



中国科学院昆明植物研究所

# Threatened Magnolias and Conservation in China

**Weibang SUN**

**(wbsun@mail.kib.ac.cn)**

**Kunming Botanical Garden, Chinese  
Academy of Science**

**11<sup>th</sup> July, 2019 Guadalajara Mexico**

# Outline

---

- 1. Species Diversity of Magnoliaceae in China**
- 2. Threatened Status of China's Magnoliaceae Plants**
- 3. Conservation of the Threatened Magnoliaceae Plants in China**

# **Species Diversity of Magnoliaceae in China**

# Taxonomy of Magnoliaceae

**Xia NH (2007):** 2 Subfam. / 2 Trib. / 17 Gen.

**Liu YH (2004) :** 2 Subfam. / 2 Trib. / 5 Subtrib / 16 Gen.

**Figlar & Nooteboom (2004) :** 2 Subfam. / 3 Subgen. / 2 Gen. (*Magnolia* L. & *Liriodendron* L.)

**Wu ZY (2003) :** 2 Subfam. / 5 Trib. / 17 Gen.

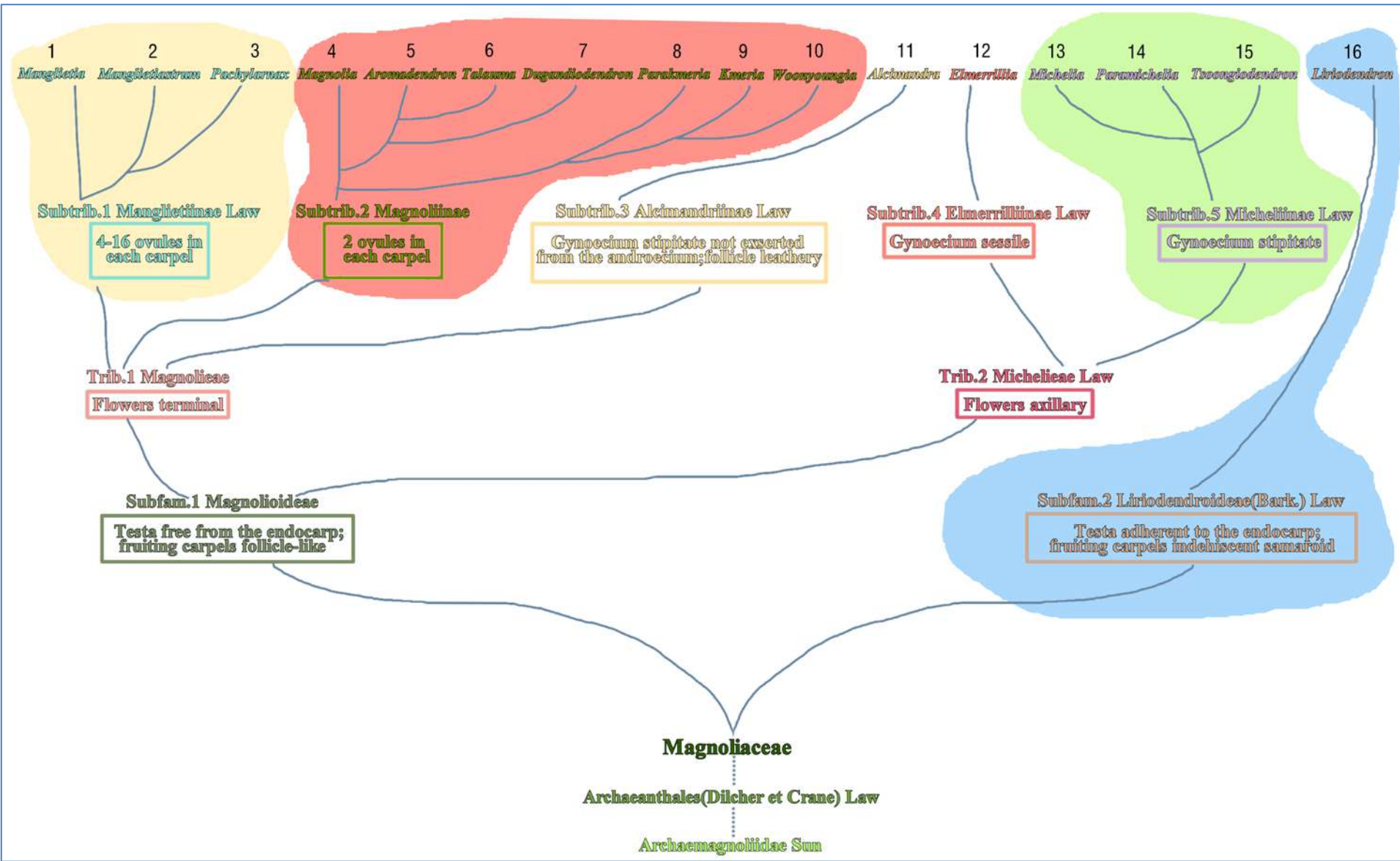
**Sun WB & Zhou J (2004) :** 2 Subfam. / 3 Gen. / 2 Subgen. / 17 Sect.

**\*\*\* Globally, 2-17 genera with 200-300 species**

**Liu's System (1997&2004) 2 Subfam. / 2 Trib. / 5 Subtrib. / 16 Gen. / 300 species**

**CHINA: 11 Genera with 160 species**





# THE EVOLUTIONARY DIAGRAM OF MAGNOLIACEAE ( LIU YH, 1997 )

## 世界地图洲际分布图



**GLOBAL:** E&SE Asia / SE North America / Centre & South America

**CHINA:** 69% Genera & 53% Species of the Global Total (Liu YH, 2004)

**YUNNAN:** Whole 12 Genera of China and 54% of China's total species

*Manglietia* BL. : 47 / 55 Species ( **China** / Total )

