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Rare and Endangered Plant Conservation in Chinese Botanical Gardens[1]
- The Construction and Analysis of Database of Rare and Endangered Plants -

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중국 식물원에서 희귀 및 멸종위기 식물의 보전[1]
-희귀 및 멸종위기 식물의 데이터베이스 구축 및 분석-

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ABSTRACT

There are more than 100 botanical gardens in China; most of the Chinese botanical gardens collected Chinese rare and endangered plant germplasm resources in the garden. In 1999, the author developed the Database system(REPC-CBG-DATA) to promote the *ex situ* conservation and relevant conservation actions. All the collected germpalsm resources for the Chinese rare and endangered plant in Chinese botanical gardens were documented in the REPC-CBG-DATA, and this documented data is crucial to the conservation and management in the botanical gardens. The management of the target plant species using by the REPC-CBG-DATA was discussed.

KEY WORDS : CONSTRUCTION, DATABASE, RARE PLANT, CONSERVATION, BOTANICAL GARDENS, CHINA

요 약

현재 중국에는 100개 이상의 식물원이 있으며, 대부분의 식물원은 희귀식물이나 멸종위기 식물의 생식질 자원을 보유하고 있다. 중국의 식물원에서 현지 외 보전과 이와 관련한 일을 수행하기 위하여 1999년에 REPC-CBG-DATA라는 데이터베이스를 구축하였다. 본 데이터베이스 구축 결과에 따라 중국 내 389종의 희귀 및 멸종위기 식물에 대한 다양한 정보와 보전상태를 분류하였으며, 이를 토대로 관리보전에 활용할 수 있게 되었다. 본 논문에서는 중국 내 희귀 및 멸종위기 식물의 보전을 위하여 각 식물원에 수집된 식물종을 대상으로 REPC-CBG-DATA를 바탕으로 각 해당 식물종의 관리에 대하여 토론하였다.

주요어 : 구축, 데이터베이스, 희귀식물, 보전, 식물원, 중국

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INTRODUCTION

The establishment and management of database concerning the rare and endangered plant conservation are of fundamental importance in the biodiversity conservation. The constructed database can provide an efficient way for the Chinese botanical gardens and arboreta to co-ordinate conservation actions all over China and academic exchange with international botanical gardens. It can also effectively to evaluate the conservation values of rare and endangered plants and evaluate the roles of Chinese Botanical Gardens in rare and endangered plant conservation.

The aim of the database is in the follows:

1. The establishment of the database can guide successful use of the rare and endangered plants in Chinese botanical gardens and arboreta.
2. This database can improve the recognition and incorporation of the values of rare and endangered plants in local, regional and national planning.
3. It takes the role of coordination among all the Chinese botanical gardens for effectively *ex situ* conservation to the rare and endangered plants.
4. Chinese botanical gardens and arboreta has a priviledge to special responsibility to conserve the endangered plant species that inputted in this database because the most Chinese species are found nowhere else.

RESEARCH METHODS

1. Data Collection

There are some literatures on the conservation of rare and endangered plants have been reported(He, 1990, 1993; Sheng, 1986). As some Chinese botanical gardens and arboreta have been developed their own database systems seperately, so the research methods have been taken following ways:

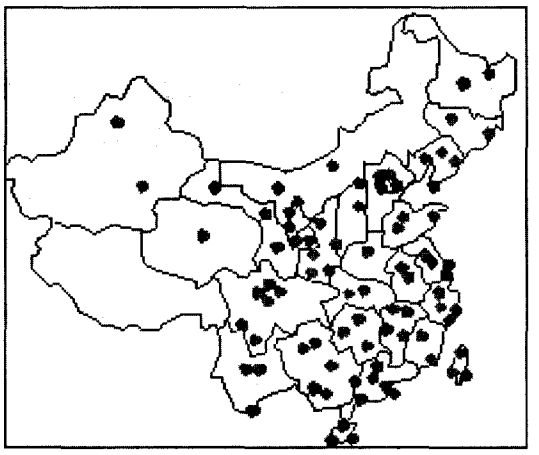

Figure 1. Distribution map of Chinese botanical gardens and arboreta

1) Review of both literature and database in Beijing Botanical Garden and Nanjing Botanical Garden.

2) Questionnaire to Chinese botanical gardens and arboreta was carried out in 100 botanical gardens and arboreta, and questions asked including the followings: the conservation species in different botanical gardens and the data on locality and climate factors of each botanical gardens and arboreta.

3) Personal visits to some leading botanical gardens and arboreta.

2. Database Construction

The REPC-CBG-DATA(Rare and Endangered Plant Conservation in Chinese Botanical Gardens Database) designed mainly using the Microsoft Excel(Zhang, 1999). American Microsoft Corporation developed the Microsoft (MS) Excel software. It has clear evidence that help us to arrange the data, perform calculations, and even display charts that illustrate the relationships in numerical data. All the establishment and analysis of the REPC-CBG-DATA stored in the Excel environment, some analyses were helped in Microsoft Access Software that used as the data matrix inversion.

This database contains comprehensive

information such as the Latin name, family name, English name, and the Chinese names of 389 rare and endangered plants are imported to the database(Editorial Committee of Flora of China, 1994, 1998; Guan *et al.*, 1986; National Environmental Protection Bureau of China, 1987, 1994). The database also includes the threatened category and national protection category of rare and endangered plants. The vertical distribution, value of utilization, suggested conservation methods and propagation methods were comprised in this database. The *Ex situ* conservation status of rare and endangered plant species in Chinese botanical gardens and arboreta shows clearly displayed in this database.

Take *Camellia chrysantha* as an example, the structure of database of rare and endangered plant conservation in Chinese Botanical Gardens and Arboreta is shown in Table 1.

3. Database analysis

The analysis used the calculation function of the Microsoft Excel combined the calculation and transition function of the Microsoft Access to induce several conclusions to guide the *ex situ* conservation.

RESULTS AND DISCUSSION

The database building of rare and endangered plant conservation in Chinese Botanical Gardens and arboreta was collected all the data on the 389 species(Appendix 3) and their *ex situ* conservation status at this moment. Several conclusions can be inferred from its analysis: (Bao, 1994; Cai, 1989; He *et al.*, 1990, 1993; Walter, 1998).

The sequence of number of different Chinese Botanical Gardens and arboreta in rare and endangered plant conservation supported the importance of each botanical garden in *ex situ* conservation. There are more than 100 botanical gardens and arboreta in China, their roles in the rare and endangered plant conservation are different. Some botanical gardens and arboreta take the leading

Table 1. The main content databased for the rare and endangered plant conservation in Chinese botanical gardens and arboreta

No.	Latin Name	Family	English Name	German Name	Chinese Name	Threatened Category	National Protection Category	Natural Distribution (Province)	Vertical Distribution	Value of Utilization
50	*Camellia chrysantha* (Hu) Tuyama	Theaceae	Yellow Camellia	Gelb Kamelie	金花茶 (jinhuacha)	Rare	1	Guangxi; Vietnam	50-500	rare and valuable ornamental plant, germplasm resources for camellia breeding

Table 1. (Continued)

Suggested Conservation Methods	Propagation Methods	*Ex situ* Conservation
Have been protected in nature reserves, need extend introduction and plantation	seed, crafting, cutting, air laying, tissue cultivation	GLBG, GXMBG, ZSFIA, KMBG, ZJAUA, XSBNBG, HNFBG, NYA, GNA, BJBG (S), BJMBG, LSBG, HXSBG, JNBG, NJBG, WHBG, CDBG, JJREPP, SCTCIBG, SHBG, XMBG

