

## Article

# Species Diversity and Geographical Distribution Patterns of Balsaminaceae in China

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**Abstract:** Balsaminaceae are world-famous ornamental flowers because of their high species diversity, rich variation, peculiar flower patterns, and long ornamental cycles. To study the species diversity, distribution patterns, and distribution hotspots of Balsaminaceae in China, we updated the list of Balsaminaceae by systematically searching the related literature. The distribution pattern and hotspots of *Impatiens* spp. were analyzed using the ArcGIS 10.8.2 software. Combining 19 meteorological factors and one elevation factor, the Maxent model was applied to analyze the dominant environmental factors that govern the distribution of *Impatiens* spp. As of February 2023, Balsaminaceae in China included 360 taxa in two genera, including one taxon in the genus of *Hydrocera*, 359 taxa in the genus *Impatiens*, 271 national endemic species, and 157 provincial endemic species. *Impatiens* spp. showed a diffusion pattern from the tropical and subtropical regions to the high-latitude and high-elevation regions concentrated in Southwest China, especially in the Hengduan Mountains in the broad sense, Southern Tibet, the Yunnan–Guizhou–Guangxi karst region, the Qinling–Daba Mountains, and the southeastern hills. The highest species richness was found in the 1200~1500 m elevation range, with 164 species of *Impatiens* spp. This high species richness was maintained at between 900 and 2700 m, the elevation range where *Impatiens* spp. are concentrated. When 100% of the species were screened out, 110 hotspots were found, including Southeast Yunnan, Northwest Yunnan, Southern Tibet, and Western Sichuan, where most of the hotspots were concentrated and overlapped with global biodiversity centers, but other hotspots were more scattered. Annual precipitation, the minimal temperature of the coldest month, the altitude and temperature annual range, and four environmental variables with a cumulative contribution of 93.7% were the dominant environmental factors affecting the distribution of *Impatiens* spp. in China. This study lays the foundation for subsequent studies of Balsaminaceae diversity and is conducive to the development and use of *Impatiens* spp. resources.

**Keywords:** *Impatiens*; diversity; geographical distribution pattern; hotspots; China



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## 1. Introduction

The Balsaminaceae family contains the genera *Hydrocera* Blume ex Wight & Arn. and *Impatiens* L. The genus *Hydrocera* has only one species and is widely distributed in tropical Asia. The genus *Impatiens* has about 1000 species worldwide and is mainly distributed in the tropical and subtropical mountainous regions of Eurasia and tropical Africa [1,2]. There are five centers of diversity in the world: tropical Africa, Madagascar, the Eastern Himalayas, Southern India and Sri Lanka, Southwest China, and Southeast Asia in the broad sense [3]. China is one of the major distribution centers of *Impatiens* spp., with most species concentrated in Southwest China, for example, Yunnan, Sichuan, Tibet and Guizhou, with a large number of national and regional endemic species [4]. Yilin Chen was the first to conduct systematic research on the plant resources of the genus *Impatiens* in

China, and in 2001, he compiled the *Flora Reipublicae Popularis Sinica, Balsaminaceae*, which recorded more than 220 taxa of *Impatiens* spp. in China. In 2007 [5], he finishing compiling the *Flora of China*, which recorded 227 taxa of *Impatiens* spp. and 187 endemic species. In 2012, Shengxiang Yu published the first monograph of the family Balsaminaceae, which counted more than 270 taxa and more than 240 endemic species in China, and briefly described more than 130 taxa [6]. In 2016, Shengxiang Yu et al. proposed a new subgeneric classification system for the genus based on morphological and molecular phylogenetic evidence, dividing the genus into the subgen. *Clavicarpa* and the subgen. *Impatiens* [7].

Studies on the geographical distribution pattern of the genus *Impatiens* in China have mostly focused on the same provinces [8–12] and physical geographic areas [13–16]. Relevant experts [5] have explored the geographical distribution of this genus *Impatiens* in China based on the geographical information of specimens in the China Virtual Herbarium, finding that it is mainly produced in South China, with the highest concentration in the southwest and with an exceptional abundance in the Hengduan Mountains. Based on the number of specimens, geographical distribution patterns can reflect a species' overall richness pattern to a certain extent, but species richness performance in some regions may show deviations due to the influence of plant expeditions and specimen collection efforts. Currently, information on the species diversity of Balsaminaceae in China has not been systematically sorted out, which is very unfavorable to the conservation, development, and utilization of this family. In the present study, the results of a large number of taxonomic revision articles are collated. Newly published new taxa are included, as well as those published by foreign scholars working in Southern Tibet, to obtain the most up-to-date species list of Balsaminaceae in China. This study explores the horizontal and vertical distribution patterns of the genus *Impatiens* and its hotspots based on the establishment of a species list and a geographic distribution database, aiming to provide a reference for *Balsaminaceae* spp. diversity research and resource development and use in China.

## 2. Materials and Methods

### 2.1. Data Sources

A list of Chinese Balsaminaceae was obtained based on the following sources: *Flora Reipublicae Popularis Sinica* (Vol. 47) [4], *Flora of China* (Vol. 12) [5], and local flora books at all levels, supplemented by monographs on the genus *Impatiens*; family members included in the Species 2000 China node; and journal papers on new taxa and national records of the genus *Impatiens* in China published up to February 2023 [17–21].

The main sources of data for the geographical distribution database included the following: (1) botanical books, such as *Flora Reipublicae Popularis Sinica* (Vol. 47), *Flora of China* (Vol. 12), and local botanical books and regional plant catalogs; (2) monographs on the genus *Impatiens*, such as *Balsaminaceae of China, Wild Balsams of Darjeeling and Sikkim Himalaya—A Pictorial Handbook* [22]; (3) academic papers, journal papers, and published doctoral and masters' theses on new records of *Impatiens* spp. distribution; (4) collections of scientific expeditions to nature reserves at all levels in China; (5) other botanical monographs, such as *Flowering Plants of Hengduan Mountain* [23]. A total of 9043 points of distribution data were summarized. The main sources of species distribution data for analyzing relationships with environmental factors were the Chinese Virtual Herbarium (<https://www.cvh.ac.cn/> (accessed on 1 September 2020)), the Global Biodiversity Information Facility (<https://www.gbif.org/zh/> (accessed on 29 November 2020)), and a dataset on the diversity and geographical distributions of wild *Impatiens* in China. Nineteen common bioclimatic factors and elevation data were obtained from the World Climate Database (<https://worldclim.org/> (accessed on 17 April 2021)).