*Manglietia deciduas*





*M. aromatica*







*Manglietia ovoidea*





*Manglietia ventii*





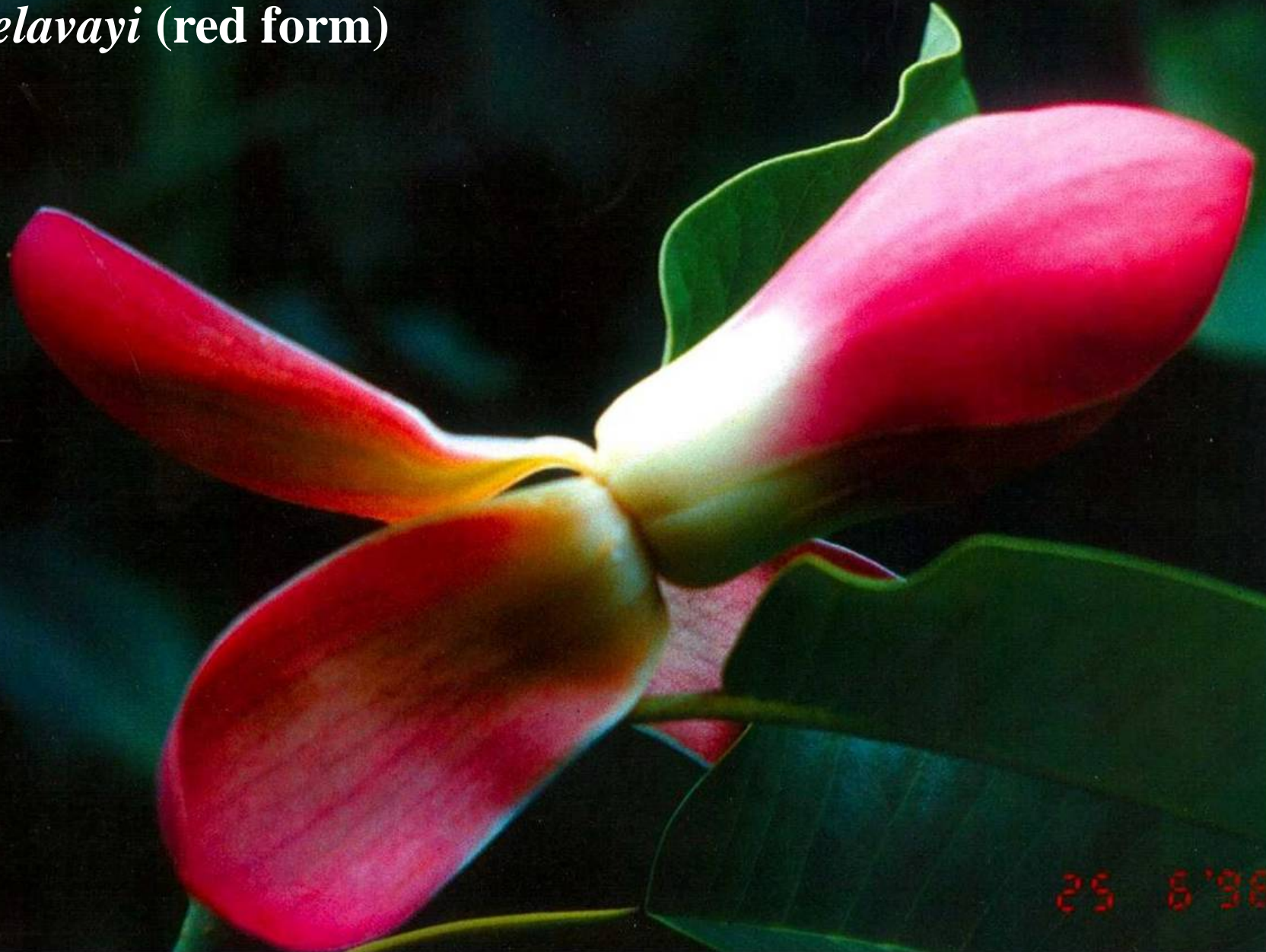
≈ 60cm × 20cm



*Manglietia lucida* (Type-tree)

*Magnolia* L. : 40 / 90 Species ( China / Total )

*M. delavayi* (red form)



*Magnolia henryi*





*Magnolia odoratissima*



*Magnolia phanerophlebia*



*Magnolia coco*

*Magnolia sargentiana*



*Magnolia officinalis*





*Magnolia biondii*





*Magnolia cylindrica*

*Magnolia liliiflora* (cultivar)



*Magnolia campbellii*



*Magnolia sprengeri*



*Michelia* L. : 70 / 80 Species ( China / Total )

*Michelia lacei*



*Michelia maudiae*



*Michelia yunnanensis*





*Michelia calcicola*



*Michelia guangdongensis*





*Michelia sphaerantha*

*Michelia floribunda*

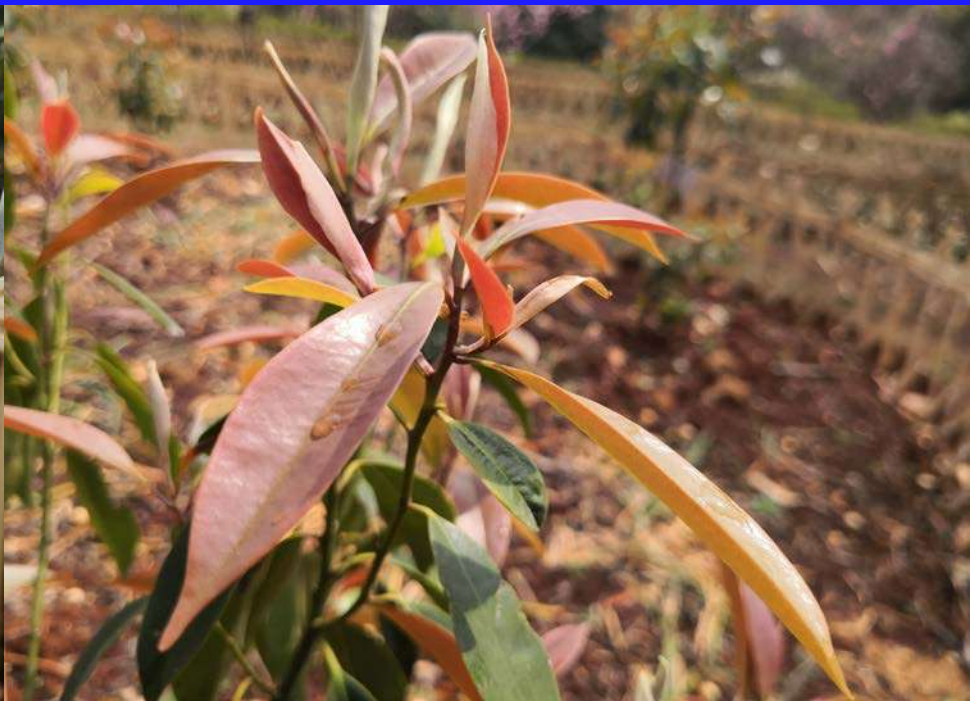
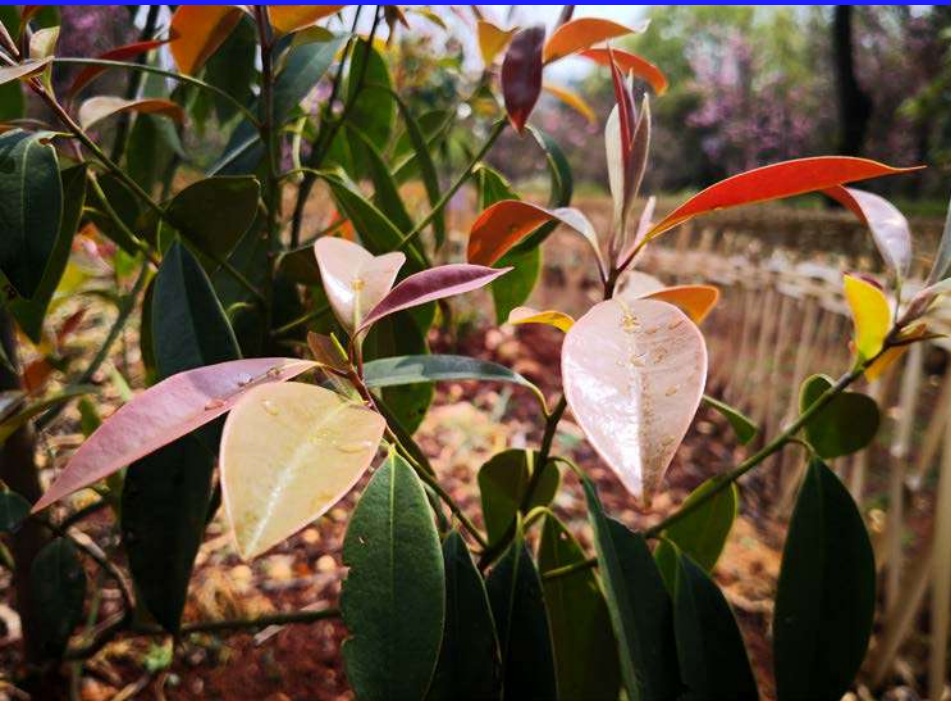