* See the Appendix 1 and 2 for the name of abbreviation to the Chinese Botanical Gardens and arboreta

Table 2. The Sequence of the number of species conservation

Sequence	Abbreviation	Botanical Garden	Number of endangered Species Conserved
1	GLBG	Guilin Botanical Garden	125
2	SCBG	South China(Huanan) Botanical Garden	107
3	JJREPP	Jiujiang Rare & Endangered Plant Pool	93
4	LSBG	Lushan Botanical Garden	84
5	SHBG	Shanghai Botanical Garden	83
6	HNFBG	Hunan Forest Botanical Garden	79
7	KMBG	Kunming Botanical Garden	79
8	NJBG	Nanjing Sun Yat-sen Botanical Garden	78
9	XSBNTBG	Xishuangbanna Tropical Botanical Garden	77
10	WHBG	Wuhan Botanical Garden	72

roles in the conservation of rare and endangered species, for example, Guilin Botanical Garden, South China(Huanan) Botanical Garden, Jiujiang Rare & Endangered Plant Pool, each of them have conserved more than 100 species. Some of them are still less enthusiastic on this research field.

The sequence of security of rare and endangered plant conservation can be deduced from the database analysis. Among the 389 rare and endangered species, some species have been conserved in many botanical gardens, but many are not yet protected in any botanical gardens. Some of these species are very important or possess the future options.

The unconserved rare and endangered species in Chinese Botanical Gardens come to our view. Among the 389 rare and endangered plants, there are still 64 species threatened with extinction due to no botanical garden introduced and conserved them. Take *Abies beshanzuensis* as an example: this species is one of the most rare in the genus (there are about 50 species in this genus). As a

Table 3. The sequence of security of rare and endangered plant conservation

Plant Name	*Ex Situ* Conservation	Number of Botanical Gardens where spp. is conserved
Ginkgo biloba Linn.	SCBG, SYIAEA, JXIFSA, KMBG, SPTBG, BJBG (N), BJEBG, MJSA, ZSFIA, XJA, NJMBG, LZBG, HZBG, JGSBG, LSBG, ZZHHBG, YAA, ZJAUA, IMGFAA, HNFBG, GNA, GLBG, GXMBG, MQPBG, XABG, HLTA, HNNLBG, YCBG, HXSBG, NYA, BJMBG, QTBG, JNBG, NJBG, GNA, WHBG, GZIFSA, CDBG, JJREPP, DLBG, MMBG, SHBG, NNA	42
Metasequoia glyptostroboides Hu et Cheng	GXMBG, HNNLBG, YCBG, BJBG (S, N), BJMBG, BJEBG, SPTBG, JXIFSA, LSBG, NYA, HLTA, ZSFIA, DHSA, XJA, ZJAUA, YAA, GLBG, XSBNBG, MJSA, GNA, HNFBG, XABG, WHBG, SCBG, ZZHHBG, JNBG, QTBG, NJBG, GZIFSA, JGSBG, CDBG, JJREPP, DLBG, MMBG, SHBG, NNA, XMBG	39

Table 3. (Continued)

Plant Name	*Ex Situ* Conservation	Number of Botanical Gardens where spp. is conserved
Eucommia ulmoides Oliv.	NYA, HLTA, HNFBG, XABG, LSBG, GLBG, HNNLBG, KMBG, JGSBG, HZBG, JSA, ZJAUA, SCBG, BJBG (S, N), BJEBG, ZSFIA, ZZHHBG, GXMBG, BJMBG, NJMBG, LZBG, NJMBG, WHBG, JXIFSA, HXSBG, XJA, GNA, YCBG, ZJAUA, YAA, QTBG, JNBG, NJBG, GZIFSA, DLBG, MMBG, SHBG, NNA, XMBG	37
Liriodendron chinensis (Hemsl.) Sarg.	ZJAUA, ZZHHBG, HNFBG, GNA, BJBG (S, N), BJMBG, GXMBG, HXSBG, WHBG, JXIFSA, SCBG, KMBG, SYIAEA, HZBG, NYA, XABG, ZSFIA, HNNLBG, LSBG, GLBG, QTBG, JNBG, NJBG, GZIFSA, JGSBG, CDBG, JJREPP, MMBG, SHBG, NNA, DLBG	32
Pseudolarix kaempferi (Lindl.) Gord. (*Pseudo-larix amabilis* (Nelson) Rehd.))	NYA, NJMBG, YAA, MJSA, JXIFSA, XSBNBG, GLBG, SCBG, HZBG, HNNLBG, GNA, YCBG, WHBG, ZJAUA, XJA, ZSFIA, BJBG (S), BJMBG, BJEBG, HXSBG, LSBG, QTBG, NJBG, GZIFSA, JGSBG, XABG, CDBG, JJREPP, SHBG, NNA	30
Phellodendron amurense Rupr.	YCBG, BJBG (S), BJMBG, XJA, YAA, URMQBG, WHBG, ZJAUA, HLJFBG, ZZHHBG, HXSBG, IMGFAA, NJMBG, SCBG, HLTA, LSBG, QTBG, JNBG, NJBG, GNA, CDBG, JJREPP, DLBG, MMBG, SHBG, MJSA, XMBG	27
Cercidiphyllum japonicum Sieb. Et Zucc	BJBG (N), WHBG, BJBG (S), SCBG, JXIFSA, XABG, KMBG, HXSBG, GNA, NYA, HNFBG, MJSA, HZBG, LSBG, GLBG, BJEBG, YCBG, ZZHHBG, JNBG, NJBG, GZIFSA, JGSBG, CDBG, JJREPP, SHBG, BJBG	25
Magnolia officinalis Redh. Et Wils.	XABG, LSBG, ZZHHBG, GXMBG, MJSA, ZJAUA, HXSBG, GNA, GLBG, NYA, ZSFIA, WHBG, KMBG, JXIFSA, BJMBG, QTBG, JNBG, NJBG, JGSBG, CDBG, JJREPP, SHBG, SCBG, HNNLBG, NNA, XMBG	25
Magnolia officinalis ssp. *Biloba* (Redh. et Wils.) Cheng et Law	XABG, LSBG, ZZHHBG, GXMBG, MJSA, ZJAUA, HXSBG, GNA, GLBG, NYA, WHBG, JXIFSA, SCBG, JGSBG, HNNLBG, BJBG (S, N), HZBG, BJMBG, NJBG, GZIFSA, CDBG, JJREPP, SHBG, NNA, KMBG	24
Pteroceltis tatarinowii Maxim.	BJBG, GNA, HZBG, BJBG (S, N), BJEBG, LSBG, WHBG, NYA, GLBG, XABG, JGSBG, YCBG, SCBG, ZZHHBG, HNFBG, ZJAUA, JNBG, NJBG, CDBG, JJREPP, DLBG, SHBG, HNNLBG	24

relict species of Anthropogene(quaternary), only 4 plants exist in Beshanzu Nature Reserve, Zhejiang Province, China. Some botanists think it as "living fossil" and were listed as the most rare species by IUCN-SSC(Species Survival Commissions). So it is important for plant research that is carried out on primitive plants in East China Sea coast and whole biosphere, the origin and development of flora as well as the ancient geography, geology and climate changes. There is still no way found to solve the propagation problems. Table 4 is only show several species and these species are suggested to conserve in some botanical gardens that with similar geology and climate conditions.

