	6.895	Yi HQ, Wang JY, Wang J, Rausher M, Kang M*

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97	Gene flow, linked selection, and divergent sorting of ancient polymorphism shape genomic divergence landscape in a group of edaphic specialists	MOLECULAR ECOLOGY	31	104	118	6.895	Ke FS, Vasseur L, Yi HQ, Yang LH, Wei X, Wang BS, Kang M*
98	Response of model-based cambium phenology and climatic factors to tree growth in the Altai Mountains, Central Asia	ECOLOGICAL INDICATORS	143	109393		6.643	Kang J, Shishov VV, Tychkov I, Zhou P, Jiang SW, Ilyin VA, Ding XG, Huang JG*
99	Effects of decadal nitrogen addition on carbon and nitrogen stocks in different organic matter fractions of typical steppe soils	ECOLOGICAL INDICATORS	144	109471		6.643	Niu GX, Liu L, Wang YL, Guan HL, Ning QS, Liu T, Rousk K, Zhong BQ, Yang JJ, Lu XK, Han XG, Huang JH*
100	Exploring ecosystem responses to coastal exploitation and identifying their spatial determinants: Re-orienting ecosystem conservation strategies for landscape management	ECOLOGICAL INDICATORS	138	108860		6.643	Guo JC, Jiang C, Wang YX, Yang J*, Huang WM*, Gong QH, Zhao Y, Yang ZY, Chen WL, Ren H
101	Tree diversity depending on environmental gradients promotes biomass stability via species asynchrony in China?s forest ecosystems	ECOLOGICAL INDICATORS	140	109021		6.643	Wu AC, Zhou GY*, He HL*, Hautier Y, Tang XL, Liu JX, Zhang QM, Wang SL, Wang AZ, Lin LX, Zhang YP, Xie ZQ, Chang RY
102	Fiddling with the blue carbon: Fiddler crab burrows enhance CO2 and CH4 efflux in saltmarsh	ECOLOGICAL INDICATORS	144	109538		6.643	Agusto LE, Qin GM, Thibodeau B, Tang JW, Zhang JF, Zhou JE, Wu JT, Zhang LL, Thapa P, Wang FM*, Cannicci S
103	Pyramiding of gn1a, gs3, and ipa1 Exhibits Complementary and Additive Effects on Rice Yield	INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES	23	12478		6.628	Li MR, Pan XP, Li HQ*
104	Target Lines for in Planta Gene Stacking in Japonica Rice	INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES	23	9385		6.628	Li RY*, Han ZG, Yin Q, Li MR, Zhang MY, Li ZZ, Wang P, Jiang L, Ow DW*
105	Genome-Wide Identification, Expression Patterns and Sugar Transport of the Physic Nut SWEET Gene Family and a Functional Analysis of JcSWEET16 in Arabidopsis	INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES	23	5391		6.628	Wu YT, Wu PZ, Xu SM, Chen YP, Li MR, Wu GJ, Jiang HW*
106	Functional Characterization of Heat Shock Factor (CrHsf) Families Provide Comprehensive Insight into the Adaptive Mechanisms of Canavalia rosea (Sw.) DC. to Tropical Coral Islands	INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES	23	12357		6.628	Zhang M*, Wang ZF, Jian SG*
107	Roles of AGD2a in Plant Development and Microbial Interactions of Lotus japonicus	INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES	23	6863		6.628	Huang MC, Yuan MR, Sun CY, Li MR, Wu PZ, Jiang HW, Wu GJ, Chen YP*
108	Comprehensive Analysis of the Hsp20 Gene Family in Canavalia rosea Indicates Its Roles in the Response to Multiple Abiotic Stresses and Adaptation to Tropical Coral Islands	INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES	23	6405		6.628	Zhang M*, Jian SG, Wang ZF*