*Parakmeria* BL. : 5 / 5 Species ( **China** / Total )





*Parakmeria omeiensis*



*Manglieastrum sinicum* Law. : 1 / 1 Species ( **China** / Total )



***Kmeria* Dandy: 1 / 2 Species ( China / Total )**





*Tsoogiodendron* Chun: 1 / 1 Species ( China / Total )



*Tsoogiodendron odorum*



*Alcimandron* Danndy: 1 / 1 Species ( **China** / Total )



*Alcimandron cathcartii*



*Talauma* Juss.: 1 / 60 Species ( **China** / Total )



*Talauma hodgsonii*



# **Threatened Status of China's Magnoliaceae Plants**

# The National Protected Wild Plants of China (First Group-1999)

**National Protected Wild Plants of China (First Group)** Issued by the  
State Forestry Administration of China & Ministry of Agriculture of  
China in 9th September, 1999

(Approved by State Council of China in 4th August, 1999)

**246 species + 8 groups = 419 species**

**Grade-I : 67 species + Grade-II 352 Species**

**9 Genera with 23 species (8.75% of China): 5 species as Grade-I and  
18 species as grade-II**

**Grade-I:** *Alcimandra cathcardii*, *Kmeria septentrionalis*, *Manglietia  
decidua*, *Manglietiastrum sinicum*, *Parakmeria omeiensis*

## Threatened China's Higher Plants By IUCN Categories

Year	Species	EX	EW	RE	CR	EN	VU
2013	34450	27	10	15	583	1297	1887
2017	35784	21	9	10	614	1313	1952

Notes: Year 2013: Issued by China's MEP and CAS  
Year 2017: Published with *Biodiversity Science*

2013: 34450 species evaluated, 3767 threatened (10.93%)?

2017: 35784 species evaluated, 3879 threatened (10.84%)?

# Threatened China's Magnoliaceae Plants!!!

**Qin et al (2017, *Biodiversity Science*)**

**Total of 76 species are threatened: 10-CR + 26-EN + 40-VU  $\approx$  47.5%**

**Magnolia: 20 species (50.0%)**

**Manglietia: 24 species (51.1%)**

**Michelia: 24 species (34.3%)**

**10 CR:** *Magnolia odoratissima*, *Magnolia zenii*, *Magnolia sinostellata*,  
*Manglietiastrum sinicum*, *Parakmeria omeiensis*, *Manglietia longipedunculata*,  
*Manglietia glaucifolia*, *Manglietia crassipes*, *Michelia guangdongensis*, *Michelia angustiblona*

## List of PSESP (Plant Species with Extremely Small populations)

**National List (2012): 7 species**

**Yunnan Provincial List (2010): 10 species**

**SW CHINA (National Key Program-2017FY100100): 19 species**

**Conservation of China's  
Threatened Magnoliaceae  
Plants**



**Biodiversity Conservation?**

**Species Diversity**

**BIODIVERSITY**

**Genetic Diversity**

**Species Diversity  
Conservation....**

**Ecosystem Diversity**

# Which Plant Species are Urgently to be Conserved?

## Rare and Endangered Plant Species



```
graph LR; A[Rare and Endangered Plant Species] --- B[National Protected Wild Plants of China: First Group issued in 1999]; A --- C[Threatened Plant Species By Following IUCN: CR+EN+VU]; A --- D[Plant Species with Extremely Small Populations (PSESP): National and Provincial Levels (Since 2005)];
```

**National Protected Wild Plants of China:  
First Group issued in 1999**

**Threatened Plant Species By Following  
IUCN: CR+EN+VU**

**Plant Species with Extremely Small  
Populations (PSESP): National and  
Provincial Levels (Since 2005)**

# Integrative Conservation of Typical PSESP Plants??? of Magnoliaceae

- PSESP (Plant Species with Extremely Small Populations)
- First appeared in a proposal in 2005 (Sun, 2013; Ma *et al.*, 2013)

1. Small remaining populations ( Lower the MVP )
2. Restricted habitats
3. Exposure to a high level of disturbance (EHD)
4. A high risk of extinction
5. EHD is prerequisite qualify a species to be PSESP

## **A MVP (Minimum Viable Population):**

**.....is the smallest isolated population having a 99% chance of remaining extant for 1000 years.....(Shaffer, 1981. BioScience)**

- 1. Not an MVP threshold for all plant species**
- 2. Proposed 5000 mature individuals (each isolated population  $\leq$  500 mature individuals with exception of only one population (Sun, 2016; Yang and Sun, 2017; Sun et al., 2018))**
- 3. Mainly focusing on the species less than 1000 mature individuals**

# 云南省极小种群野生植物保护

## 实践探索

中国科学院昆明植物研究所昆明植物研究所编  
昆明植物研究所昆明植物研究所编  
中国科学院昆明植物研究所昆明植物研究所编



Sun WB(2013)

中国科学院昆明植物研究所  
昆明植物研究所编  
(昆明)

## *Conserving plant species with extremely small populations (PSESP) in China*

**Yongpeng Ma, Gao Chen, R. Edward Grumbine, Zhiling Dao, Weibang Sun & Huijun Guo (2013)**

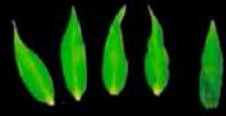
**Biodiversity and Conservation**

ISSN 0960-3115  
Volume 22  
Number 3

Biodivers Conserv (2013) 22:803-809  
DOI 10.1007/s10531-013-0434-3



 Springer



STUDY AND CONSERVATION OF PLANT SPECIES  
WITH EXTREMELY SMALL POPULATIONS (PSESP)  
IN YUNNAN PROVINCE, CHINA

# 云南省极小种群 野生植物研究与 保护

孙卫邦 杨静 刀志灵◎主编



科学出版社

Sun WB et al. (2019)

## Science & Society How a New Conservation Action Concept Has Accelerated Plant Conservation in China

Wei-Bang Sun,<sup>1,\*</sup>  
Yong-Peng Ma,<sup>1,\*</sup> and  
Stephen Blackmore<sup>2</sup>

Since 2005, a new conservation action concept has been implemented to address the most threatened plant species requiring priority conservation in China. The concept is now widely recognized at different levels of governmental departments and by the general public, and is leading to great achievements for plant conservation in China.