Some rare and endangered plants that only *ex situ* conserved in limited botanical gardens need extend introduction. Among the 389 rare and endangered species, some species have been protected in many botanical gardens, but many are not yet protected in any botanical gardens. Some of these species are very important or possess the future options. Some species is conserved in the very limited botanical gardens(Table 5). It is suggested the extend conservation in some botanical gardens that with similar geological and climate conditions.

The relict plants are worth extending conservation. There are many relict plants grow in China. Most of them grow in the most fragile ecosystems. As the Ice Age came to a close and the Hipsothermal period (with temperatures warmer than today) began, these rare plants were able to survive here only under the special geographical conditions. In these isolated pockets, they have persisted for thousands of years without overrun by common native plants. Like living museums, these diverse natural areas add immensely to our understanding of China natural heritage. Some relict plants have been wildly planted for 1 to 2 centuries, for example, *Ginkgo biloba*, *Metasequoia glyptostroboides*, and *Davidia involucrata* var. *involucrata*, etc.

Table 4. Unconserved species in Chinese botanical gardens

No.	Name	Suggest to conservation
1	*Betula halopylla* Ching ex P. C. Li	TRPEBG, URMQBG
2	*Abies fanjingshanensis* W. L. Huang,Y. L. Tu et S. Z. Fang	GZBG, GZIFSA, CDBG, QQOPG, SCMBG, KMBG
3	*Aconitum brachypodum* Diels	KMBG, KMHLBG, CDBG, QQOPG, JYSBG, SCMBG
4	*Amentotaxus formosana* Li	HCBG, TBBG, FSBG
5	*Aptereoperma oblata* H. T. Chang	HCBG, TBBG, FZBG, XMBG, HNTEBG, SCBG, DHSA, SZBG, GLBG, GXMBG, GXKA, NNA, XSBNTBG, FSBG
6	*Archangiopteris henryi* Christ et Gies	KMBG, KMHLBG, XSBNTBG
7	*Archiboehmeria atrata* (Gagnap.) C. J. Chen (*Debregeasia atrata* (Gagnep))	HCBG, TBBG, FZBG, XMBG, HNTEBG, SCBG, DHSA, SZBG, GLBG, GXMBG, GXKA, NNA, XSBNTBG, FSBG, HNFBG, DGSA
8	*Archinecttia gaudissartii* (Hand.-Mazz) S. C. Chen	WTSA, YBSBG, ZZHHBG
9	*Artocarpus lakoocha* Roxb.	KMBG, KMHLBG, XSBTBG
10	*Bhesa sinica* (H. T. Chang et S. Y. Liang) H. T. Chang et S. Y. Liang	HCBG, TBBG, FZBG, XMBG, HNTEBG, SCBG, DHSA, SZBG, GLBG, GXMBG, GXKA, NNA, XSBNTBG, FSBG

Table 5. The limited conservation species in Chinese botanical gardens

No.	Name	*Ex situ* conservation	Suggest to conservation
1	*Abies beshanzuensis* M. H. Wu	HZBG	NJBG, NJMBG, SHBG, HFBG, ZJAUA
2	*Abies yuanbaoshanensis* Y. J. Lu et L. K. Fu	GLBG	NNA, GXMBG, GXKA
3	*Aconitum nagarum* var. *heterotrichum* Fletch. et Lauener	KMBG	KMHLBG, LSBG
4	*Adiantum reniforme* var. *sinense* Y. X. Lin	WHBG	WHUA, HNFBG
5	*Amentotaxus yunnanensis* Li	KMBG	KMHLBG, LSBG
6	*Anogeissus acuminata* (Roxb. Ex DC.) Guill. Rt Perr. var. *lanceolata* Wall. ex Clarke	XSBNTBG	XMBG, HNIFSA, HNTEBG, SCBG, SZBG
7	*Cinnamomum mairei* Levl.	HNNLBG	HNFBG, DGSA, WHBG, WHUBG
8	*Circaeaster agrestis* Maxim.	LZBG	YAA, YLPBG, HHHTBG, MQPBG, YCALSG, YCBG, DKPBG, XJA, XNBG, MJSA
9	*Cistanche tubulosa* (Schrenk) R. Wight	TRPEBG	URMQBG
10	*Coptis teeta* Wall.	KMBG	KMHLBG, LSBG

But, some species need to be conserved urgently, for example, the 4 relict species indigenous in Taiwan, *Juniperus chinensis* var. *tsukusiensis*, *Fagus hayatae*, *Keteleeria taiwaniana*, *Amentotaxus formosana*. The number of these 4 species is very limited due to the population growth, over-exploitation and the natural habitat destruction. It is necessary to extend conservation to them.

From the establishment and analysis of the database, some other results can deducted that the rare and endangered plants in China are very important for human beings. Some species are potential new crops, breeding germplasm resources (for crops, fruits, ornamental plants, tee, etc.), natural products (e.g. pesticides or disease chemicals, medicines, materials), environmental services (keystone species, environment improvement, silviculture species), and future option plants. The Chinese Botanical gardens have being taken an important role in rare and endangered plant conservation. There are 327 of 389 species are in cultivation at present. The constructed database or rare and endangered plant conservation in Chinese botanical gardens will provide an effective way to coordinate conservation action all over China and academic exchange with international botanical gardens. Some botanical gardens have being taken the leading roles in rare and endangered plant conservation e.g. Guilin Botanical garden, South China Botanical Garden, and Xishuangbanna Tropical Botanical Gardens, etc. Among 389 rare and endangered species in China, the *ex situ* conservation security is differently from species to species, some species have been cultivated in more than 30 botanical gardens all over China, for example, *Ginkgo biloba*, *Metasequoia glyptostroboides*, *Eucommia ulmoides*, and *Liriodendron chinensis*, etc., 64 species still have no conserved in the botanical gardens at the moment. The unconserved species in natural habitats need urgently to extend their cultivation scopes.

Table 6. The relict plants need to extend conservation actions

Name	Family	English name	Characteristics
Abies beshanzuensis	*Pinaceae*	Beshanzuensis Fir	Endemic species and relict in China
Ammopiptanthus mongolicus	*Leguminosae*	Mongolian Ammopiptanthus	Relict (relic plant) in China
Ammopiptanthus nanus	*Leguminosae*	Dwarf Ammopiptanthus	Relict (relic plant) in China
Annamocarya sinensis	*Juglandaceae*	Chinensis Annamocarya	Relict (relic plant) in China
Bretschneidra sinensis	*Bretschneiderace*	Chinensis Bretschnerdra	Single-species family, relict species
Calocedrus macrolepis	*Cupressaceae*	Chinese Incense Cedar	Relict (relic plant) in China
Camellia sinensis var. *assamica*	*Theaceae*	Assam Tea	Relict of Kainozoic era in China
Carpinus potoensis	*Betulaceae*	Puto Hornbeam	The only relict in China
Cephalotaxus lanceolata	*Cephalotaxaceae*	Kungshan Plumyew	Relict (relic plant) in China
Cephalotaxus oliveri	*Cephalotaxaceae*	Oliver Plumyew	Relict in China

Both the relict and endemic plants are very important in the research of botany, geology, ecology and other relevent fields; the extension of cultivation should be emphasized to those target plant species.