### 2.2. Mapping of the Geographical Distribution

Based on the established geographical distribution database of *Impatiens* spp. in China [24], ArcGIS 10.2 software was used to map the genus's geographical distribution. First, China's administrative divisions were used as the base map, and provincial and

county administrative division layers were retained. The statistics on species richness, Chinese endemic species richness, provincial endemic species richness, and the ratio of provincial endemic species to all species in the region were entered separately into Excel. The species richness was assigned to its corresponding area and graded using the nature break (Jenks) method to draw a horizontal distribution map. The map of China was divided into  $100 \times 100$  km grids, the species distribution data were imported into the map, and the number of species present in the same grid was summed up to obtain the distribution pattern of species richness for *Impatiens* spp. in China [25].

### 2.3. Screening Algorithm

The Dobson [26] screening algorithm was used to identify the hotspots of *Impatiens* spp. in China. The counties obtained were *Impatiens* spp. hotspots in China. This collection included both regions with the highest species richness and regions with high endemism; thus, the regions with high abundance and endemism complemented each other to form the hotspots. If the number of species contained in two counties was the same, the counties with smaller areas were screened first; for the same number of species, the smaller the area, the higher the species richness in the region. The map layer for the distribution of 36 global biodiversity hotspots was obtained from the Critical Ecosystem Partnership Fund (CEPF) (<https://zh-cn.cepf.net/our-work/biodiversity-hotspots/hotspots> (accessed on 26 August 2021)).

### 2.4. Model Establishment and Operation

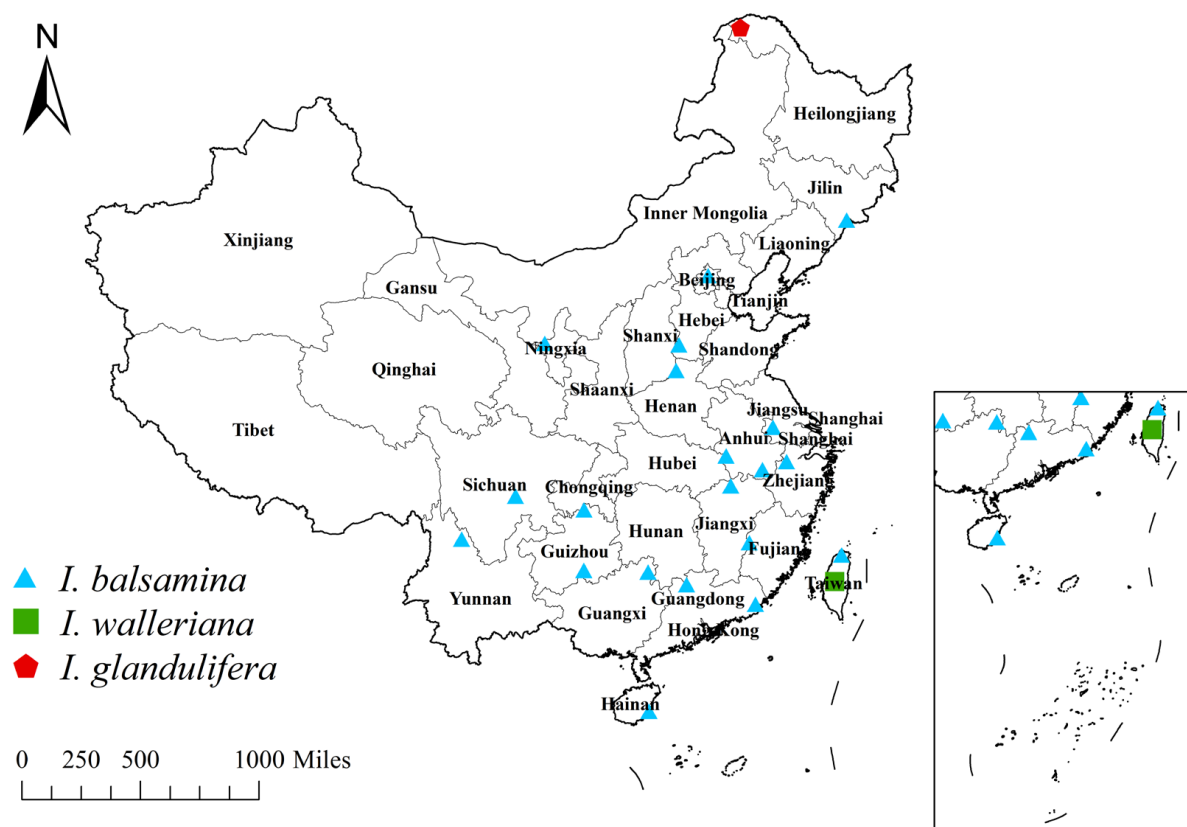
The software used in this paper was Maxent v3.4.4. To avoid overfitting the model, 19 climate factors were initially screened, with a total of 10 being obtained for the model runs. Ten climatic factors and one elevation factor were screened, and the distribution data were added to Maxent. The relevant parameters were determined with reference to Roberto et al. [27]; 25% of the distribution points were set as testing data, and 75% of the distribution points were set as training data. The importance and contribution of environmental variables were assessed using the Jackknife method, and modeling was repeated 10 times. Most researchers determine the number of dominant factors based on the cumulative contribution rate and use them as dominant factors before the cumulative contribution rate exceeds a certain value. In this study, environmental factors with a cumulative contribution of more than 90% were used as dominant factors; factors with a contribution of more than 10% were considered the most important factors [28].