Despite much progress in the conservation of plants in China over recent decades, current efforts are still insufficient to protect China's high level of plant diversity [1]. In fact, only plants in 'The Wild Plant Species List for National Protection of China', issued in 1999, enjoy full legal protection, and plant conservation in China still faces great challenges. Recently, some 3879 higher plant species, representing just under 11% of the total flora, (which comprises 35 784 higher plants, including 30 068 angiosperms, 251 gymnosperms, 2244 lycophytes and ferns, and 3221 bryophytes), have been evaluated as threatened according to the World Conservation Union (IUCN) categories and criteria (following the IUCN Red List Version 3.1, second edition), and Guidelines for Application of IUCN Red List Criteria at Regional and National Levels (Version 4.0) [2]. Furthermore, of those 3879

threatened plant species, 21 are believed to be extinct (EX), nine are extinct in the wild (EW), and 10 are regionally extinct (RE) [2]. The threats leading to extinction range from rapid population growth (the total population has increased approximately 2.53 times since 1949), development following rapid economic growth, overexploitation of natural resources and the resulting degradation of habitats, as well as the stresses associated with global climate change. Other important challenges include knowing exactly which plants are the most threatened and in need of protection as a matter of priority, and making this knowledge readily accessible and easily understandable to government officials and local people. Together these factors greatly hinder the implementation of plant conservation action in China.

In response to these challenges, a new conservation action concept of 'plant species with extremely small populations' (PSESP), or 'Ji-Xiao Zhong-Qun Ye-Sheng Zhi-Wu' in Chinese, was proposed in 2005. It focuses on species that face an elevated risk of extinction, characterized by small remaining populations in restricted habitats and exposure to serious human disturbance [1]. When promoting conservation awareness of PSESP to government officers, local people, and nonconservation scientists, economic and scientific values are highlighted, such as crop improvement, medical and ornamental usage, and evolutionary significance of PSESP (Figure 1).

PSESP was conceived to address the most threatened plant species requiring urgent conservation actions, given the near impossibility of simultaneously developing conservation action plans for the nearly 4000 threatened plant species in China. Defined in terms clearly understandable to both government officials and local people, species qualify as

PSESP, if there are less than 5000 mature individuals in total and fewer than 500 mature individuals in each isolated population. This definition was based on both a review of literature addressing global minimum viable population (MVP), and consideration of conservation practices in China [3]. Having first been promulgated in Yunnan Province, which is home to over 50% of China's plant species [4], PSESP is now becoming more widely recognized at different levels in China's governmental departments and by the general public, leading to the implementation of several national and regional level conservation strategies and actions for conserving PSESP.

In March 2012, the 'National Level Implementation Plan of Rescuing and Conserving China's PSESP (2010-2015)' was jointly issued by China's State Forestry Administration and the National Development and Reform Commission. The implementation plan is a major milestone for the PSESP concept, because it specifies and assigns conservation priority to the first group of 120 PSESP that were selected based on their status as national or provincial key protected plants; their total number of individuals estimated at less than 5000, their restriction to only one or two known localities, and their great potential for economic or scientific values. As a consequence, accelerated financial support from both central and local governments has been invested to conserve PSESP. Between 2013 and 2017 three national key programs, with a total value of circa 80 million RMB (equivalent to 11.5 million US\$), have been funded by the Ministry of Science and Technology of China (MSTC) and the National Natural Science Foundation of China (NSFC). Based on these national key programs, more detailed information on population size and distribution, as well as potential threats, have been identified to all 120 PSESP. As a result, in situ and/or ex situ conservation activities are

*Trends in Plant Science*

Sun WB et al. (2019)

# Some typical PSESPs: Population Size < 100 individuals



*Pinus squamata*  
(37 individuals 1 site)



*Quercus sichourensis*  
(8 individuals 3 sites)



*Manglietiastrum sinicum*  
(52 individuals 5 sites)



*Paphiopedilum wenshanense*  
(1 location in SE Yunnan)



*Cypripedium lichiangense*  
(<30 individuals?)



*Nyssa yunnanensis*  
(8 individuals 2 sites)

# National Key Program “Survey and Germppasm Conservation of PSESP in Southwest China”(2017 FY100100) (2017-2021) (24.26 million RMB)

附件

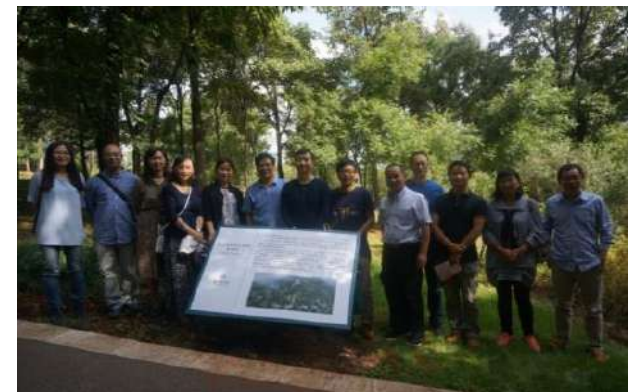
科技基础资源调查专项 2017 年立项项目清单

项目编号	项目名称	项目牵头承担单位	项目负责人	推荐部门
2017FY100100	中国西南地区极小种群野生植物调查与种质保存	中国科学院昆明植物研究所	孙卫邦	中国科学院
2017FY100200	中国荒漠主要植物群落调查	中国科学院寒区旱区环境与工程研究所	赵学勇	中国科学院
2017FY100300	中国湖泊微生物多样性及资源调查	中国科学院南京地理与湖泊研究所	陈非洲	中国科学院
2017FY100400	京津冀地区地下水饮用水源地基础资源环境状况调查	中国水利水电科学研究院	唐克旺	水利部
2017FY100500	中国积雪特性及分布调查	中国科学院寒区旱区环境与工程研究所	王建	中国科学院
2017FY100600	中国南方草地牧草资源调查	中国热带农业科学院热带作物品种资源研究所	白昌军	农业部
2017FY100700	红树林生物资源调查与重要种类 DNA 条形码库构建	中国科学院南海海洋研究所	王友辉	中国科学院
2017FY100800	西太平洋典型海山生态系统科学调查	中国科学院海洋研究所	徐奎桥	中国科学院
2017FY100900	中国南北过渡带综合科学考察	中国科学院地理科学与资源研究所	张百千	中国科学院
2017FY101000	中国沙漠变迁的地质记录和人类活动遗迹调查	浙江大学	杨小平	教育部
2017FY101100	中国 0-18 岁儿童营养与健康系统调查与应用	中国疾病预防控制中心营养与健康所	赵文华	国家卫生和计划生育委员会
2017FY101200	我国区域人群气象敏感性疾病科学调查	中国疾病预防控制中心环境与健康相关产品安全所	姚孝元	国家卫生和计划生育委员会
2017FY101300	中蒙俄国际经济走廊多学科联合考察	中国科学院地理科学与资源研究所	董锁成	中国科学院
2017FY201400	南海及其附属岛礁海洋科学考察历史资料系统编纂	中国科学院南海海洋研究所	龙丽娟	中国科学院