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109	Ectopic Expression of JcCPL1, 2, and 4 Affects Epidermal Cell Differentiation, Anthocyanin Biosynthesis and Leaf Senescence in Arabidopsis thaliana	INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES	23	1924		6.628	Chen YB, Wu PZ, Zhang C, Guo YL, Liao BB, Chen YP, Li MR, Wu GJ, Wang YQ*, Jiang HW*
110	Leaf trait expression varies with tree size and ecological strategy in a subtropical forest	FUNCTIONAL ECOLOGY	36	1010	1022	6.609	Bin Y, Li YP, Russo SE, Cao HL, Ni YL, Ye WH, Lian JY*
111	How do functional traits influence tree demographic properties in a subtropical monsoon forest?	FUNCTIONAL ECOLOGY	36	3200	3210	6.609	He PC, Lian JY, Ye Q*, Liu H, Zheng Y, Yu KL, Zhu SD, Li RH, Yin DY, Ye WH, Wright IJ
112	A 14-year experiment emphasizes the important role of heat factors in regulating tree transpiration, growth, and water use efficiency of Schima superba in South China	AGRICULTURAL WATER MANAGEMENT	273	107902		6.574	Ouyang L, Lu LW, Wang CL, Li YQ, Wang JY, Zhao XH, Gao L, Zhu LW, Ni GY, Zhao P*
113	Spatio transcriptome uncover novel insight into the Lycium ruthenicum seedling tolerant to salt stress	INDUSTRIAL CROPS AND PRODUCTS	177	114502		6.508	Mo SQ, Biao A, Wang ZQ, Lin S, Yang TS, Pan LZ, Wang Y, Zeng SH*
114	Pectin-associated mannans and xylans play distinct roles in cell-cell adhesion in pine and poplar wood	INDUSTRIAL CROPS AND PRODUCTS	184	115054		6.508	Liu DJ, Qian JJ, Xu JY, Carpita NC, McCann MC, Yang HB*
115	Forest succession accelerates soil carbon accumulation by increasing recalcitrant carbon stock in subtropical forest topsoils	CATENA	212	106030		6.497	Xiang HM, Luo XZ, Zhang LL, Hou EQ, Li J, Zhu QD, Wen DZ*
116	Mechanism underlying the carotenoid accumulation in shaded tea leaves	FOOD CHEMISTRY-X	14	100323		6.443	Fu XM, Chen JM, Li JL, Dai GY, Tang JC, Yang ZY*
117	Effect of gamma-irradiation on structure, physicochemical property and bioactivity of soluble dietary fiber in navel orange peel	FOOD CHEMISTRY-X	14	100274		6.443	Li XN, Wang BY, Hu WJ, Chen HG, Sheng ZL, Yang *B, Yu LM*
118	A Combined Analysis of Transcriptome and Proteome Reveals the Inhibitory Mechanism of a Novel Oligosaccharide Ester against Penicillium italicum	JOURNAL OF FUNGI	8	111		6.413	Feng LY, Xu LX, Li XJ, Xue JH, Li TT*, Duan XW*
119	The HDA9-HY5 module epigenetically regulates flowering time in Arabidopsis thaliana	JOURNAL OF CELLULAR PHYSIOLOGY	237	2961	2968	6.398	Chu LT, Yang C, Zhuang F, Gao YM, Luo M*
120	Phyllosphere bacterial and fungal communities vary with host species identity, plant traits and seasonality in a subtropical forest	ENVIRONMENTAL MICROBIOME	17	29		6.36	Li MJ, Hong L, Ye WH, Wang ZM, Shen H*

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121	Valeric acid delays aril breakdown of longan (Dimocarpus longan Lour.) fruit in relation to the regulation of histone deacetylase activity	LWT-FOOD SCIENCE AND TECHNOLOGY	168	113959		6.295	Wu YF, Xie LH, Li ZW, Li TT*, Jiang YM
122	Hydrogen-rich water treatment maintains the quality of Rosa sterilis fruit by regulating antioxidant capacity and energy metabolism	LWT-FOOD SCIENCE AND TECHNOLOGY	161	113361		6.295	Dong BY*, Zhu DQ, Yao QP, Tang HM, Ding XC*
123	Physiological traits and response strategies of four subtropical tree species exposed to drought	ENVIRONMENTAL AND EXPERIMENTAL BOTANY	203	105046		6.246	Wu T, Tan ND, Tissue DT, Huang J, Duan HL, Su W, Song YT, Liu XJ, Liu Y, Li X, Lie Z, Yang SM, Zhou SYD, Yan JH, Tang XL, Liu SZ, Chu GW, He XH, Liu JX*
124	A geospatial model of nature-based recreation for urban planning: Case study of Paris, France	LAND USE POLICY	117	106107		6.158	Liu HX, Hamel P*, Tardieu L, Remme RP, Han B, Ren H
125	Inhibitory Mechanism of Pinosylvin Monomethyl Ether against Aspergillus flavus	JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY	70	15840	15747	6.048	Li XC, Yao LY, Xiong BH, Wu YD, Chen SH, Xu ZF, Qiu SX*
126	Antifungal Mechanism of MTE-1, a Novel Oligosaccharide Ester, against Ustilaginoidea virens	JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY	70	7441	7446	6.048	Li XJ, Xu LX*, Lv ZC, Li FM, Xue JH, Peng YH, Wei XY*, Li L*
127	Soil moisture dominated the temporal dynamics of litter moisture content in subtropical forests: a 7-year observation in south China	JOURNAL OF HYDROLOGY-REGIONAL STUDIES	41	101102		6.007	Liu XD, Feng YJ, Liu PL, Zhang QM, Njoroge B, Zhou Q, Gan XH, Zhang WQ*, Li YL*
128	Response Surface Modeling and Optimization of Enzymolysis Parameters for the In Vitro Antidiabetic Activities of Peanut Protein Hydrolysates Prepared Using Two Proteases	FOODS	11	3303		5.94	AL-Bukhaiti WQ, Al-Dalali S, Noman A, Qiu SL, Abed SM, Qiu SX*
129	Effect of Polishing on Lead and Cadmium Bioavailability in Rice and Its Health Implications	FOODS	11	2718		5.94	Chen XH, Chen FM, Sun S, Li YW, Li YX, Mo H, Li ZA, Zhuang P*
130	Total syntheses of hyperaspidinols A and B enabled by a bioinspired diastereoselective cascade sequence	CHINESE CHEMICAL LETTERS	33	885	889	5.935	Zheng AQ, Zhou TT, Wang SS, Zhang WG, Lu XX, Chen HY*, Tan H*
131	C-methyl flavonoid from the leaves of Cleistocalyx conspersipunctatus: a-glucosidase inhibitory, molecular docking simulation and biosynthetic pathway	ARABIAN JOURNAL OF CHEMISTRY	15	103687		5.913	Du HF, Li HX, Wu P*, Xue JH, Wu YS, Wei XY, Liu B*
132	Plastid phylogenomics of tribe Perseeae (Lauraceae) yields insights into the evolution of East Asian subtropical evergreen broad-leaved forests	BMC PLANT BIOLOGY	22	32		5.761	Xiao TW, Yan HF, Ge XJ*