## 3. Results

### 3.1. Species Diversity of Balsaminaceae in China

As of February 2023, there are known to be two Balsaminaceae genera and 360 Balsaminaceae taxa in China. In the past 16 years, 81 new taxa have been added to the record, and five new national records have been created. Of these, only one taxon of the genus *Hydrocera* is distributed in Hainan Province. A total of 359 taxa (including 14 varieties and one subspecies) have been recorded for the genus *Impatiens* (Appendix A). *Impatiens* spp. has obvious regional species, and most of them are endemic to China, mainly concentrated in the southwest. The genus includes 271 endemic species in China, accounting for about 75.6% of the total species, with 157 endemic species at the provincial level, accounting for about 43.9% of the total species.

Three non-native balsams, *Impatiens balsamina*, *I. glandulifera*, and *I. walleriana* have been reported [21,29] as spontaneous plants in different parts of China (Figure 1). *I. balsamina* was the first genus of *Impatiens* to be naturalized in China and is widely distributed in the southeastern part of the country because of its extreme ecological adaptability. *I. walleriana* is naturalized only in Taiwan. As an invasive species, *I. glandulifera* is widely distributed all over the world, and in China, it is found in the northernmost city of Mohe, Heilongjiang Province.



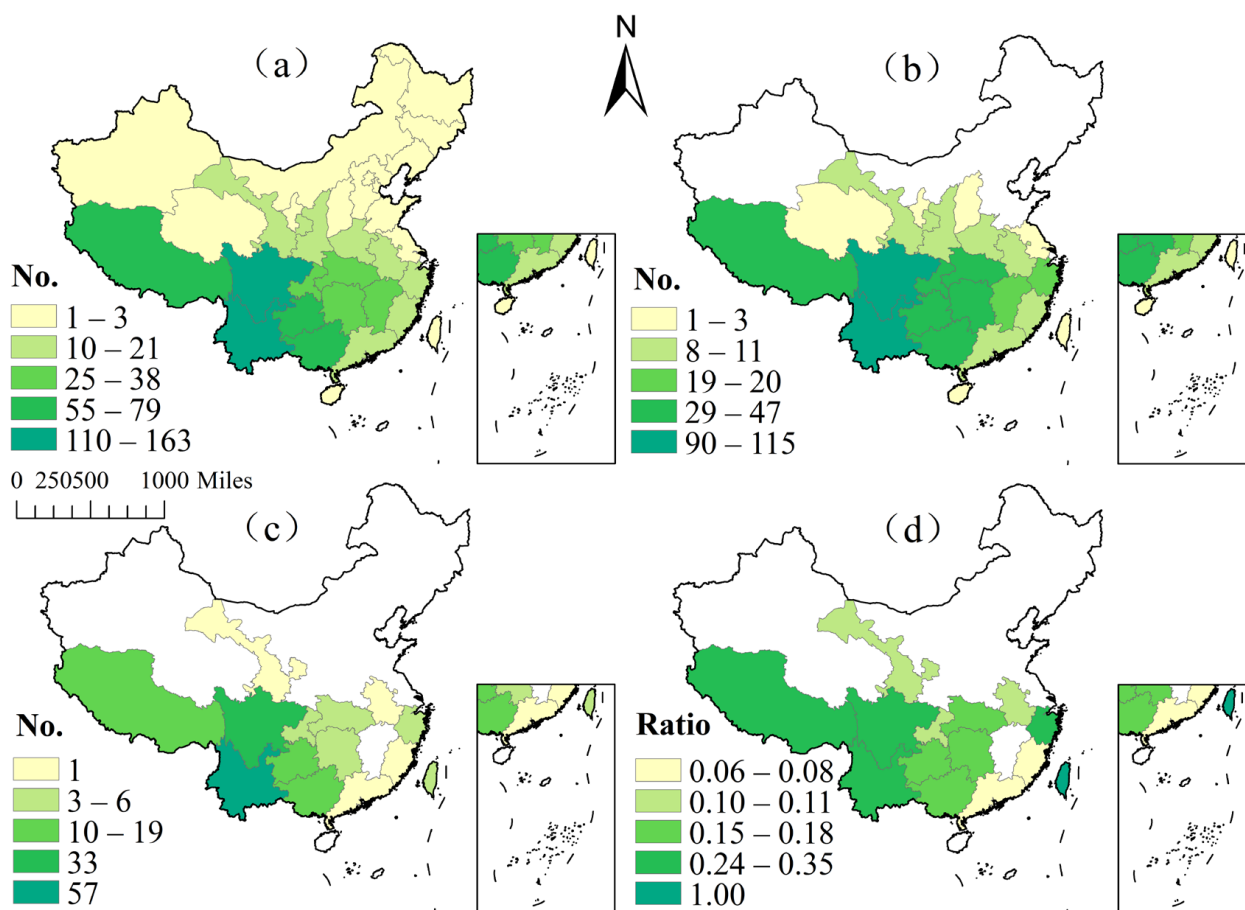
**Figure 1.** Distribution of three non-native balsams in China.

The morphological variation in *Impatiens* spp. is complex, and the taxonomic problems are severe. Many plant taxonomists have differing views on the taxonomic status of some of these taxa. Based on published articles and books on taxonomic revision, the following decisions were made for taxa with controversial taxonomies: *Impatiens chungtienensis* and *I. cristata* are accepted as separate species, according to the related study by Akiyama S. et al. [30,31]. *I. sunkoshiensis* is accepted as a synonym of *I. laxiflora* [32], and *I. taronensis* as a synonym of *I. prainii* [33]. We cannot deny the identification of *I. scabrifolia* by Chinese taxonomists; thus, we still retain it in the list. *I. walongensis* is accepted as an independent species according to the related study by Gogoi et al. [34]. *I. yui* is accepted as a synonym of *I. uncipectata* [35]. *I. atherosepala*, *I. crassiloba*, *I. ganpiuana*, *I. reptans*, and *I. rhombifolia* are accepted as synonyms of *I. procumbens* based on a related study by Huang et al. [36]. Ruchisansakun et al. [37], in their study of the Balsaminaceae in Myanmar, treated *I. aureliana* as a synonym of *I. violiflora*, but in their recent book, *Impatiens of Thailand*, they concluded that more taxonomic evidence is still needed for the revision of these two species. Therefore, we accept that *I. aureliana* remains a separate species. In *Impatiens of Thailand* [38], the authors treated *I. rubrostriata* as a synonym of *I. duclouxii*, but according to field surveys, the stripes on the petals are an obvious taxonomic feature, as is a difference in flower color, so we retain *I. rubrostriata* as a separate species. Based on the field survey and related taxonomic studies by Ruchisansakun and Singh et al. [37,39], we accept *I. monticola* and *I. mengtzeana* as synonyms of *I. pulchra*. Based on the studies by Abrahamczyk et al. [40] on the plant longevity, flower morphology, and pollinators of *I. namchabarwensis* and *I. arguta*, we accept *I. namchabarwensis* as a separate species. *I. wenshanensis* and *I. clavigeroides* are treated as synonyms of *I. damrongii*, in accordance with Ruchisansakun and Souvannakhommane et al. [38,41].