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Appendix 1. Name abbreviation of Chinese Botanical Gardens

No.	Abbreviation	Botanical Garden	No.	Abbreviation	Botanical Garden
1	AHIBBG	Botanical Garden of Anhui Institute of Biology	35	HZBG	Hangzhou Botanical Garden
2	BJBG	Baoji Botanical Garden	36	IMGFAA	Inner Mongolia Academy of Fore-stry Arboretum
3	BJBG (N)	Bejijing Botanical Garden(North Garden)	37	JGSBG	Jingganshan Botanical Garden
4	BJBG (S)	Beijing Botanical Garden(South Garden)	38	JJREPP	Jiujiang Rare & Endangered Plant Pool
5	BJEBG	Beijing Educational Botanical Garden	39	JNBG	Jinan Botanical Garden
6	BJMBG	Beijing Medicinal Botanical Garden	40	JXIFSA	Arboretum of Jiangxi Institute of Forestry Science
7	CCFBG	Changchun Forest Botanical Garden	41	JYSBG	Jinyunshan Botanical Garden
8	CDBG	Chengdu Botanical Garden	42	KMBG	Kunming Botanical Garden
9	CQOPG	Chongqing Ornamental Plants Garden	43	KMHLBG	Kunming Horticultural Land-scape Botanical Garden
10	DGSA	Dagangshan Arboretum	44	LSBG	Lushan Botanical Garden
11	DHSA	Dinghushan Arboretum	45	LZBG	Lanzhou Botanical Garden
12	DKPBG	Dengkou Psammophytes Botani-cal Garden	46	MJSA	Maijishan Arboretum
13	DLBG	Dalian Botanical Garden	47	MMBG	Medicinal Medical Botanical Garden,Shanghai Second Mar-tial
14	FSBG	Fushan Botanical Garden	48	MQPBG	Minqin Psammophytes Botani-cal Garden
15	FZA	Fuzhou Arboretum	49	NJBG	Nanjing Sun Yat-sen Botani-cal Garden
16	GDFIA	Guangdong Institute of Forestry Science Arboretum	50	NJMBG	Nanjing Medicinal Botani-cal Garden
17	GLBG	Guilin Botanical Garden	51	NNA	Nanning Arboretum
18	GNA	Gannan Arboretum	52	NYA	Nanyue Arboretum
19	GXKA	Guangxi Karst Arboretum	53	QTBG	Qingtao Botanical Garden
20	GXMBG	Guangxi Medicinal Botanical Garden	54	SCBG	South China(Huanan) Botanical Garden
21	GZBG	Guizhou Botanical Garden	55	SCMBG	Sichuan Medicinal Botanical Garden
22	GZIFSA	Arboretum of Guizhou Institute of Forestry Science	56	SCTCIBG	South China Tropical Crop-Institute, Haian
23	HCBG	Hengchun Botanical Garden	57	SDFSA	Arboretum of Shandong Forestry School
24	HFBG	Hefei Botanical Garden	58	SHBG	Shanghai Botanical Garden
25	HHHBG	Huhhot Botanical Garden	59	SPTBG	Shapotou Botanical Garden
26	HJA	Hunjiang Arboretum	60	SYBG	Shenyang Botanical Garden
27	HKBG	Hongkong Botanical Garden	61	SYIAEA	Arboretum of Shenyang Insti-tute of Applied Ecology, Chinese Academy of Science
28	HLJFBG	Heilongjiang Forest Botanical Garden	62	SZBG	Shenzhen Fairy Lake Botanical Garden
29	HLTA	Heilongtan Arboretum	63	TBBG	Taibei Botanical Garden
30	HNFBG	Hunan Forest Botanical Garden	64	TRPEBG	Turpan Eremophytes Botanical Garden
31	HNIFSA	Arboretum of Hainan Institute of Forestry Science	65	URMQBG	Urumqi Botanical Garden
32	HNNBG	Hunan Nanling Botanical Garden	66	WHBG	Wuhan Botanical Garden
33	HNTEBG	Hainan Tropical Economic Bo-tanical Garden			
34	HXSBG	Huaxi Subalpine Botanical Garden			

Appendix 1. (Continued)

No.	Abbreviation	Botanical Garden	No.	Abbreviation	Botanical Garden
67	WHUA	Wuhan University Arboretum			Garden
68	WTSA	Wutaishan Arboretum	79	YCA	Yichun Arboretum
69	WZBG	Wenzhou Botanical Garden	80	YCBG	Yinchuan Botanical Garden
70	XABG	Xi' an Botanical Garden	81	YLPBG	Yulin Psammophytes Botanical Garden
71	XJA	Xiji Arboretum			
72	XMBG	Xiamen Botanical Garden	82	ZJAUA	Zhejiang Agriculture University Arboretum
73	XNBG	Xining Botanical Garden			
74	XSBNTBG	Xishuangbanna Tropical Botanical Garden	83	ZJBBG	Zhejiang Bamboo Botanical Garden
75	XYA	Xiongyue Arboretum	84	ZSFIA	Zhoushan Institute of Forestry Science Arboretum
76	YAA	Yanan Arboretum			
77	YALSG	Yanchi Arid Land Shrub Garden	85	ZZHHBG	Zhengzhou Huanghe Botanical Garden
78	YBSBG	Yianbei Semiarid Botanical			

Appendix 2. The geographical locality, climate factors and size of 71 Chinese botanical gardens

No.	Botanical Garden	Longitude	Latitude	Altitude	Annual Mean of Temp.(°C)	Maximum of Temp.(°C)	Minimum of Temp.(°C)	Relative of Humidity(%)	Annual Precipitation (mm)	Area(ha)
1	AHIBBG	117.07	31.97	45.00	15.70	41.00	-20.00	76.00	988.40	37.30
2	BJBG	107.13	34.35	598.00	12.00	39.60	-16.70	68.50	701.00	77.20
3	BJBG (N)	116.47	39.80	113.00	11.80	38.00	-20.10	55.90	527.00	157.00
4	BJBG (S)	116.47	39.80	76.00	11.60	41.30	-17.50	61.00	634.20	56.00
5	BJEBG	116.33	39.97	40.00	11.80	42.60	-22.80	60.00	638.80	11.60
6	BJMBG	116.42	39.78	50.00	10.00	42.10	-20.20	57.50	600.00	20.00
7	CCFBG	125.35	43.87	299.00	4.80	28.30	-36.54	69.00	645.30	150.00
8	CDBG	104.00	30.67	539.25	16.30	38.00	-5.90	82.00	976.00	53.20
9	CQOPG	106.45	30.12	292.00	18.40	42.00	-5.00	80.00	1080.00	14.11
10	DGSA	114.75	27.83	293.50	17.50	39.90	-8.30	80.00	1593.70	212.50
11	DHSA	112.57	23.17	60.00	22.80	38.00	-0.20	81.00	1953.00	1155.00
12	DKPBG	106.58	40.48	1044.00	7.50	32.70	-23.80	47.00	137.00	87.00
13	FSBG	121.72	24.77	900.00	18.20	35.30	-1.00	96.00	4067.00	1000.00
14	FZA	119.85	26.12	340.50	20.00	40.00	-2.00	79.00	1438.50	859.00
15	GLBG	110.28	25.02	240.00	19.20	38.00	-4.00	78.30	1899.35	67.00
16	GNA	114.04	25.85	415.5	18.5	36.2	-7.1	80	1612	566.00
17	GXKA	106.75	22.08	209.50	21.40	41.00	-1.50	79.00	1367.00	13.30
18	GXMBG	108.32	22.85	92.50	21.60	40.40	-2.10	79.00	1300.60	240.00
19	GZBG	106.70	26.57	1310.50	14.00	32.10	-6.40	80.00	1200.00	210.00
20	GZIFSA	106.72	26.63	1151.00	15.20	37.50	-7.30	77.00	1198.90	20.00
21	HCBG	120.82	21.95	225.00	25.60	39.10	13.70	92.00	2500.00	40.00
22	HFBG	117.28	31.25	32.98	15.70	41.00	-20.00	71.00	988.40	57.20
23	HHHBG	111.68	40.80	1056.00	5.60	37.30	-32.80	61.00	426.10	20.00
24	HJA	126.71	42.04	865.00	2.50	34.40	-39.40	68.00	1106.00	97.56
25	HLJFBG	126.63	45.72	145.50	3.60	36.40	-38.10	68.00	560.90	137.40
26	HNFBG	113.02	28.33	81.00	17.50	40.20	-7.50	80.00	1380.00	140.00