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133	Structural Modifications and Biological Activities of Natural alpha- and beta-Cembrenediol: A Comprehensive Review	PHARMACEUTICALS	15	601		5.711	Xu K, Du XY, Ren X, Li XX, Li H, Fu XJ*, Wei XY*
134	Increased interactions between iron oxides and organic carbon under acid deposition drive large increases in soil organic carbon in a tropical forest in southern China	BIOGEOCHEMISTRY	158	287	301	5.709	Chen JW, Hu YL, Hall SJ, Hui DF, Li JL, Chen GY, Sun LW, Zhang DQ, Deng Q*
135	Soil specific enzyme stoichiometry reflects nitrogen limitation of microorganisms under different types of vegetation restoration in the karst areas	APPLIED SOIL ECOLOGY	169	104253		5.678	Guan HL, Fan JW*, Lu XK*
136	Elevation explains variation in soil microbial diversity and community composition under experimental warming and fertilization treatments in mountain meadows	APPLIED SOIL ECOLOGY	171	104311		5.678	Liu JJ, Jin L, Shan YX, Burgess KS, Ge XJ*
137	Split-Cre mediated deletion of DNA no longer needed after site-specific integration in rice	THEORETICAL AND APPLIED GENETICS	135	2333	2340	5.662	Yin Q, Li RY*, Ow DW*
138	Target lines for recombinase-mediated gene stacking in soybean	THEORETICAL AND APPLIED GENETICS	135	1163	1175	5.662	Jiang L, Li RY*, Han ZG, Zhao XH, Cao D, Ow DW*
139	Characterization of Key Odorants in Lingtou Dancong Oolong Tea and Their Differences Induced by Environmental Conditions from Different Altitudes	METABOLITES	12	1063		5.531	Wang M, Li JL, Liu XH, Liu CS, Qian JJ, Yang J, Zhou XC, Jia YX, Tang JC, Zeng LT*
140	Shoot organogenesis and somatic embryogenesis from leaf and petiole explants of endangered Euryodendron excelsum	SCIENTIFIC REPORTS	12	20506		5.516	Xiong YP, Chen SY, Wu T, Wu KL, Li Y, Zhang XH, da Silva JAT, Zeng SJ, Ma GH*
141	Intensified rainfall in the wet season alters the microbial contribution to soil carbon storage	PLANT AND SOIL	476	337	351	5.44	Zhou JG, Zhang JF, Lambers H, Wu JT, Qin GM, Li YW, Li YX, Li ZA, Wang J, Wang FM*
142	Nitrogen addition increases aboveground silicon and phytolith concentrations in understory plants of a tropical forest	PLANT AND SOIL	477	25	39	5.44	Lu XF, Qin ZF, Lambers H, Tang SB, Kaal J, Hou EQ, Kuang YW*
143	Ten years of warming increased plant-derived carbon accumulation in an East Asian monsoon forest	PLANT AND SOIL	481	349	365	5.44	Zhang J, Kuang LH, Mou ZJ, Kondo T, Koarashi J, Atarashi-Andoh M, Li Y, Tang XL, Wang YP, Penuelas J, Sardans J, Hui DF, Lambers H, Wu WJ, Kaal J, Li J, Liang NS*, Liu ZF*
144	Divergent responses of fine root decomposition to removal of understory plants and overstory trees in subtropical Eucalyptus urophylla plantations	PLANT AND SOIL	476	639	652	5.44	Chen YQ, Zhang YJ, Cao JB, Fu SL, Wang J, Lambers H, Liu ZF*