### 3.2. Geographic Distribution Patterns of *Impatiens* spp. in China at Different Scales

#### 3.2.1. Provincial Scale

The species richness patterns of 34 provincial administrative regions in China were counted and divided into five levels. Level I contains 110–163 species, including Yunnan and Sichuan; Level II contains 55–79 species, including Tibet, Guizhou, and Guangxi; Level III contains 25–38 species, including Chongqing, Hunan, Hubei, and Jiangxi; Level IV contains 10–21 species, including Zhejiang, Guangdong, Fujian, and another 7 provinces; and Level V contains 1–3 species, including Liaoning, Taiwan, and another 17 provinces (Figure 2a). *Impatiens* spp. in China are mainly distributed in Southwest China, and are the most abundant in Yunnan Province (163 species), Sichuan Province (110 species), Tibet (79 species), Guizhou (60 species), and Guangxi (55 species). There are 300 species of *Impatiens* spp. in five provinces, accounting for 83.8% of the total number of *Impatiens* spp. in China, followed by Central and South China, which also have high species richness. The species richness in the northern provinces is generally low, and only one to four species of *Impatiens* spp. are distributed in most provinces (Table 1).



**Figure 2.** Distribution pattern of *Impatiens* spp. at the provincial level. (a) Distribution map of species richness. (b) Abundance distribution map of Chinese endemic species. (c) Abundance distribution map of provincial endemic species. (d) Distribution map of provincial endemic species/all species in the province.

The distribution of endemic species in China is the highest in Yunnan (115 species) and Sichuan (90 species). Although the number of species in Tibet is second only to Yunnan and Sichuan, the number of endemic species in China is lower than in Guizhou, Guangxi, Hunan, Hubei, and Chongqing. There is no distribution of Chinese endemic species in Xinjiang, or in most areas of the northeast in North China (Figure 2b). Yunnan Province has the highest abundance of endemic species at the provincial level (57 species),

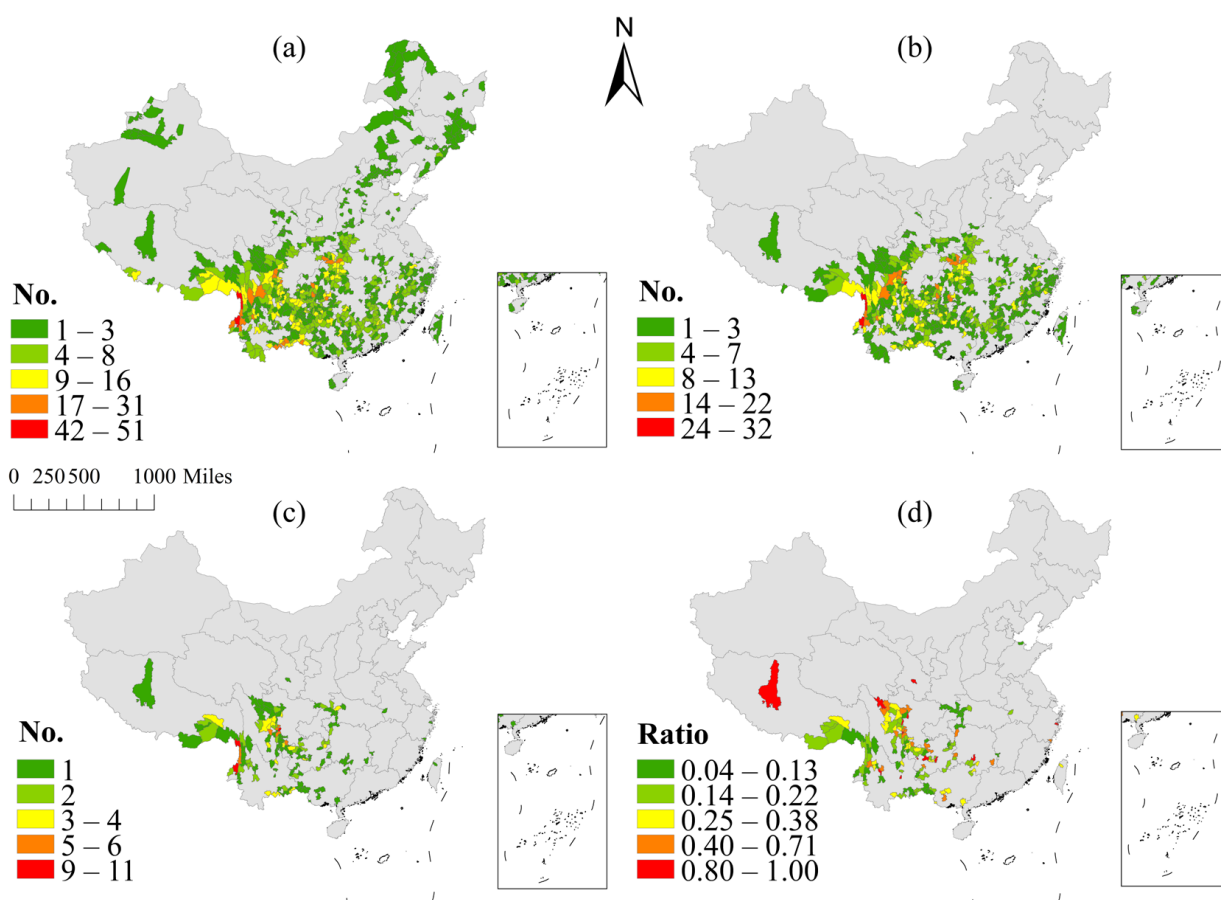
followed by Sichuan Province (33 species), and Tibet, Guizhou, and Guangxi have more than 10 endemic species at the provincial level. Qinghai, Ningxia, Shaanxi, Henan, and Jiangsu have Chinese endemic species, but no provincial endemic species. Zhejiang has more endemic species (six species) than the surrounding provinces, with a higher endemic rate (Figure 2c). The largest ratio of provincial endemic species to all species in the province is Taiwan, followed by Yunnan, Sichuan, and Tibet, with high endemism rates (Figure 2d).