Appendix 2. (Continued)

No.	Botanical Garden	Longitude	Latitude	Altitude	Annual Mean of Temp.(°C)	Maximum of Temp.(°C)	Minimum of Temp.(°C)	Relative of Humidity(%)	Annual Precipitation (mm)	Area(ha)
27	HNIFSA	109.93	19.10	200.00	23.00	39.30	2.80	85.00	2000.00	15.00
28	HNTEBG	109.50	19.50	147.79	23.40	38.40	1.50	81.50	1766.20	32.00
29	HZBG	120.10	30.25	26.42	16.10	41.00	-10.50	82.00	1400.70	231.30
30	JGSBG	114.20	26.42	848.00	14.30	34.80	-11.00	84.00	1865.50	212.50
31	JNBG	117.01	36.65	57.00	14.20	42.70	-19.70	58.00	685.00	43.00
32	JXIFSA	115.80	28.77	350.00	15.60	36.00	-9.00	85.00	1600.00	138.40
33	JYSBG	107.35	29.82	650.50	13.60	34.60	-0.70	87.00	1611.80	100.00
34	KMBG	102.68	25.02	1980.00	14.70	31.50	-5.40	73.00	1879.60	43.80
35	KMHLBG	102.78	25.09	2046.50	15.60	30.50	-7.80	69.00	1079.00	33.30
36	LSBG	115.82	29.58	1150.00	12.30	30.30	-16.80	80.00	1900.00	300.00
37	LZBG	103.78	36.08	1768.5	9.3	39.1	-23.1	58	329.7	150.20
38	MJSA	106.00	34.33	1749.50	8.00	29.00	-13.40	74.00	860.00	372.30
39	MQPBG	102.97	38.57	1340.00	7.40	39.50	-27.30	47.00	110.00	67.00
40	NJBG	118.80	32.12	35.00	15.40	43.00	-13.00	76.00	1000.00	186.60
41	NJMBG	118.78	32.05	28.50	15.40	43.00	-14.10	76.00	1038.60	25.00
42	NNA	108.35	22.67	150.00	21.60	39.50	-1.40	72.50	1340.00	380.00
43	NYA	112.68	27.25	600.00	16.10	37.00	-5.00	78.00	1462.00	540.00
44	QTBG	120.13	36.08	89.25	12.10	36.20	-16.40	75.00	693.30	69.00
45	SCBG	113.33	23.17	50.00	22.00	38.70	0.20	78.00	1933.30	300.00
46	SCMBG	107.35	28.95	630.00	16.30	34.60	-3.00	84.50	1250.20	9.50
47	SDFSA	117.12	36.20	200.00	12.80	40.70	-22.40	68.50	691.50	5.30
48	SHBG	121.43	31.17	4.00	15.50	40.20	-12.10	78.60	1143.40	80.90
49	SYBG	123.68	41.85	86.00	7.80	33.30	-30.60	65.00	700.00	154.00
50	SYIAEA	123.42	41.78	41.60	7.80	38.30	-33.10	65.00	734.50	6.00
51	SZBG	114.17	22.57	315.50	22.00	38.70	0.20	78.00	1933.30	580.00
52	TBBG	121.52	25.05	60.00	22.00	38.10	7.00	75.50	2124.00	8.00
53	TRPPEBG	98.18	40.85	-85.50	13.90	47.60	-28.00	41.00	16.40	34.00
54	URMQBG	78.55	43.90	715.00	6.40	40.90	-41.50	45.50	194.60	60.61
55	WHBG	114.40	30.55	26.50	16.30	40.00	-18.30	79.00	1282.00	70.00
56	WHUA	104.42	30.50	69.00	16.80	42.70	-17.30	77.00	1284.00	196.44
57	WTSA	113.57	38.97	1936.00	-4.10	20.00	-44.80	68.00	913.30	133.52
58	WZBG	120.67	28.02	40.00	17.90	39.30	-4.50	81.00	1698.20	50.00
59	XABG	108.97	34.22	437.47	13.30	41.70	-20.60	71.00	604.00	20.00
60	XJA	105.52	35.90	2194.50	5.00	32.60	-27.90	47.00	425.70	66.70
61	XMBG	118.07	24.58	137.50	21.24	38.20	2.00	74.00	1555.50	277.00
62	XNBG	101.77	36.62	2293.00	5.70	33.50	-26.60	61.00	368.70	73.00
63	XSBNTBG	101.42	21.68	570.00	21.60	40.00	3.00	81.00	1500.00	900.00
64	XYA	122.15	40.02	22.40	9.20	36.60	-26.00	62.00	657.70	6.80
65	YAA	109.52	36.60	1073.50	9.40	39.70	-25.40	70.00	550.00	57.50
66	YAALSG	107.40	37.78	1350.00	7.70	38.10	-29.60	51.00	296.50	74.00
67	YCA	128.90	47.72	267.93	0.50	34.43	-41.00	80.18	755.00	40.00
68	YCBG	107.37	38.47	1115.00	8.50	37.20	-27.90	55.75	135.30	280.00
69	YLPBG	109.20	38.33	1100.00	8.00	38.60	-32.70	69.00	412.00	308.70
70	ZJAUA	120.27	30.25	8.00	16.30	41.00	-10.50	81.00	1450.00	0.93
71	ZJBBG	120.12	30.23	18.50	16.10	40.50	-9.60	81.00	1545.70	2.40

Appendix 3. The list of rare and endangered plant species in China (Source: Plant Red Data Book of China, 1994)