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145	A chromosome-level genome assembly of the pollinating fig wasp Valisia javana	DNA RESEARCH	29	dsac014		5.358	Chen LF, Feng C, Wang R, Nong XJ, Deng XX, Chen XY*, Yu H*
146	The genome of the Paleogene relic tree Bretschneidera sinensis: insights into trade-offs in gene family evolution, demographic history, and adaptive SNPs	DNA RESEARCH	29	dsac003		5.358	Liu HL, Harris AJ, Wang ZF*, Chen HF*, Li ZA, Wei X
147	Fingerprints of climatic changes through the late Cenozoic in southern Asian flora: Magnolia section Michelia (Magnoliaceae)	ANNALS OF BOTANY	130	41	52	5.351	Zhao N, Park S, Zhang YQ, Nie ZL, Ge XJ, Kim S*, Yan HF*
148	Multi-target mechanisms against coronaviruses of constituents from Chinese Dagang Tea revealed by experimental and docking studies	JOURNAL OF ETHNOPHARMACOLOGY	297	115528		5.242	Zhao LY, Qin XB, Lin TT, Xie FD, Yao LY, Li YL, Xiong BH, Xu ZF, Ye YC, Chen HF, Qiu SX*
149	Leaf nutrient resorption differs among canopy and understory plant species in subtropical Eucalyptus and Acacia plantations	LAND DEGRADATION & DEVELOPMENT	33	1662	1676	5.205	Wang J, Hui DF, Liu ZF, Lin YB, Wang FM, Long J, Mou ZJ, Lu HF*, Ren H
150	Changes in the composition of soil microbial communities and their carbon-cycle genes following the conversion of primary broadleaf forests to plantations and secondary forests	LAND DEGRADATION & DEVELOPMENT	33	974	985	5.205	Luo XZ, Wen DZ*, Hou EQ, Zhang LL, Li Y, He XJ
151	Accumulation of glomalin-related soil protein benefits soil carbon sequestration: Tropical coastal forest restoration experiences	LAND DEGRADATION & DEVELOPMENT	33	1541	1551	5.205	Zhang J, Li J, Ma LL, He XH, Liu ZF, Wang FM, Chu GW, Tang XL*
152	CRISPR gene editing of major domestication traits accelerating breeding for Solanaceae crops improvement	PLANT MOLECULAR BIOLOGY	108	157	173	5.197	Rehman F*, Gong HG, Bao YF, Zeng SH, Huang HW, Wang Y*
153	Transcriptomic insights into the regulatory networks of chilling-induced early flower in tobacco (Nicotiana tabacum L.)	JOURNAL OF PLANT INTERACTIONS	17	496	506	5.124	Xu GY, Guo WX, Li ZQ, Wang C, Xu YL, Jin JJ, Zhou HN*, Deng SL*
154	Effects of elevated CO2 concentration and nitrogen addition on the chemical compositions, construction cost and payback time of subtropical trees in Cd-contaminated mesocosm soil	TREE PHYSIOLOGY	42	1002	1015	5.121	Zang XW, Luo XZ, Hou EQ, Zhang GH, Zhang XF, Xiao MJ, Wen DZ*, Zhang LL*
155	Auxin concentration and xylem production of Pinus massoniana in a subtropical forest in south China	TREE PHYSIOLOGY	42	317	324	5.121	Guo XL, Huang JG*, Butto V, Luo DW, Shen CY, Li JY, Liang HX, Zhang SK, Hou XL, Zhao P, Rossi S
156	Effects of nitrogen addition and increased precipitation on xylem growth of Quercus acutissima Caruth. in central China	TREE PHYSIOLOGY	42	754	770	5.121	Yu BY, Rossi S, Liang HX, Guo XL, Ma QQ, Zhang SK, Kang J, Zhao P, Zhang W, Ju YX, Huang JG*