# First Key Lab Approved in 2017:

Yunnan Key Laboratory for Integrative Conservation of Plant Species with Extremely Small Populations (2018DG004) (1.0 million RMB/Year)



# The First Academic Committee Meeting



**THE FIRST ACADEMIC COMMITTEE MEETING WAS CONVENED ON  
3RD SEPTEMBER 2018**



**The First  
Innovation Team  
for Conservation  
and Utilization of  
PSESP Approved  
by Yunnan  
Government in  
2018 (1.0million  
RMB)**

团队（带头人：肖文）

14. 云南大学大湄公河次区域气候变化研究省创新团队（带头人：曹杰）

## 二、绿色食品及支撑绿色食品开发

### （一）绿色食品及相关产业

15. 西南林业大学高值木本油料种质新种质创制与产业化省创新团队（带头人：刘爱忠）

16. 云南省农业科学院甘蔗种质创新及新品种选育省创新团队（带头人：吴才文）

17. 云南农业大学畜禽健康养殖与品质安全省创新团队（带头人：贾俊静）

18. 云南大学多年生稻技术省创新团队（带头人：胡凤益）

### （二）支撑绿色食品开发

19. 昆明理工大学土壤环境与生态安全省创新团队（带头人：潘波）

20. 中国科学院昆明植物研究所山地农业生态系统省创新团队（带头人：许建初）

21. 中国科学院昆明植物研究所极小种群野生植物保护与利用省创新团队（带头人：孙卫邦）

## 二、绿色能源

22. 昆明理工大学光电功能材料省创新团队（带头人：邱建备）

23. 云南云铝涌鑫铝业有限公司水电铝绿色低碳新技术省创新团队（带头人：苏其军）

## 四、其他重点产业及领域

# New Ecological Redline Policy(ERP) Both National (MEP & NDRC: No.48 of 2017) and Provincial Levels

7th April 2016 (Yunnan)

## 1. 一级管控区（红线区）（Grade-1 Control Zone）

一级管控区是生态保护红线的核心区，实行最严格的管控措施，禁止一切形式的开发建设活动。具体范围包括：自然保护区的核心区和缓冲区、国家公园严格保护区和生态保育区、43个重点城市主要集中式饮用水水源地保护区一级保护区、牛栏江流域水源保护核心区、九大高原湖泊一级保护区、珍稀濒危、特有和极小种群等物种分布的栖息地等，以及其他需要纳入一级管控区的区域。

**Habitats for SESP (Species with Extremely Small Populations)**

云南省第十三届人民代表大会常务委员公告  
(第八号)

《云南省生物多样性保护条例》已由云南省第十三届人民代表大会常务委员第五次会于2018年9月21日审议通过,现予公布,自2019年1月1日起施行。

云南省人民代表大会常务委员会  
2018年9月21日

第一章 总则

第一条 为了保护和合理利用生物多样性,维护生态安全,促进经济社会可持续发展,根据有关法律、法规,结合本省实际,制定本条例。

# 云南省生物多样性保护条例

(2018年9月21日云南省第十三届人民代表大会常务委员第五次会审议通过)

氛围。

新闻媒体应当开展生物多样性保护法律法规和有关保护知识的宣传,对违法行为进行舆论监督。

第八条 县级以上人民政府环境保护主管部门,对本行政区域内生物多样性保护工作实施综合管理。

县级以上人民政府林业、农业、水利、住房城乡建设、国土资源、卫生等行政主管部门依照有关法律法规的规定,对生物多样性保护工作实施监督管理。

生物多样性保护的投入力度,将生物多样性的保护和管理经费列入本级财政预算,支持生物多样性保护基础设施、能力建设等。

鼓励、支持、引导社会资金参与生物多样性保护。

第十七条 各级人民政府应当加强区域协作,建立健全生物多样性保护的信息共享、预警预报、应急处置、协同联动等工作机制。

支持在生物多样性保护领域开展科学研究,鼓励、支持企业、社会组织

个人对野生生物物种进行采集、收购、野外考察或者携带、邮寄出境,应当遵守有关法律法规规定;有关主管部门应当建立健全信息共享机制,及时通报相关情况。

第二十四条 任何单位和个人不得擅自向自然保护区引进外来物种,确需引进的,应当依法办理审批手续,并按照有关技术规范进行试验。

第二十五条 禁止扩散、放生或者丢弃外来物种、入侵物种和有害生物。

的内容、方式、期限,必要时可以在一定范围内采取封闭保护措施。

## 第五章 公众参与和惠益分享

第三十一条 县级以上人民政府环境保护主管部门和其他负有生物多样性保护管理职责的部门,应当按照权限依法公开生物多样性保护有关信息,完善公众参与程序,为公民、法人和其他组织参与和监督生物多样性保护提供便利。

的其他行为,由有关行政主管部门按照相关法律、法规的规定处理。

## 第七章 附则

第三十九条 本条例中下列用语的含义:

(一)生态系统,是指植物、动物和微生物群落和它们的非生命环境作为一个生态单元交互作用形成的一个动态复合体;

(二)惠益分享,是指公正和公平分享利用生物遗传资源等生物多样性组成部分而产生的惠益,包括货币和非货币惠益、科技成果、技术转让和能力建设等;

(三)生物物种名录,是指有关生物多样性科研机构组织相关领域

## 第三章 物种和基因多样性保护

第十八条 县级以上人民政府应当加强对本行政区域内野生生物物种及其遗传资源的保护,完善就地保护、迁地保护、离体保存相结合的生物多样性保护体系和保护网络,对珍稀濒危物种、极小种群物种实施抢救性保护,对云南特有物种和在中国仅分布于云南的物种实施重点保护。

(七)极小种群物种,是指分布地域狭窄或者呈间断分布,长期受到外界因素胁迫干扰,呈现出种群退化和数量持续减少,种群及个体数量都极少,已经低于稳定存活界限的最小生存种群,而随时濒临灭绝的野生动植物种类;

## Regulations on Biodiversity Conservation in Yunnan: Approved on 21 Sept., 2018

In Total: 7 Chapters with 39 articles

Chapter 3: Conservation of genetic & species diversity

--- Rescuing SESP(Species with extremely Small populations) & Rare and threatened species

Chapter 7: Supplementary Article  
--- No.7: Definition of SESP

Extremely Important!