No.	Latin Name	No.	Latin Name
1	*Abies beshanzuensis* M. H. Wu		Bunge var. *membranaceus* (*Bunge*) *Hsiao*
2	*Abies chinensis* Van Tiegh	38	*Astragalus membranaceus* (Fisch.) Bunge var. *mongolicus* (*Bunge*) *Hsiao*
3	*Abies fanjingshanensis* W. L. Huang, Y. L. Tu et S. Z. Fang	39	*Berchemiella wilsonii* Nakai
4	*Abies georgei* Orr	40	*Betula halophilla* Ching ex P. C. Li
5	*Abies sibirica* Ledeb.	41	*Bhesa sinica* (H. T. Chang et S. Y. Liang) H. T. Chang et S: Y: Liang
6	*Abies yuanbaoshanensis* Y. J. Lu et L. K. Fu	42	*Boschniakia rossica* (Cham. et Schltal.) Fedtsch et Flerov.
7	*Abies ziyuanensis* L. K. Fu et S. L. Mo	43	*Brachystachyum densiflorum* (Rendle) Keng
8	*Acanthopanax senticosus* (Rupr. et Maxim. Harms	44	*Bretschneidra sinensis* Hemsel.
9	*Acer catalpifolium* Rehd.	45	*Burretiodendron esquirolii* (Levl.) Rehd.
10	*Acer miaotaiensis* P. C. Tsoong	46	*Burretiodendron hsienmu* Chun et How
11	*Acer yangjurchi* Fang et P. L. Chiu	47	*Calocedrus macrolepis* Kurz
12	*Aconitum brachypodum* Diels	48	*Calycanthus chinensis* Cheng et S. Y. Chang
13	*Aconitum nagarum* var. *heterotrichum* Fletch. et Lauener	49	*Calycopteris floribunda* (Roxb.) Lam
14	*Acrocarpus fraxinifolius* wight et Arn.	50	*Camellia chrysantha* (Hu) Tuyama
15	*Adiantum reniforme* var. *sinense* Y. X. Lin	51	*Camellia crapnelliana* Tutcher
16	*Aesculus wangii* Hu ex Fang	52	*Camellia eupholebia* Merr. ex Sealy
17	*Alcimandra cathcardii* (Hook. f. et Thoms) Dandy	53	*Camellia granthamiana* Sealy
18	*Alseodaphne hainanensis* Merr.	54	*Camellia grijsii* Hance
19	*Alseodaphne rugosa* Merr. et Chun	55	*Camellia pingguoensis* D. fang
20	*Amentotaxus argotaenia* (Hance) Pilger	56	*Camellia pudipetala* Y. Wan et S. Z. Huang
21	*Amentotaxus formosana* Li	57	*Camellia reticulata* Lindl.
22	*Amentotaxus yunnanensis* Li	58	*Camellia sinensis* (L.) var. *assamica* (Mast.) Kitamura
23	*Amesiodendron tienliensis* H. S. Lo	59	*Camellia thunhinensis* H. T. Chang
24	*Ammopiptanthus mongolicus* (Maxim.) Chengf.	60	*Carallia diplopetala* Hand.-Mazz.
25	*Ammopiptanthus nanus* (M. pop) Cheng f.	61	*Carpinus potoensis* Cheng
26	*Amoora dasyclada* (How et T. Chen) C. Y. Wu (Agleia dasyclada How et T. Chen)	62	*Caryota urens* L.
27	*Annamocarya sinensis* (Dode) Leroy	63	*Castanopsis concinna* (champ. ex Benth.) A. DC
28	*Anogeissus acuminata* (Roxb. Ex DC.) Guill. Rt Perr. var. *lanceolata* Wall. ex Clarke	64	*Castanopsis kawakamii* Hayata
29	*Antiaris toxicaria* (Pers.) Lesch.	65	*Cathaya argyrophylla* Chun et Kuang
30	*Aptereoperma oblata* H. T. Chang	66	*Celtis wightii* Planch.
31	*Aquilaria sinensis* (Lour.) Gilg	67	*Cephalomappa sinensis* (Chun et How) Kosterm
32	*Archangiopteris henryi* Christ et Gies	68	*Cephalotaxus lanceolata* K. M. Feng
33	*Archiboehmeria atrata* (Gagnap.) C. J. Chen (*Debregeasia atrata* (Gagnep))	69	*Cephalotaxus mannii* Hook
34	*Archinecttia gaudissartii* (Hand.-Mazz) S. C. Chen	70	*Cephalotaxus oliveri* Mast.
35	*Artocarpus hypargyreus* Hance ex Benth.	71	*Cercidiphyllum japonicum* Sieb. et Zucc
36	*Artocarpus lakoocha* Roxb.	72	*Chamaecyparis formosensis* Matsum
37	*Astragalus membranaceus* (Fisch.)	73	*Changium smyrnioides* Wolff
		74	*Changnienia amoena Chien*
		75	*Chosenia arbotifolia* (Pall.) A. Skv.
		76	*Chunia bucklandioides* H. T. Chang
		77	*Chuniophoenix hainanensis* Burret

Appendix 3. (Continued)

No.	Latin Name	No.	Latin Name
78	*Chuniophoenix huminis* C.Z.Tang et T. L. Wu	119	*Dipteronia dyeriana* Henry
79	*Cinnamomum japonicum* Sieb.	120	*Dipteronia sinensis* Oliv.
80	*Cinnamomum mairei* Levl.	121	*Disanthus cercidifolius* Maxim. var. *longipes* H. T. Chang
81	*Cinnamomum micranthum* (Hayata) Hayata	122	*Dracaena cambodiana* Pierre ex Gagnep.
82	*Circaeaster agrestis* Maxim.	123	*Dracaena cochichinensis* (Lour.) S. C. Chen var. enneandra Zou et Liu
83	*Cistanche deserticola* Y. C. Ma	124	*Dunnia sinensis* Tutcher
84	*Cistanche tubulosa* (Schrenk) R. Wight	125	*Dysosma versipellis* (Hance) M. Cheng
85	*Cleidiocarpon cavaleriei* (Levl.) Airy-Shaw	126	*Elaeagnus mollis* Diels
86	*Coptis chinensis* Franch.	127	*Eleutharrhena macrocarpa* (Diels) Forman
87	*Coptis chinensis* Franch. var. *brevisepala* W. T. Wang et Hsiao.	128	*Emmennopterys henryi* Oliv.
88	*Coptis omeiensis* (Chen) C. Y. Cheng	129	*Empetrum nigrum* var. *japonicum* K. Koch
89	*Coptis teeta* Wall.	130	*Epilobium nankotaizanense* Yamamota
90	*Corylus chinensis* Franch.	131	*Erythrophleum* fordii Oliv.
91	*Craigia kwangsieniss* Hsue	132	*Euchresta japonica* Hook f. et Regel
92	*Craigia yunnanensis* W.W. Smith et W. E. Evens	133	*Eucommia ulmoides* Oliv.
93	*Croomia japonica* Miq.	134	*Euptelea pleiospermum* Hook F. et Thoms.
94	*Croton laui* Merr. et Metc.	135	*Eurycorymbus cavaleriei* (Levl.) Rehd. et hand.-Mazz.
95	*Crypteronia paniculata* Bl.	136	*Euryodendron excelsum* H. T. Chang
96	*Cunninghamia unicanaliculata* D. Y. Wang et H. L. Liu	137	*Fagus hayattae* Palib. ex. Hayata
97	*Cupressus chengiana* S. Y. Hu	138	*Fatsia polycarpa* Palib. ex Hayata
98	*Cupressus gigantea* Cheng et. L. K. Fu	139	*Ferula sinkiangensis* K. M. Chen
99	*Cyathea spinulosa* Wall ex Hook. (*Alsophila spinulosa* (wall. ex Hook.) Tryon	140	*Firmiana hainanensis* Kosterm.
100	*Cycas micholitzii* Dyer	141	*Firmiana major* (W. W. Smith) Hand.-Mazz.
101	*Cycas pectinata* Griff.	142	*Fokienia hodginsii* (Dunn) Henry er Thomas
102	*Cycas penzhihuaensis* L. Zhou et S. Y. Yang	143	*Frankenia pulverulenta* Linn.
103	*Cycas siamensis* Miq.	144	*Fraxinus manschurica* Rupr.
104	*Cycas taiwaniana* Carruth	145	*Fritllaria pallidiflora* Schrenk
105	*Cyclobalanopsis rex* (Hemsl.) Schott.	146	*Fritllaria ussuriensis* Maxim.
106	*Cystoathyrium chinense* Ching	147	*Fritllaria walujewii* Regel
107	*Dacrydium pierrei* Hickel	148	*Garcinia paucinervis* Chun et how
108	*Dalbergia fusca Pierre* var. *enneandra* Zou et Liu	149	*Gastrodia elata* Bl.
109	*Dalbergia odorifera* T. Chen	150	*Ginkgo biloba* Linn.
110	*Davidia involucrata Baillon* var. *Involucrata*	151	*Gleditsia vestita* How ex B. K. Lee
111	*Davidia involucrata* var. *vilmoriniana* (Dode) Wanger	152	*Glehnia littoralis* F. Schmidt ex Miq.
112	*Dendrobium candicum* Wall. ex Lindl.	153	*Glycine soja* Sieb. et Zucc.
113	*Deutzianthus tonkinensis* Cagnep	154	*Glyptostrobus pensilis* (Staunt.) Koch
114	*Dimocarpus longan* Lour.	155	*Gmelina arborea* Roxb.
115	*Dipentodon sinicus* Dunn	156	*Gmelina hainanensis* Oliv.
116	*Diplandrorchis sinica* S. C. Chen	157	*Gymnocarpos przewalskii* Maxim.
117	*Diplopanax stachyanthus* Hand.-Mazz.	158	*Halesia macgregorii* Chun
118	*Dipterocarpus rutasus* Bl.	159	*Haloxylon ammodendron* (C. A. Mey) Bunge
		160	*Haloxylon persicum* Bunge ex Boiss. et Buhse
		161	*Handeliodendron bodinieri* (Levl.) Rehd.
		162	*Helianthemum soongoricum* Schrenk