**Table 1.** Species richness statistics for *Impatiens* spp. in China's provincial administrative regions.

Province	Species Number	Percentage of Chinese Species (%)	Number of Chinese Endemic Species	Percentage of Chinese Endemic Species (%)	Provincial Endemic Species	Percentage of Provincial-Level Endemic Species (%)
Yunnan	163	45.28	115	42.44	57	34.97
Sichuan	110	30.56	90	33.21	33	30.00
Tibet	79	21.94	30	11.07	19	24.05
Guizhou	60	16.67	47	17.34	10	16.67
Guangxi	55	15.28	39	14.39	10	18.18
Hubei	38	10.56	35	12.92	6	15.79
Chongqing	36	10.00	33	12.18	4	11.11
Hunan	33	9.17	29	10.70	5	15.15
Jiangxi	25	6.94	20	7.38	0	0.00
Zhejiang	21	5.83	19	7.01	6	28.57
Guangdong	17	4.72	11	4.06	1	5.88
Fujian	12	3.33	10	3.69	1	8.33
Shaanxi	12	3.33	11	4.06	0	0.00
Henan	11	3.06	10	3.69	0	0.00
Anhui	10	2.78	8	2.95	1	10.00
Gansu	10	2.78	9	3.32	1	10.00
Liaoning	3	0.83	0	0.00	0	0.00
Taiwan	3	0.83	3	1.11	3	100.00
Heilongjiang	3	0.83	0	0.00	0	0.00
Jilin	3	0.83	0	0.00	0	0.00
Shanxi	3	0.83	2	0.74	0	0.00
Jiangsu	3	0.83	3	1.11	0	0.00
Hainan	2	0.56	1	0.37	0	0.00
Hebei	2	0.56	0	0.00	0	0.00
Inner Mongolia	2	0.56	0	0.00	0	0.00
Ningxia	2	0.56	1	0.37	0	0.00
Qinghai	2	0.56	1	0.37	0	0.00
Shandong	2	0.56	0	0.00	0	0.00
Tianjin	2	0.56	0	0.00	0	0.00
Hong Kong	2	0.56	1	0.37	0	0.00
Xinjiang	2	0.56	0	0.00	0	0.00
Macao	1	0.28	0	0.00	0	0.00
Beijing	1	0.28	0	0.00	0	0.00
Shanghai	0	0.00	0	0.00	0	0.00

### 3.2.2. County Scale

A total of 714 county-level administrative units were found to have *Impatiens* spp. distributions. The counties with the highest species richness have as many as 51 species, namely, Gongshan County and Tengchong City, which are the richest county-level administrative units for *Impatiens* spp., while Gongshan County is smaller than Tengchong City. These are followed by Fugong County (42 species) and Lushui City (31 species), both in Yunnan Province. Other county-level administrative units with species richness exceeding 20 species include Emeishan City (27 species), Longyang District (27 species), Dali City (24 species), Nanchuan District (24 species), Shennongjia Forestry District (24 species), Yingjiang County (24 species), Longling County (26 species), and Wuxi County (21 species) (Figure 3a).



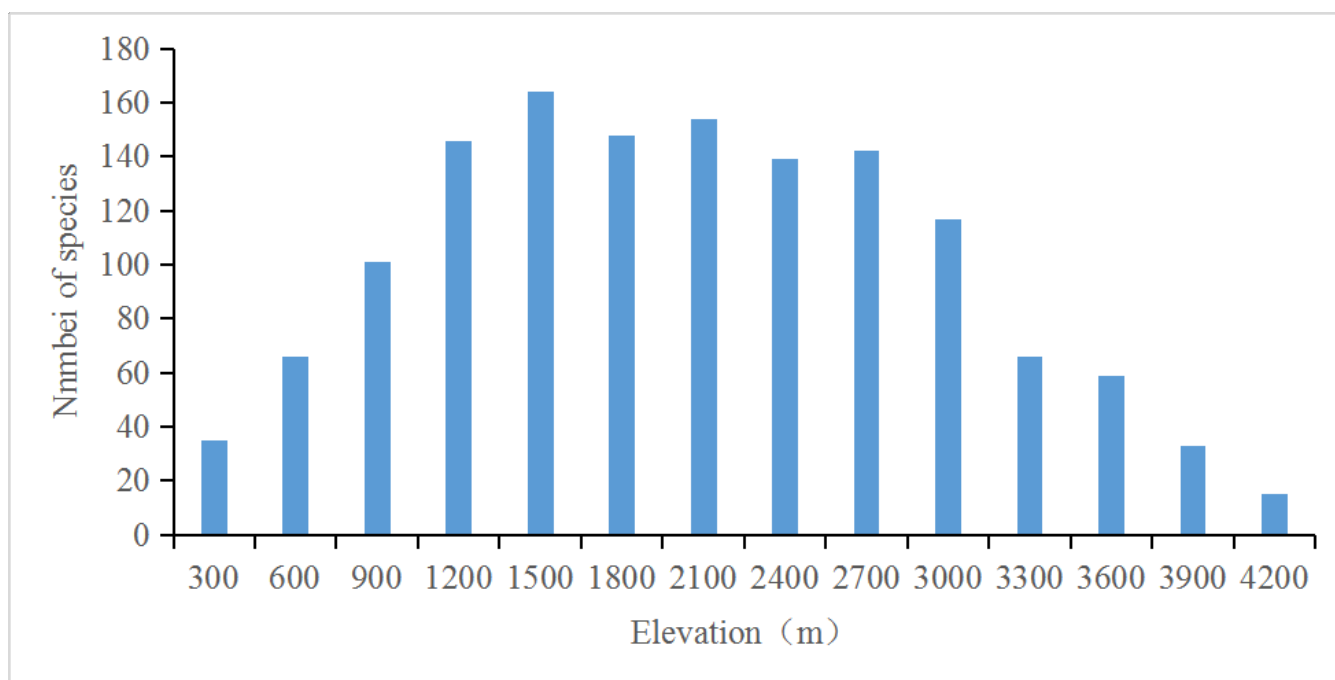
**Figure 3.** Distribution patterns of *Impatiens* spp. at the county level. (a) Distribution map of species richness. (b) Abundance distribution map of Chinese endemic species. (c) Abundance distribution map of provincial endemic species. (d) Distribution map of provincial endemic species/all species in the county.