No.	Title	Journal	Issue Volume	Start Page	End Page	Impact Factor	Authors
157	The putative obtusifoliol 14 alpha-demethylase OsCYP51H3 affects multiple aspects of rice growth and development	PHYSIOLOGIA PLANTARUM	174	e13764		5.12	Jiao ZL, Yin LJ, Zhang QM, Xu WJ, Jia YX, Xia KF*, Zhang MY*
158	Comparative profiles of the cuticular chemicals and transpiration barrier properties in various organs of Chinese flowering cabbage and Chinese kale	PHYSIOLOGIA PLANTARUM	174	e13650		5.12	Huang H, Hu Y, Wang L, Li FJ, Shan YX, Lian QQ, Jiang YM*
159	Tree Diversity, Structure and Functional Trait Identity Promote Stand Biomass Along Elevational Gradients in Subtropical Forests of Southern China	JOURNAL OF GEOPHYSICAL RESEARCH-BIOGEOSCIENCES	127	e2022JG006950		5.062	Wu AC, Tang XL*, Li AD, Xiong X, Liu JX, He XH, Zhang QM, Dong AQ, Chen HF*
160	Urbanization intensifies tree sap flux but divergently for different tree species groups in China	ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH	29	27832	27844	5.053	Ouyang L, Du J, Zhang ZZ*, Zhao P, Zhu LW, Ni GY
161	Bioinspired syntheses of cryptoflavanones C and D, oboflavanones A and B, and cryptoyunnanones G and H enabled by an acid-triggered cascade sequence	ORGANIC CHEMISTRY FRONTIERS	9	2424	2429	5.011	Zheng AQ, Wang SS, Zhou TT, Chen Y, Ke X, Chen HY*, Tan HB*

INTERNATIONAL REGISTERED CULTIVARS

No.	Cultivar Name	Authorized by	Cultivar Breeders
1	Paphiopedilum SCBG Charming Fairy	The Royal Horticultural Society	ZENG Songjun
2	Paphiopedilum SCBG Fantasy Fairy	The Royal Horticultural Society	ZENG Songjun
3	Paphiopedilum SCBG Radiance	The Royal Horticultural Society	ZENG Songjun
4	Paphiopedilum SCBG Starriness	The Royal Horticultural Society	ZENG Songjun
5	Paphiopedilum SCBG Mysterious Frog	The Royal Horticultural Society	ZENG Songjun
6	Paphiopedilum SCBG Shuangfei	The Royal Horticultural Society	ZENG Songjun
7	Paphiopedilum SCBG Slender Fairy	The Royal Horticultural Society	ZENG Songjun
8	Paphiopedilum SCBG Guangzhou Star	The Royal Horticultural Society	ZENG Songjun、FANG Lin
9	Paphiopedilum SCBG Hopes	The Royal Horticultural Society	ZENG Songjun、HUANG Xiangli
10	Paphiopedilum SCBG Xiangli	The Royal Horticultural Society	HUANG Xiangli、ZENG Songjun
11	Paphiopedilum SCBG Tranquility	The Royal Horticultural Society	WU Kunlin、ZENG Songjun
12	Paphiopedilum SCBG Xiaguang	The Royal Horticultural Society	WU Kunlin、ZENG Songjun
13	Paphiopedilum SCBG Mysterious Fairy	The Royal Horticultural Society	FANG Lin、ZENG Songjun
14	Paphiopedilum SCBG Expectation	The Royal Horticultural Society	FANG Lin、ZENG Songjun
15	Paphiopedilum SCBG MD Breakthrough	The Royal Horticultural Society	LI Lin、ZENG Songjun
16	Paphiopedilum SCBG MD Surmounting	The Royal Horticultural Society	LI Lin、ZENG Songjun
17	Paphiopedilum SCBG White Fairy	The Royal Horticultural Society	FANG Lin、ZENG Songjun
18	Paphiopedilum SCBG Reminiscence	The Royal Horticultural Society	FANG Lin、ZENG Songjun
19	Paphiopedilum SCBG Yunxia	The Royal Horticultural Society	WU Kunlin、ZENG Songjun
20	Paphiopedilum SCBG RB Elegance	The Royal Horticultural Society	WU Kunlin、ZENG Songjun
21	Paphiopedilum SCBG Hongxia	The Royal Horticultural Society	LI Lin、ZENG Songjun
22	Paphiopedilum SCBG Zilin	The Royal Horticultural Society	LI Lin、ZENG Songjun
23	Hibiscus SCBG Maiden in White	International Hibiscus Society	LIN Qiaosheng、LIU Hua
24	Hibiscus SCBG Oriental Siste	International Hibiscus Society	LIN Qiaosheng、LIU Hua