Appendix 3. (Continued)

No.	Latin Name	No.	Latin Name
163	*Helicia shweliensis* W. W. Smith	207	*Magnolia amoena* Cheng
164	*Heliciopsis terminalis* (Kurz.) Sleum	208	*Magnolia cylindrica* Wils.
165	*Heptacodium micronioides* Rehd. (*Heptacodium micronioides* Airy Shaw)	209	*Magnolia henryi* Dunn
166	*Heritiera parvifolia* Merr.	210	*Magnolia officinalis* Redh. et Wils.
167	*Heteroplexis microcephala* Y. L. Chen	211	*Magnolia officinalis* ssp. *biloba* (Redh. et Wils.) Cheng et Law
168	*Heteroplexis sericophylla* Y. L. Chen	212	*Magnolia rostrata* W. W. Smith
169	*Heteroplexis vernonioicles* Chang	213	*Magnolia sieboldii* K. Koch
170	*Homalium loaticum* Gagnep. var. *glabratum* C. Y. Wu	214	*Magnolia sinensis* (Rehd. et Wils.) Stapf.
171	*Hopea chinensis* Hand.-Mazz.	215	*Magnolia wilsonii* (Finet et Gagnep.) Rehd.
172	*Hopea exalata* Lin. Yang et Hsue	216	*Magnolia zenii* Cheng
173	*Hopea hainanensis* Merr. et Chun	217	*Malania oleifera* Chun et Lee
174	*Hopea mollissima* C. Y. Wu	218	*Malus komarovii* (Sarg.) Rehd.
175	*Horsfieldia hainanensis* Merr.	219	*Malus sieversii* (Ledeb.) Roem.
176	*Horsfieldia pandurifolia* Hu	220	*Malus sikkimensis* (Wenz.) Koehne
177	*Horsfieldia teteratepala* C. Y. Wu et W. T. Wang	221	*Mangifera sylvatica* Roxb.
178	*Hydnocarpus hainanensis* (Merr.) Sleum.	222	*Manglietia aromatica* Dandy
179	*Illicium difengpi* K. I. B. et K. I. M.	223	*Manglietia grandis* Hu et Cheng
180	*Isoetes japonica* A. Br.	224	*Manglietia insignis* (Wall.) Bl.
181	*Isoetes sinensis* Palmer	225	*Manglietia magaphylla* Hu et Cheng
182	*Ixonanthes chinensis* Champ.	226	*Manglietia patungensis* Hu
183	*Ixonanthes cochichinensis* Pirre	227	*Manglietiastrum sinicum* Law
184	*Juglans manschurica* Maxim.	228	*Metasequoia glyptostroboides* Hu et Cheng
185	*Juglans regia* Linn.	229	*Michelia hedyosperma* Law
186	*Keteleeria calcarea* Cheng et L. K. Fu	230	*Michelia wilsonii* (Finet et agnep.) Rehd.
187	*Keteleeria fortunei* (Murr.) Carr	231	*Migration kawasakii* (Hayata) Makino
188	*Keteleeria hainanensis* Chun et Tsiang	232	*Monimopetarum chinensis* Rehd.
189	*Keteleeria pubescens* Cheng et L. K. Fu	233	*Morinda officinalis* How
190	*Keteleeria xerophila* Hsueh et S. H. Huo	234	*Mussaenda anomala* Li
191	*Kingdonia uniflora* Balf. f. et W. W. Smith	235	*Myristica yunnanensis* Y. H. Li
192	*Kirengeshoma palmata* Yatabe	236	*Neocheiropteris palmatopedat* (Bak.) Christ
193	*Kolkwitzia amabilis* Graebn.	237	*Neolitsea sericea* (Bl.) Koidz.
194	*Lagerstroemia intermedia* Koehne	238	*Neopicrorhiza scrophulariiflora* (Pennell) Hong (*Picrorhiza scrophulariifolia* Penell)
195	*Laportea urantissima* Gagnep.	239	*Nouelia insignis* Franch.
196	*Larix chinensis* Beissen.	240	*Nypa fruticans* Wurmb.
197	*Larix mastersiana* Rehd. et Wils.	241	*Nyssa yunnanensis* W. C. Yin
198	*Leucomeris decora* Kurz	242	*Oncodotigma hainanensis* (Tsiang et P. T. Li) Tsiang et P. T. Li (*Chieniodendron hainanense* (Merr.) Tsiang et P. T. Li)
199	*Liriodendron chinensis* (Hemsl.) Sarg.	243	*Ophioglossum thermale* Kom.
200	*Litchi chinensis Sonn.* var. *euspontanea* Hsue	244	*Oplopanax elatus* Nakai
201	*Litsea auriculata* Chien et Cheng	245	*Orchidentha chinensis* T. L. Wu
202	*Litsea dilleniifolia* P. Y. Pai et P. H. Huang	246	*Ormosia hosiei* Hemsel. et Wils.
203	*Litsea pierrei* var. *szemois* Liou	247	*Ormosia howii* Merr. et Chen
204	*Lumnitzera littorea* (Jack.) Voigt	248	*Oryza granulata* Nees et Arn. ex Steud.
205	*Madhuca hainanensis* Chun et How	249	*Oryza officinalis* Wall ex Steud.
206	*Madhuca pasquieri* (Dubard) Lam.		