The county-level administrative region distribution of endemic species in China is mainly distributed in the vast area south of Qinling and the Huaihe River, where there are 525 county-level administrative regions with Chinese endemic species. The counties with the highest abundance of Chinese endemic species are Tengchong City (32 species), Gongshan County (30 species), and Fugong County (25 species) in the northwest of Yunnan Province. The countries with the second-highest abundance are Emeishan City, Sichuan (24 species); Nanchuan District, Chongqing (22 species); and Shennongjia Forest District, Hubei (21 species) (Figure 3b). At the county level, 139 county-level administrative regions were screened for provincial-level endemic species. Emeishan City has 11 provincial-level endemic species and is the county-level administrative unit with the highest number of endemic species, most of which are endemic to Emeishan. Next are Gongshan County (10 species), Tengchong City (9 species), Ebian County (6 species), Fugong County (6 species), Hongya County (6 species), and Lushui City (6 species), all of which are counties with highly abundant provincial-level endemic species (Figure 3c).

Based on the statistics for the proportion of endemic species, we found that the proportion of endemic species and the pattern of species richness are quite different, and the regions with a high proportion of endemic species presented discrete distributions. The counties with the highest proportion of endemic species reach 100%, including Chengjiang City, Dong'an County, Jinkouhe District, Longli County, Lushan County, Midu County, Nima County, Sanmen County, Seda County, Zhangxian County, Zhijin County, and Zhongshan District.

### 3.3. Vertical Distribution Pattern

The elevation distribution range of *Impatiens* spp. in China is 10~4200 m. The species with the lowest distribution is *I. chinensis*; those with the highest are *I. delavayi*, *I. laxiflora*, and *I. margaritifera* var. *humilis*. Based on the elevation distribution range of balsamina in China, we created 14 elevation gradients with an interval of 300 m to divide the species richness statistics. The elevation range with the highest species richness is 1200~1500 m, where there are 164 species of *Impatiens* spp., and the lowest richness is found in 3900~4200, with only 15 species. High abundance was maintained between 900 and 2700 m, with more than 139 species at each elevation, while the species richness decreases sharply above 3000 m (Figure 4).