No.	Cultivar Name	Authorized by	Cultivar Breeders
25	Hibiscus SCBG Pink Purple Gege	International Hibiscus Society	LIN Qiaosheng、LIU Hua
26	Hibiscus SCBG Your Smiling Face	International Hibiscus Society	LIN Qiaosheng、LIU Hua
27	Hibiscus SCBG Rose Girl	International Hibiscus Society	LIU Hua、LIN Qiaosheng
28	Hibiscus SCBG Pink Cotton	International Hibiscus Society	LIU Hua、LIN Qiaosheng
29	Hibiscus SCBG Pink Apple	International Hibiscus Society	LIU Hua、LIN Qiaosheng
30	Hibiscus SCBG Radix Asteris	International Hibiscus Society	LIU Hua、LIN Qiaosheng
31	Hibiscus SCBG Army Boots	International Hibiscus Society	LIU Hua、LIN Qiaosheng
32	Hibiscus SCBG Raging Fire	International Hibiscus Society	LIU Hua、LIN Qiaosheng

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Director： REN Hai
Secretary of the Party Committee, Deputy Directors： WEI Ping,
Deputy Directors: YAN Junhua, YE Qing
Deputy Secretary of the Party Committee, Secretary of the Discipline Inspection Commission： XU Hai

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Secretary: WEI Ping
Deputy Secretary: XU Hai
Members: YE Qing, REN Hai, YAN Junhua, YANG Ziyin, XU Hai, GONG Xiaoping, WEI Ping

Disciplinary Committee of CPC
Secretary: XU Hai
Deputy Secretary: FAN Dequan
Members: WANG Ruijiang, WEN Jun, FAN Dequan, HOU Xingliang, XU Hai

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General Office（Co located with the Office of the Development Planning and Strategy Advisory Committee）
Division Chief: ZHENG Xiangci（division chief of the Office of the Development Planning and Strategy Advisory Committee）
Deputy Division Chief: HUANG Ruilan

Party Committee Office/Discipline Supervision Office
Division Chief: FAN Dequan
Deputy Division Chief: LI Nan

Scientific Research and Foreign Affairs Management Division
Division Chief: WANG Jun
Deputy Division Chief: YU Yan, FANG Maichun

Personnel and Education Division
Division Chief: GONG Xiaoping
Deputy Division Chief: MA Lecheng

Assets and Financial Services Division
Division Chief: KE Qiusheng
Deputy Division Chief: HUANG He, YANG Xiangwei

Horticulture Center
Division Chief: WANG Ying
Deputy Division Chief: WU Xing, NING Zulin

Dinghushan National Nature Reserve (Arboretum)
Division Chief: XIA Hanping
Deputy Division Chief: FAN Zongji

Research Teams

Plant Sciences Center
Director: Prof. / Dr. KANG Ming
Deputy Director: Prof. / Dr. CHEN Hongfeng, Prof. / Dr. LUO Shixiao, Prof. / Dr. WANG Baosheng

1.Major Task Team I: Evolution and Maintenance Mechanism of Biodiversity in Nanling Ecological Barrier Zone
Person in charge: Prof. / Dr. KANG Ming

(1) Research direction: Plant genetic resources and evolution (only part personnel are included)
Person in charge: Prof. / Dr. KANG Ming
Members: WANG Jing, KONG Hanghui

(2) Research direction: Phylogenetic and Reproductive Biology
Person in charge: Associate Prof. / Dr. TU Tieyao
Members: ZHANG Dianxiang, LI Shijin, ZHAO Zhongtao, SHI Miaomiao, WANG Xiangping, Alexandre Antonelli (visiting researcher)

(3) Research direction: Conservation of rare and endangered plants
Person in charge: Prof. / Dr. WANG Ruijiang
Members: DONG Shiyong, XU Yuan

(4) Research direction: Plant classification and floristic geography
Acting principal: Prof. / Dr. DENG Yunfei
Member: LIN Zheli

(5) Research direction: Plant diversity and systematics
Person in charge: Prof. / Dr. CHEN Yousheng
Members: SONG Zhuqiu, XU Liansheng

(6) Research direction: Plant classification and systematic evolution
Person in charge: Associate Prof. / Dr. REN Chen
Members: YANG Qin'er, YUAN Qiong, WANG Long

(7) Research direction: Plant classification and resources
Person in charge: Associate Prof. / Dr. TONG Yihua
Members: XIA Nianhe, CHEN Juan, BAI Lin

2.Major Task Team II: Evolution and Ecological Adaptation of Important Groups of Evergreen Broadleaved Forest
Person in charge: Prof. / Dr. LUO Shixiao

(1) Research direction: Animal-plant relationship and ecological adaptation
Person in charge: Prof. / Dr. LUO Shixiao
Members: CHEN Huayan, YUAN Shuai