# Ex Situ Conservation

EX SITU CULTIVATED FLORA OF CHINA  
中国迁地栽培植物志

木兰科

主编 黄宏文

本卷主编 杨科明 陈新兰 龚 洵 王亚玲



科学出版社

10/2015

## Total of 147 species

(incl. 1 subsp., 7 varieties and 3 hybrids)

134 CHINA's Native Species (91.2%)

National Protected Species (1999):

All 23 species

Grade-I: 5 Grade-II: 18

Threatened Species in 2017 List:

67/76 ( 88.2 %)

CR-8 +EN-22+VU-37

PSESP (Plant Species with Extremely Small Populations)

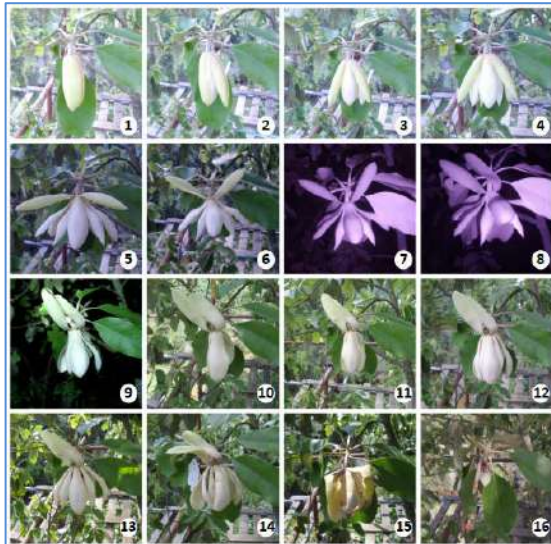
CHINA: All 7 species

YUNNAN: All 10 species

SW China: All 19 species

Integrative Conservation [Surveys+*In-situ* micro-reserves+Researches+*Ex-situ*+Restorations (Populations and Habitats) ].....

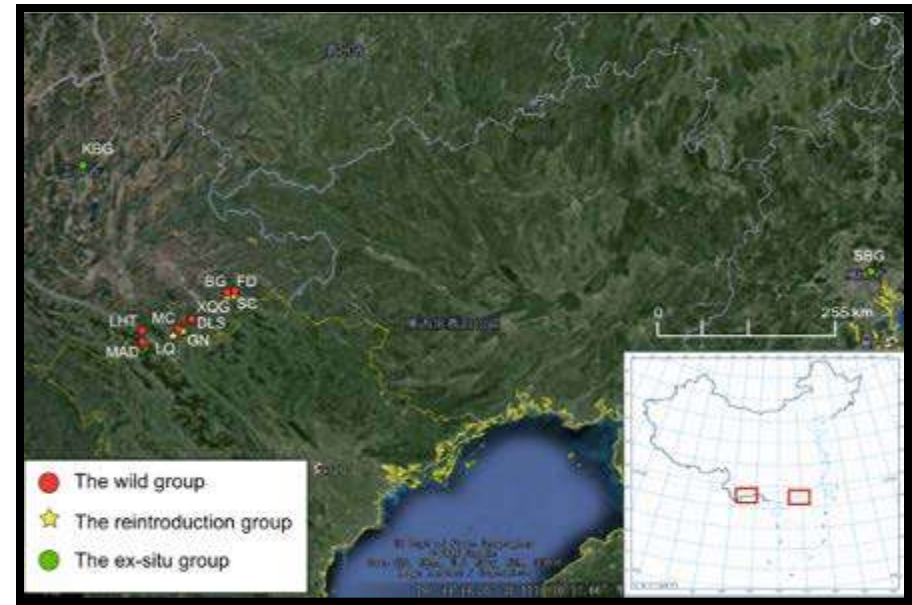
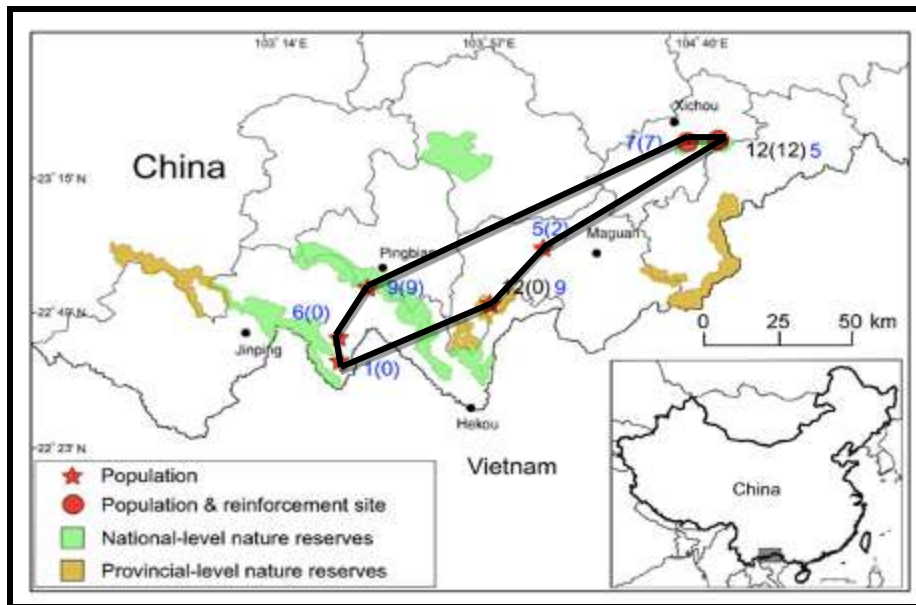
**Four Species** of *Magnolia phanerophlebia*, *Manglietia ventii*, *Manglietiastrum sinicum* and *Parakmeria omeiensis*



**Integrative conservation of *Manglietia ventii* ( Reproductive biology + *Ex situ* + *In situ* )**

# Case: *Manglietiastrum Sinuicum* (Law, 1979)

Zheng & Sun (2009) Sun (2012) 、 Wang et al (2015)、 Chen et al (2016)、 Chen(2017)



Distr. 794.18 km<sup>2</sup>; **52 individuals in total [16 (1983) & 37 (2012) ]**; 4 Reintroductions and 2 ex-situ conservations





**SINCE IN THE GARDEN**



Starting to flower after 30 years *ex-situ* cultivation at Kunming BG (2013)



**Reintroduction/Reinforcement Base-I XQS  
in SE YUNNAN (2007)**

**E 104° 41' 27" , N23° 21' 51" &  
Altitude of 1600 m (by the type trees)**



# 云南金平分水岭国家级自然保护区 极小种群野生植物保护

金平分水岭国家级自然保护区 刘杰勇

2014年5月，在云南省林业厅支持下，金平分水岭国家级自然保护区管理局对金平县现有分布的极小种群野生植物华盖木和毛果木莲保护项目取得诸多进展。项目地点选择在金平县马鞍底乡瓦窑河一中良片区，即华盖木、毛果木莲极小种群野生保护物种分布比较集中的区域。