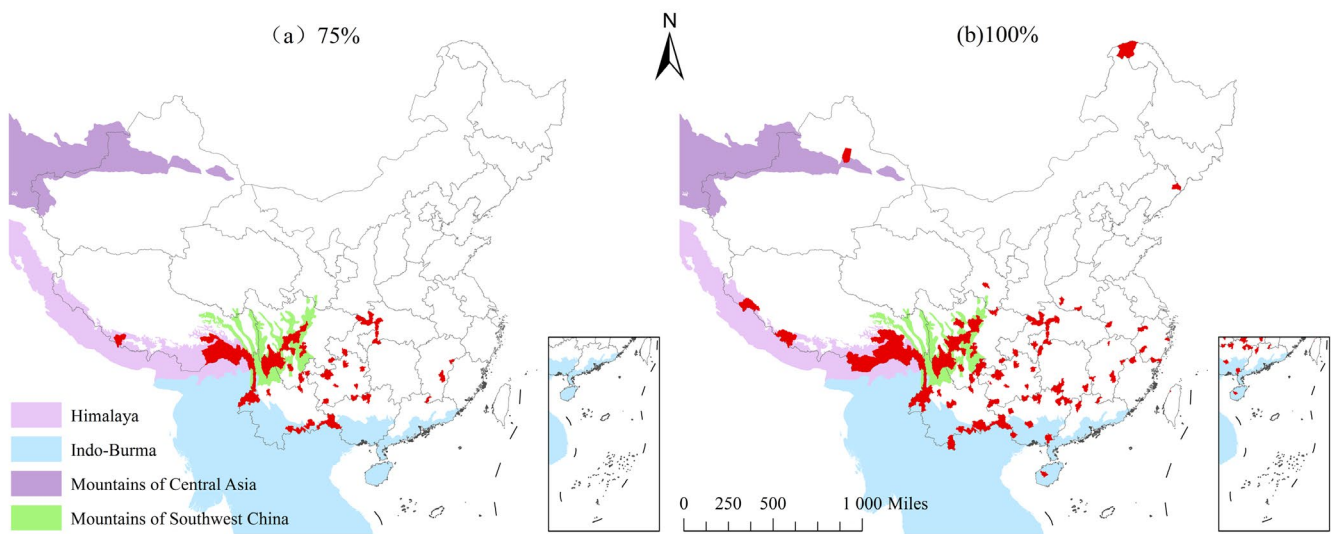


**Figure 4.** Vertical distribution of *Impatiens* spp. in China.

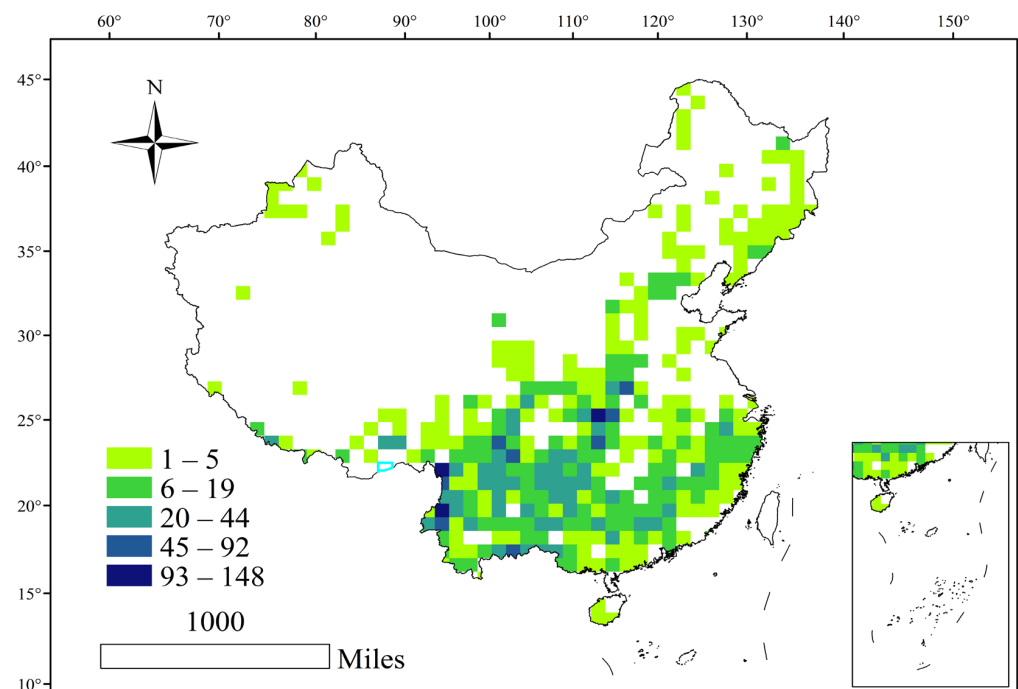
### 3.4. Hotspots

When the screened species reached 75%, including 265 species of *Impatiens* spp., 54 hotspots were obtained. Thirteen counties overlapped with the Indo–Burma region among the global biodiversity hotspots, four counties overlapped with the Himalayas, and eighteen counties overlapped with the mountains of Southwest China. The rest of the hotspots were mainly distributed in the Daba Mountains, western Hubei, eastern Chongqing, and Guizhou Province (Figure 5a). When the number of species screened reached 100%, a total of 110 hotspots were obtained (Figure 5b), among which the hotspots with the highest concentrations overlapped with the southwest mountains, the Himalayas, and the Indo–Burma regions among the global biodiversity regions. The rest were scattered. The terrain of China is high in the west and low in the east, and is divided into three steps based on the average elevation. *Impatiens* spp. are mainly concentrated in the transition zone of the three steps, are highly dependent on the humid mountainous environment, and are rarely distributed in the plains and basins. The species distribution density is generally high in the Hengduan Mountains, Southern Tibet, Yunnan, Guizhou, the Guangxi karst region, the Qinling–Daba Mountains, and the southeast hills (Figure 6).





**Figure 5.** The hotspots of *Impatiens* spp. in China, established based on the screening algorithm and its location with relation to global biodiversity hotspots. (a) The screened species reach 75%; (b) the screened species reach 100%.



**Figure 6.** Species richness distribution pattern of *Impatiens* spp. in China.

### 3.5. Relationship with Environmental Factors

The annual precipitation and the minimal temperature of the coldest month had a cumulative contribution rate of >10% and were the most important climatic factors in the distribution of *Impatiens* spp. The contribution rate of mean annual rainfall amounted to 65.7%, and the contribution rate of the minimum temperature of the coldest month amounted to 14.6%. The subsequent factors were altitude and annual temperature range. The cumulative contribution of these four environmental variables reached 93.7%, and they were dominant in affecting the distribution of *Impatiens* spp. in China.

The annual precipitation was the strongest environmental factor. *Impatiens* spp. are delicate plants with fleshy, juicy stems. Abundant water is the most important condition for their growth, meaning they often grow in shady and moist places at the bottom of

valleys and streams, as well as in the undergrowth of forests. Some species, such as the *Impatiens procumbens*, can be fully submerged in water during the nutrient growth phase before flowering. The minimal temperature of the coldest month was the second-highest contributing climatic factor after annual precipitation, indicating that extreme cold weather severely affects the distribution of *Impatiens* spp. in China. The area south of Qinling Mountain–Huaihe River had a distribution of about 92% for Chinese *Impatiens* spp. Less than 30 *Impatiens* spp. were distributed north of this area, including some widely distributed and naturalized species, such as *I. noli-tangere*, *I. stenosepala*, *I. glandulifera*, etc. The contribution rate ranking of environmental factors affecting *Impatiens* spp. in China is as follows: moisture factor > heat factor > topography factor. The annual precipitation was 419.9~2004.4 mm and the minimal temperature of the coldest month was  $-15.6\sim-22.7\text{ }^{\circ}\text{C}$ , both of which are suitable for the survival of *Impatiens* spp.

#### 4. Discussion

Because the plants of *Impatiens* spp. are tender and juicy, specimens are not easy to dry or preserve. It is difficult to determine the original morphological characteristics of fragile flowers after they are flattened, and continuous variations in flower morphology, leaf morphology, and root morphology make it very difficult to classify their genera. With the completion of the compilation of *Flora Reipublicae Popularis Sinica*, *Flora of China*, and local botanical books, China has more detailed data on the plant resources of *Impatiens* spp. However, as one of the major distribution centers of *Impatiens* in the world, field survey and plant taxonomy research in the country is not adequate. The species diversity catalog of *Impatiens* established in this paper is based on *Flora Reipublicae Popularis Sinica* and *Flora of China*, both of which objectively include the published wild *Impatiens* spp. present in China. Molecular technology has become an important technical means of determining plant taxonomy. Some species are independent species at the molecular level, but they are difficult to morphologically distinguish from their relatives, which increases the difficulty of species identification in the field. It is important to establish a scientific list of wild *Impatiens* in China by integrating morphological and molecular evidence, conducting textual research and analysis on the origin of species patterns and collection history, and carrying out reasonable taxonomic treatments of suspected species. Research on the distribution of species should be based on accurate identification. The evolution and distribution of this genus can be more accurately determined only with further taxonomic studies and revisions of mispublished and misidentified species. This study lays the foundation for subsequent studies of Balsaminaceae diversity and is conducive to the development and use of *Impatiens* spp. resources. The distribution data obtained from extensive research can also more accurately show the distribution of Balsaminaceae in China.