(2) Research direction: Phylogeny and adaptive evolution
Person in charge: Associate Prof. / Dr. YAN Haifei
Members: GE Xuejun, HUANG Huirun, LIU Jiajia, LIU Tongjian
(3) Research direction: Ecological adaptation and evolution of banyan bee specific system
Acting principal: Prof. / Dr. YU Hui
Members: LIU Wanzhen, Simon Segar (visiting researcher)

(4) Research direction: Plant pangenome and phylogeny
Acting principal: Prof. / Dr. John Seymour Heslop Harrison
Member: LIU Qing

3.Major task team III: Conservation, exploration and utilization of characteristic plant resources
Person in charge: Prof. / Dr. CHEN Hongfeng

(1) Research direction: Conservation and utilization of species diversity
Person in charge: Prof. / Dr. CHEN Hongfeng
Members: WANG Faguo, DUAN Lei, YI Qifei, FU Lin

(2) Research direction: Natural Product Chemical Biology
Person in charge: Prof. / Dr. QIU Shengxiang
Members: ZHAO Liyun, LI Xiancai, XIONG Binghong, XU Zhifang

(3) Research direction: Plant *ex situ* Conservation
Person in charge: Prof. / Dr. LIAO Jingping
Members: XU Fengxia, KUANG Yanfeng, LIU Huanfang

(4) Research direction: Plant genetic resources and evolution (only part personnel are included)
Person in charge: Prof. / Dr. KANG Ming
Members: CHEN Haishan, FENG Chao, YANG Lihua

4. Innovative Talent Team
(1) Forest Ecological Genomics
Person in charge: Prof. / Dr. WANG Baosheng
Members: SHI Yong

Ecological & Environmental Sciences Center
Director: Prof. / Dr. LIU Zhanfeng
Deputy Director: Prof. / Dr. LIU Juxiu, Prof. / Dr. LU Xiankai, Prof. / Dr. WANG Faming

1.Major Task Team I: Restoration ecology
Person in charge: Prof. / Dr. LIU Zhanfeng

(1)Research direction: Plant Physiological Ecology
Person in charge: Prof. / Dr. YE Qing
Members: LIU Hui, LIANG Xingyun, TAN Xiangping, NIE Yanxia, YIN Deyi

(2)Research direction: Vegetation and landscape ecology
Person in charge: Prof. / Dr. JIAN Shuguang
Members: REN Hai, LU Hongfang, LIU Nan, WANG Jun, LIU Hongxiao, WEI Liping, JIAO Min, Xu Ming (visiting researcher)

(3)Research direction: Soil Biology and Ecological Remediation
Person in charge: Prof. / Dr. LIU Zhanfeng
Members: ZHOU Lixia, ZHANG Jing, WU Wenjia, CAI Xi'an, LI Yue

2.Major Task Team II: Ecosystem and global change
Person in charge: Prof. / Dr. LIU Juxiu

(1)Research direction: Ecosystem Physiology
Person in charge: Associate Prof. / Dr. OUYANG Lei
Members: ZHAO Ping, GAO Lei, ZHU Liwei, NI Guangyan, ZHAO Xiuhua

(2)Research direction: Biogeochemistry of phosphorus
Person in charge: Prof. / Dr. HOU Enqing
Members: LUO Xianzhen

(3)Research direction: Ecosystem Ecology
Person in charge: Prof. / Dr. LIU Juxiu
Members: YAN Junhua, LI Yuelin, TANG Xuli

(4)Research direction: Land Surface Biogeochemical Cycles
Person in charge: Prof. / Dr. WANG Yingping
Members: WANG Chen, JIANG Jun, WANG Linhua

(5)Research direction: Ecosystem Management
Person in charge: Associate Prof. / Dr. ZHENG Mianhai
Members: MO Jiangming, HUANG Juan, ZHANG Wei, MAO Qinggong

3.Major Task Team III: Guangdong Hong Kong Macao Greater Bay Area Sustainable Development
Person in charge: Prof. / Dr. WANG Faming

(1)Research direction: Coastal Ecosystem Processes and Environmental Health
Person in charge: Prof. / Dr. WANG Faming
Members: LI Zhi'an, ZHUANG Ping, ZHANG Lulu, LU Zhe, GAN Shuchai

(2)Research direction: Environmental Ecology
Person in charge: Prof. / Dr. KUANG Yuanwen
Members: WEN Dazhi, ZHANG Lingling

(3)Research direction: Biodiversity and Ecological Security
Person in charge: Prof. / Dr. CAO Honglin
Members: YE Wanhui, WANG Zhenfeng, LIAN Juyu, SHEN Hao, LIU Wei, BIN Yue

(4)Research direction: Forest Ecology and Simulation
Person in charge: Prof. / Dr. MA Qianqian
Members: ZHU Huoxing, ZHANG Shaokang, ZHANG Yaling