保护地体系的建设。建立野生华盖木、毛果木莲极小种群保护小区，划定面积和范围。建设标桩（牌）、防护栏、巡护路、管护房等极小种群物种保护管理所必要的基础设施，购置相关拯救保护设备等。目前已完成华盖木、毛果木莲极小种群保护区小区界碑（100棵）与宣传碑（5块）

的制作和埋设工作。

建立极小种群野生植物近地保护基地。建设近地保护园，采用混合采集的方式采集种子等繁殖材料，建立健康的近地保护群。建立极小种群野生植物回归基地，开展物种回归实验。目前已实施毛果木莲极小种群保护物种近地回归。2015年年初建立苗圃基地（2亩）并实施育苗。回归地点在中良村委会虎恋山村民小组集体林内（海拔1331m，阳坡），现有树种有喜树、木荷、人工杉木林、桧木、马蹄荷、乌桕、槲木、三丫苦、黄毛榕、人工竹类及野生芭蕉等，面积约20亩。回归毛果木莲387株，一年生植株，平均地径0.5cm，平均苗高

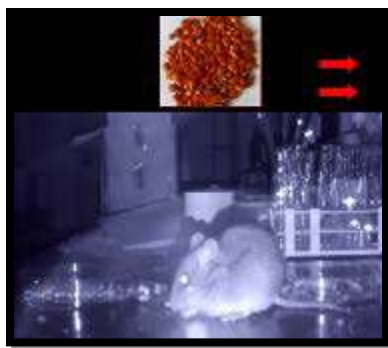
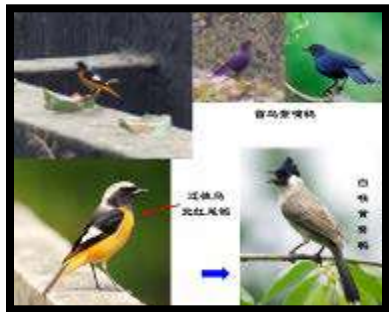
30cm。回归苗木由虎恋山村民小组进行管理，由局研究所负责监测。

通过该拯救保护措施的实施，以点带面，以局部带动全局，推动金平县境内极小种群物种保护工作进入常态，使野生植物保护管理工作迈进新台阶。使保护小区内极小种群野生保护物种的原生地和生境得到有效的就地保护。对华盖木和毛果木莲极小种群野生保护物种建立近地保护种群，扩大种群规模，实现野外回归自然试验示范。后期将对华盖木和毛果木莲极小种群野生植物的所有个体全部进行编目、挂牌和建档，建立数字化监测体系和保护管理信息系统。

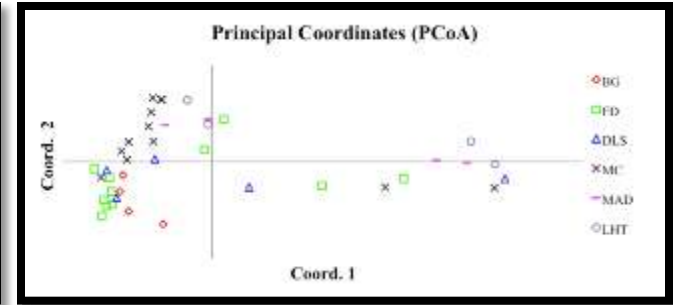
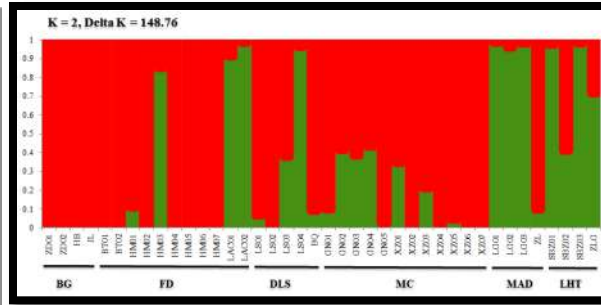


*An in-situ Micro-reserve for Manglietiastrum sincum (Magnolia sinica) and Manglietia ventii*

# Biology & Ecology: Flowering --- Fruiting --- seed dispersal --- seed germination in the wild/Botanical Garden



# Genetic Diversity and Genetic Structure (SSR)



Population	$N_A$	$N_E$	$I$	$H_O$	$H_E$	$A_R$	$A_P$	$F_{is}$	PPB
XQG	2.850	2.128	0.736	0.426	0.315	1.437	0.150	0.243	95%
SC	2.650	1.908	0.649	0.386	0.384	1.400	0.100	0.071	90%
GN	3.150	1.956	0.747	0.420	0.310	1.437	0.200	0.296	100%
LQ	3.350	2.389	0.856	0.472	0.386	1.505	0.900	0.132	90%
Mean	3.000	2.095	0.747	0.426	0.349	1.445	-	0.186	93.75%

Population	$N_A$	$N_E$	$I$	$H_O$	$H_E$	$A_R$	$A_P$	$F_{is}$	PPB
KBG	4.050	2.185	0.846	0.459	0.384	1.468	2.250	0.202	100%
SBG	1.900	1.340	0.316	0.187	0.176	1.198	0.100	0.087	50%
Mean	2.975	1.763	0.581	0.323	0.280	1.333	-	0.145	75%

**Total:**  
**152 individuals**

□ 40 individuals from 6 localities

□ 74 individuals from 4 reintroductions

□ 38 from 2 BGs (*ex-situ*)

## **Wild group :**

1. High genetic diversity ( $PPB = 92.5\%$ 、 $H_E = 0.423$ 、 $I = 0.825$ ) and lower differentiation among populations
2. High inbreeding rate, Inbreeding depression may affect levels of genetic diversity after several generations