Appendix 3. (Continued)

No.	Latin Name	No.	Latin Name
250	*Oryza rufipogon* Griff.	292	*Platycrater arguta* Sieb. et Zucc.
251	*Ostrya rehderiana* Chun	293	*Podocarpus annamiensis* N. E. Gray
252	*Otophora unicularis* (Leenh.) H. S. Lo	294	*Podocarpus fleuryi* Hickel
253	*Ottelia acuminata* (Gagnep.) Dandy	295	*Podocarpus imbricatus* Bl.
254	*Paeonia delavayi* var. *lutea* (Franch.) Fin et Gagnep	296	*Poikilospermum suaveolense* (Bl.) Merr.
255	*Paeonia suffruticosa* var. *spontanea* Rehd.	297	*Polygala arcuata* Hayat
256	*Paeonia suffruticosa* var.*papaveracea* (Andr.) Kerner	298	*Pometia tomentosa* (Bl.) Teysm. et Binn.
257	*Paeonia szechuanica* Fang	299	*Populus euphratica* Oliv.
258	*Panax ginseng* C. A. Mey	300	*Populus pruinosa* Schren
259	*Panax pseudoginseng* Wall.	301	*Potaniana mongolica* Maxim.
260	*Panax zingiberensis* C. Y. Wu et K. M. Feng	302	*Premna szemaoensis* Pei
261	*Parakmeria lotungensis* (Chun et C. Tsoong) Law	303	*Prunus mongolica* (Maxim.) Yu (*Amygdalumongolica* (Maxim.) Ricker)
262	*Parakmeria omeiensis* Cheng	304	*Psammosilene tunicoides* W. C. Wu et C. Y. Wu
263	*Parakmeria yunnanensis* Hu	305	*Pseudolarix kaempferi* (Lindl.) Gord. (*Pseudolarix amabilis* (Nelson) Rehd.)
264	*Paramichelia baillonii* (Pierre) Hu	306	*Pseudotaxus chienii* (Cheng) Cheng
265	*Paranephelium hainanense* H. S. Lo	307	*Pseudotsuga brevifolia* Cheng et L. K. Fu
266	*Parashorea chinensis* Wang Hsie	308	*Pseudotsuga forrestii* Craib
267	*Pellacalyx yunnanensis* Hu	309	*Pseudotsuga gaussenii* Flous
268	*Phalaenopsis aphrodite* Reichb. F	310	*Pseudotsuga sinensis* Dode
269	*Phellodendron amurense* Rupr.	311	*Pseudotsuga wilsoniana* Hayata
270	*Phoebe bournei* (Hemsl.) Yang	312	*Pteroceltis tatarinowii* Maxim.
271	*Phoebe chekiangensis* C. B. Shang	313	*Pterospermum kingtungense* C. Y. Wu ex Hsue
272	*Phoebe nanmu* (Oliv.) Gamble	314	*Pterospermum menglunense* Hsue
273	*Phoebe zhennan* S. Lee et F. N. Wei	315	*Pterospermum yunnanensis* Hsue
274	*Phyllitis japonicus* Kom.	316	*Pterostyrax psilophylla* Diels ex Perk.
275	*Phyllodoce caerulea* (L.) Babingt.	317	*Qiongzhuea tumidinoda* Hsueh et Yi
276	*Picea aurantiaca* Mast.	318	*Reevesia rotundifolia* Chun
277	*Picea brachytyla* (French.) Pritz.	319	*Rehderodendron macrocarpum* Hu
278	*Picea montigena* Mast.	320	*Rhododendron chrysanthum* Pall.
279	*Picea neoveitchii* Mast.	321	*Rhododendron cyanocarpum* (Franch.) W. W. Smith
280	*Picea obovata* Ledeb.	322	*Rhododendron fictolaoteum* Balf. f.
281	*Picea smithiana* (Wall.) Boiss.	323	*Rhododendron haematodes* Franch.
282	*Pinus dabeshanensis* Cheng et Law	324	*Rhododendron jucundum* Balf. f. et W. W. Smith
283	*Pinus kwangtungensis* Chun ex Tsiang	325	*Rhododendron protistum* var. *giganteum* (Forrest ex Tagg) Chamberiain
284	*Pinus massoniana* var. *hainanensis* Cheng et L. K. Fu	326	*Rhododendron redowshianum* Maxim.
285	*Pinus roxburghii* Sarg.	327	*Rhododendron rex* Levl.
286	*Pinus sibirica* (Loud.) Mayr	328	*Rhododendron sulphureum* Franch.
287	*Pinus sylvestris* var. *mongolica* Litv.	329	*Rhoiptelea chiliantha* Diels et Hand.-Mazz.
288	*Pinus sylvestris* var. *sylvestriformis* (Takenouchi) Cheng et C. D. Chu	331	*Rosa rugosa* Thunb.
289	*Pinus takahasii* Nakai	332	*Saccopetalum prolificum* (Chun et How)Tsian
290	*Pinus wangii* Hu et Cheng		
291	*Platycerium wallichii* Hook.		

Appendix 3. (Continued)

No.	Latin Name	No.	Latin Name
333	*Salix magnifica* Schneid.	362	*Terminalia myriocarpa* Huerch et Muell.-Arg.
334	*Salix polyadenia* Hand. -Mazz. var. *tschangbaischanica* (Y. L. Chou et Chang) Y. L. Chou	363	*Tetracentron sinense* Oliv.
335	*Saussurea involucrata* Kar. et Kir.	364	*Tetraena mongolica* Maxim.
336	*Semiliquidambar cathayensis* H. T. Chang	365	*Tetrameles nudiflora* R. Br
337	*Shorea assamica* Dyer	366	*Tetrathyrium subcordatum* Benth.
338	*Sibbaldia omeiensis* Yu et Li	367	*Thuja Koriensis* Nakai
339	*Sinia rhodoleuca* Diels	368	*Thuja sutchuenensis* Franch.
340	*Sinojackia dolichocarpa* C. J. Qi	369	*Toona ciliata* Roem.
341	*Sinojackia xylocarpa* Hu	370	*Torreya jachii* Chun
342	*Sinopodophyllum emodi* (Wall. ex Royle) Ying	371	*Torreya yunnanensis* Cheng et L. K. Fu
343	*Sinopteris grevilleoides* Christ C. Chr. et Ching	372	*Trachycarpus nana* Becc. (*Trachycarpus dracocephalus* Ching et Hsu)
344	*Sinowilsonia henryi* Hemsl.	373	*Trigonobalamus dolichangensis* (A. Camus) Farm.
345	*Sonneratia hainanensis* Eo, K. Y. Chen et W. Y. Chen	374	*Trillium govanianum* Wall ex Royle
346	*Sorbus amabilis* Cheng et Yu	375	*Trillium tschonoskii* Maxim.
347	*Sorolepidium glaciale* Christ	376	*Trocodendron aralioides* Sieb. et Zucc.
348	*Sphaeropteris lepifera* (Hook.) Tryon (Cyathea lepifera (J. Sm.) Cop.)	377	*Tsoongiodendron odorum* Chun
349	*Stewartia sinensis* Rehd. et Wils.	378	*Tsuga chinensis* var. *tchekiangensis* (Flous) Cheng et L. K. Fu
350	*Syringa pinnatifolia* Hemsl. var. *alashanica*	379	*Tsuga forestii* Downie
351	*Syringa pinnatifolia* Hemsl. var. *pinnatifolia*	380	*Tsuga longibracteata* Cheng
352	*Tacca chantrieri* Andre	381	*Tugarinovia mongolica* Iljin.
353	*Taihangia rupestris* var. *ciliata* Yu et Li	382	*Ulmus chenmoui* Cheng
354	*Taihangia rupestris* var. *rupestris* Yu et li	383	*Ulmus elongata* L. K. Fu et C. S. Ding
355	*Taiwania cryptomerioides* Hayata	384	*Ulmus gaussenii* Cheng
356	*Taiwania flousiana* Gaussen	385	*Vatica guangxiensis* S. L. Mo
357	*Tamarix taklamakanensis* M. T. Liu	386	*Vatica mangachapoi* Blanco (*Vatica hainanensis* H. T. Chang et L. C. Wang)
358	*Tangtsinia nanchuanica* S. C. Chen	387	*Vatica xishuangbannaensis* G. D. Tao et J. H. Zhang
359	*Tapiscia sinensis* Oliv.	388	*Xerospermum bonii* (Lec.) Radlk.
360	*Taraktogenos annamensis* Gagrep.	389	*Zenia insignis* Chun
361	*Taxus wallichiana* Zucc.		