(5)Research direction: Environmental Change and Underground Ecological Processes
Person in charge: Prof. / Dr. Deng Qi
Members: LI Jianling

4. Innovative Talent Team
(1) Biogeochemistry of nitrogen in forest ecosystem
Person in charge: Prof. / Dr. LU Xiankai
Members: ZHONG Buqing, ZHU Xiaomin, CHEN Weibin

Agriculture & Biotechnology Research Center
Director: Prof. / Dr. HOU Xingliang
Deputy Director: Prof. / Dr. YANG Ziyin, Prof. / Dr. DUAN Xuewu, Prof. / Dr. YANG Bao

1.Major Task Team I: Research and utilization of fruit and vegetable preservation technology
Person in charge: Prof. / Dr. DUAN Xuewu

(1)Research direction: Postharvest Biology of Fruits and Vegetables
Person in charge: Prof. / Dr. DUAN Xuewu
Members: JIANG Guoxiang, YUN Ze, LI Zhiwei

(2)Research direction: Postharvest preservation techniques of fruits and vegetables
Person in charge: Prof. / Dr. JIANG Yueming
Members: GONG Liang, ZHANG Dandan, HE Junxian (visiting researcher)

(3)Research direction: Postharvest quality and safety of fruits and vegetables
Person in charge: Prof. / Dr. QU Hongxia
Members: LI Taotao, XIAO Jianbo (visiting researcher)

2.Major Task Team II: Resource Plant Research and Industrialization Application
Person in charge: Prof. / Dr. WANG Ying

(1)Research direction: Innovation and utilization of medicinal plant germplasm
Person in charge: Prof. / Dr. WANG Ying
Members: ZENG Shaohua, LI Yongqing, YANG Chao, YANG Xiaoman

(2)Research direction: Genetic breeding of medicinal plants
Person in charge: Associate Prof. / Dr. HE Chunmei
Members: DUAN Jun,Si Can

(3)Research direction: Functional Genome of Resource Plants
Person in charge: Prof. / Dr. LUO Ming
Members: LI Yuping, LI Qianqian

(4)Research direction: Interaction between resource plants and microorganisms
Person in charge: Associate Prof. / Dr. CHEN Yaping
Members: WU Guojiang (retired from May, 2022), JIANG Huawu, LI Meiru

(5)Research direction: Phytochemistry resource biology
Person in charge: Associate Prof. / Dr. Tan Haibo
Members: WEI Xiaoyi (retired from July, 2022), ZHOU Zhongyu, WU Ping, XIE Haihui

(6)Research direction: Resource Plant Biotechnology
Person in charge: Associate Prof. / Dr. ZHANG Xinhua
Members: MA Guohua, LI Yuan, YU Yuhua, BIAN Zhan, XIONG Yuping

(7)Research direction: Innovation and utilization of ornamental plant germplasm
Person in charge: Associate Prof. / Dr. FANG Lin
Members: ZENG Songjun, LI Lin, WU Kunlin

3.Major Task Team III: Analysis of the Genetic Basis of Important Traits in Resource Plants and Germplasm Innovation
Person in charge: Prof. / Dr. HOU Xingliang

(1)Research direction: Plant Development and Quality Control
Person in charge: Prof. / Dr. HOU Xingliang
Members: LIU Xu, LI Yuge, HU Yilong, LI Xiaoming, ZHANG Chunyu, MIU Yansong (visiting researcher)

(2)Research direction: Efficient Crop Nutrition and Molecular Breeding
Person in charge: Prof. / Dr. ZHANG Mingyong
Members: XIA Kuaifei, LI Jian, ZENG Xuan, ZENG Jiqing, CHEN Jiantong

(3)Research direction: Plant Microbial Interactions
Person in charge: Prof. / Dr. DENG Shulin
Members: ZHANG Yi, LV Shanwu

(4)Research direction: Plant stress resistance
Person in charge: Prof. / Dr. CHEN Chen
Members: WANG Changhu, LI Ruyu

(5)Research direction: Economic Plant Stress Resistance and Protein Modification
Person in charge: Prof. / Dr. LIU Xuncheng
Members: ZHENG Feng, LIANG Minting

4. Innovative Talent Team
(1) Secondary Metabolism and Resource Utilization of Tea Trees
Person in charge: Prof. / Dr. YANG Ziyin
Members: ZENG Lanting, GU Dachuan, FU Xiumin, YANG Yuhua, XUE Jinghua, YANG Jie

(2) Functional Food Science
Person in charge: Prof. / Dr. YANG Bao
Members: ZHU Hong, WEN Lingrong

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Deputy Station Manager: LIN Yongbiao

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★ Editorial Board of the 2022 Annual Report of SCBG ★

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