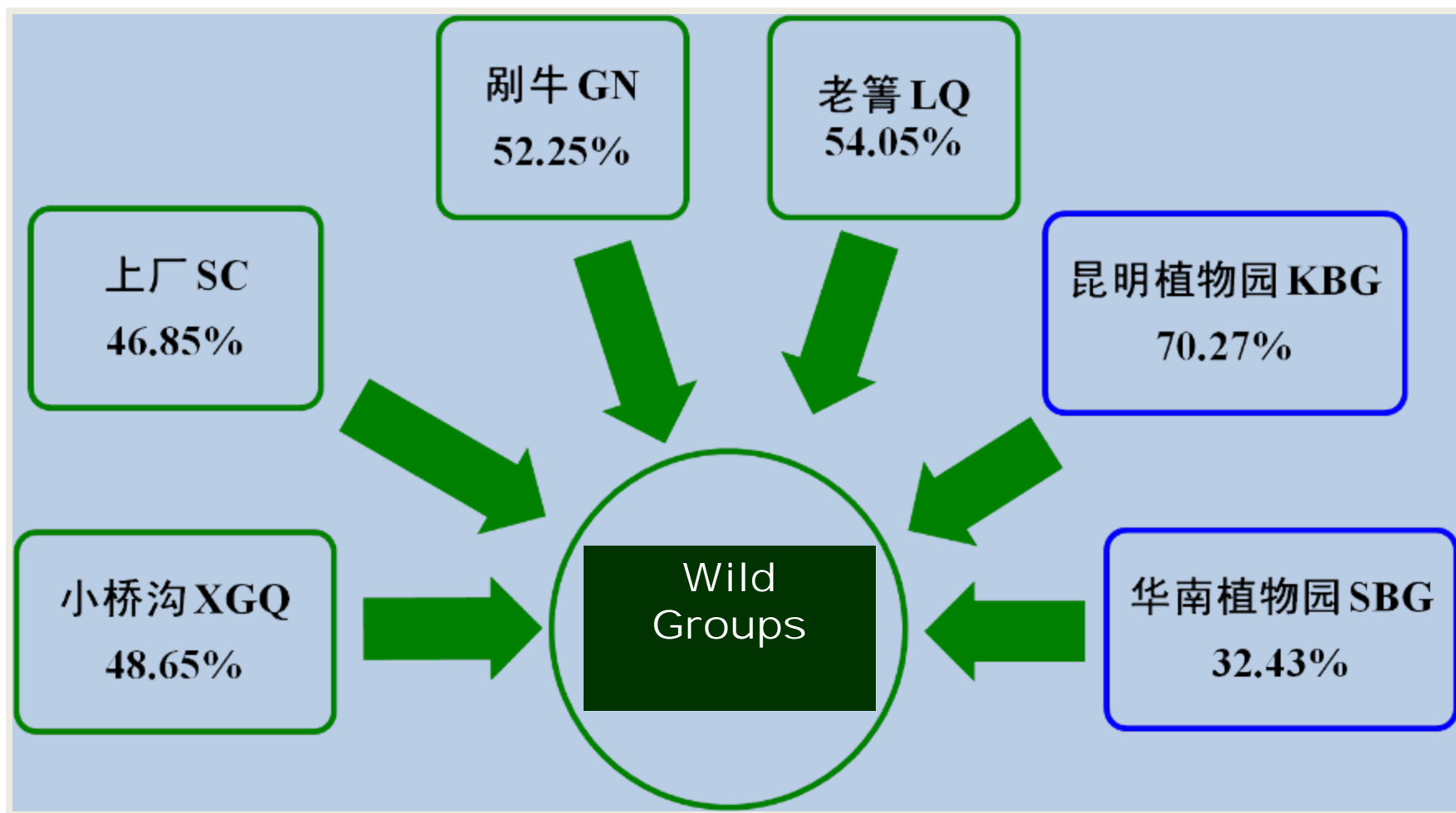
## **Reintroduced group :**

1. A total of 89 alleles were detected, with an average of 4.45 alleles per locus, and an effective number of 2.418
2. Population LQ has the highest genetic diversity, while the population SC has the lowest genetic diversity

## ***Ex-situ* group :**

1. A total of 83 alleles were detected, with an average of 4.15 alleles per locus, and an effective number of 2.056
2. The genetic diversity of Kunming Botanical Garden is higher than that of Southern China Botanical Garden

**Recent human activities should be the main reason for fragmentation and habitat destruction**



**Genetic Diversity of Reintroduced and *Ex-Situ* conserved groups**



# Future Protection Measures

- 1. *In-situ* :** Strengthen the protection of the existing populations and the habitats. Scientifically establishing the conservation sites to promote rapid recovery of populations
- 2. Further Seed collecting strategies :** Key populations of MAD, FD and LHD.
- 3. Non-fruiting individuals and in-mature trees (9 plants) :** Collecting the vegetative organs of all individuals for propagating and in-vitro preservation.

# SUMMARY/FUTURE WORK?

- China has rich species of Magnoliaceae, it takes **69% Genera & 53% Species** of the Global Total
- 76 species are threatened (**47.5%**) (**2017**), and 23 species (**8.75%**) (**1999**) and 7 species (**2012**) were in lists of national wild protected plants and the PSESP (Plant Species with Extremely Small populations) respectively
- **88.2%**( **67/76**) of threated species, **all** national wild protected and PSESP Species have been *Ex-situ Conserved* in China's BGs, and **4 typical PSESP** have been comprehensively studied and **integrative conserved**

# SUMMARY/FUTURE WORK?

- **Evaluation** of conservation effectiveness (based on **genetic diversity** research) **is urgently required** for supporting further conservation planning and actions
  
- **Restoration of Population and habitat is “A VERY LONG -TERM WOR”...Funding, Policy Supporting.....are all important!!!**





Kunming Botanical Garden  
Chinese Academy of Sciences, Kunming  
650204, China  
May 7th, 2019

Invitation

Neotropical Conservation Consortium for *Magnolia* and Workshop Conservation Horticulture for  
Magnolias, Guadalajara, México, 8 – 14 July, 2019

Dear Dr Weibang Sun,

Botanic Gardens Conservation International (BGCI), in collaboration with the University of Guadalajara, México, are organizing the first Neotropical Conservation Consortium for *Magnolia* to exchange recent scientific and horticultural techniques progress, enhance the conservation and sustainable utilization of magnolias and promote cooperative research worldwide. The proposed scheduled for this international event is:

- July 8-9, **Workshop Conservation Horticulture for Magnolias** where participants will have the opportunity of learning about different *Magnolia* propagation techniques (including micropropagation and cryopreservation).
- July 10, **Scientific Session** focusing in recent development for the areas of Taxonomy, Phylogeny, Morphology, Molecular Biology, Genetics and Physiology.
- July 11, **Conservation Session and Consortium** focusing in practical conservation projects worldwide and initiating the development of a *Magnolia* Consortium with the aim of implementing a comprehensive conservation plan for *Magnolia* that encompasses *in situ* and *ex situ* conservation in countries of origin.
- July 12-14, **Post-Symposium Excursion** visiting the sites of three highly threatened Magnolias in the Jalisco state.

As an important member of the *Magnolia* research and conservation community, you are cordially invited to participate in this event as a Key speaker for the Conservation Session and Consortium.

Your accommodation and meals will be covered by BGCI. Kindly confirm your attendance so that the necessary logistical arrangements can be made in time. If you have any questions, please contact BGCI ([noelia.alvarez@bgci.org](mailto:noelia.alvarez@bgci.org)).

We look forward to welcoming you soon to the University of Guadalajara, in July 2019.

*Joachim Gratzfeld*

Joachim Gratzfeld  
Director of Regional Programmes;  
BGCI, UK

*J. Antonio Vázquez-García*

Prof. J. Antonio Vázquez-García  
Professor of Plant Systematics and Ecology;  
University of Guadalajara, México

**Many Thanks to  
Joachim Gratzfeld  
and Noelia Alvarez  
de Roman from BGCI**

**AND**

**Prof. Antonio  
Vazquez-Garcia from  
Guadalajara  
University for  
Inviting me to attend  
this important  
Symposium!!!**



**Thanks to all members & families in my PSESP group: for their years' contributions**



KUNMING BOTANICAL GARDEN

**THANK YOU VERY MUCH FOR  
YOUR ATTENTIONS!!**