Some scholars have investigated and studied the hotspot mountainous areas in China, such as Yiyang Cong [13,14], who conducted a detailed resource survey of the Hengduan Mountains and the Gaoligong Mountains and an in-depth study of the species composition, systematic characteristics, distribution, and origin of the genus *Impatiens* in this region. They found that the *Impatiens* spp. flora in the Hengduan Mountains region have an ancient evolutionary history, and their work has an important position in the global study of this species. With deepening botanical research, a large number of new taxa have been discovered [42], and the number of species in each region has increased greatly. However, affected by a variety of factors, such as anthropogenic interference and climate change, the habitats of *Impatiens* spp. are shrinking, and some species are facing endangerment [43], such as *Impatiens hainanensis*, which is a key wild plant under provincial protection, and relevant scholars have carried out many conservation studies on this species [44–46].

This study only quantified the dominant environmental factors affecting the distribution of *Impatiens* in China with respect to hydro-thermal factors and altitude, and the ways in which other environmental conditions, such as anthropogenic disturbances, vegetation types, and climate change, affect the distribution ranges of their species is still a worthy topic of research.

## 5. Conclusions

As of February 2023, 359 *Impatiens* taxa and *Hydrocera triflora* had been recorded in China. With deepening field investigations, the publication of new *Impatiens* taxa in China is growing at a stable rate. At the provincial level, Yunnan and Sichuan are not only the provinces with the highest *Impatiens* species richness in China, but are also the provinces with the highest proportion of endemic species. Yunnan and Sichuan overlap with the Indo–Burma region, global biodiversity hotspots, and the Hengduan Mountains of southwest China. These two provinces contain 63% of the *Impatiens* species in China. At the county level, the three administrative regions with the highest species richness are Gongshan County, Tengchong City, and Fugong County in Yunnan Province. The highest provincial-level endemic species richness is in Emeishan City in Sichuan Province, and most species are distributed on Emei Mountain. Given the special geographical location and natural conditions of Emei Mountain, its floristic elements have an ancient origin, which indicates the richness of its unique plant species population [47]. In screening Chinese hotspots, we found that most overlap with the global biodiversity hotspots, while the rest are scattered. When the screening species reached 100%, 110 hotspot counties were found. Some contained fewer species of the genus *Impatiens*, but some regional endemic species could not be found in other regions, and thus, they had a high complementary contribution and irreplaceability.

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**Data Availability Statement:** A dataset on the diversity and geographical distributions of wild *Impatiens* spp. in China can be downloaded at <http://dataopen.info/home/datafile/index/id/246> (accessed on 20 May 2022).

**Conflicts of Interest:** The authors declare no conflict of interest.

## Appendix A

**Table A1.** List of Balsaminaceae in China.

No.	Scientific Name	Synonym	China Specific	Altitudinal Limits (m)	Distribution in China
1	<i>Hydrocera triflora</i> (L.) Wight & Arn.	<i>Impatiens triflora</i> L. <i>Tytonia triflora</i> (L.) C.E.Wood <i>Balsamina angustifolia</i> Blume <i>Hydrocera angustifolia</i> (Blume) Blume ex Wight & Arn. <i>Impatiens angustifolia</i> Blume <i>Impatiens baccifera</i> Roxb. ex Wight & Arn. <i>Impatiens natans</i> Willd. <i>Tytonia natans</i> (Willd.) G.Don		100	Hainan
2	<i>Impatiens abbatis</i> Hook.f.		√	1200~2100	Yunnan

Table A1. Cont.

No.	Scientific Name	Synonym	China Specific	Altitudinal Limits (m)	Distribution in China
3	<i>Impatiens aconitoides</i> Y.M.Shui & W.H.Chen		✓	1800~2000	Yunnan
4	<i>Impatiens alpicola</i> Y.L.Chen & Y.Q.Lu		✓	1050~2900	Sichuan, Chongqing, Hubei, Yunnan
5	<i>Impatiens amabilis</i> Hook.f.		✓	1100~3100	Sichuan
6	<i>Impatiens amplexicaulis</i> Edgew.	<i>Impatiens sulcata</i> var. <i>amplexicaulis</i> (Edgew.) R.Kr.Singh & D.Borah		2900~3900	Tibet
7	<i>Impatiens angulata</i> S.X.Yu, Y.L.Chen & H.N.Qin			200~600	Guangxi
8	<i>Impatiens anhuiensis</i> Y.L.Chen		✓	1200	Anhui
9	<i>Impatiens apalophylla</i> Hook.f.			200~2300	Guizhou, Guangdong, Guangxi, Yunnan, Jiangxi
10	<i>Impatiens apsotis</i> Hook.f.		✓	2000~3900	Qinghai, Sichuan, Tibet, Shaanxi, Yunnan
11	<i>Impatiens aquatilis</i> Hook.f.	<i>Impatiens gagnepainii</i> Hook. ex H.Lév. <i>Impatiens tongchouanensis</i> H.Lév.	✓	200~3400	Guizhou, Yunnan, Sichuan, Guangxi
12	<i>Impatiens arctosepala</i> Hook.f.		✓	1800~2746	Yunnan
13	<i>Impatiens arguta</i> Hook.f. & Thomson	<i>Impatiens arguta</i> var. <i>bulleyana</i> Hook.f. <i>Impatiens gagei</i> Hook.f. <i>Impatiens taliensis</i> Lingelsh. & Borza		900~3800	Guizhou, Tibet, Yunnan, Sichuan
14	<i>Impatiens armeniaca</i> S.H.Huang		✓	950~1500	Yunnan
15	<i>Impatiens aureliana</i> Hook.f.			680~2800	Yunnan
16	<i>Impatiens austroyunnanensis</i> S.H.Huang			1850~2700	Yunnan
17	<i>Impatiens bachii</i> H.Lév.		✓	1900~2930	Yunnan
18	* <i>Impatiens balsamina</i> L.	<i>Balsamina balsamina</i> (L.) Huth <i>Balsamina hortensis</i> Desp. <i>Impatiens balsamina</i> var. <i>vulgaris</i> Wight & Arn.		10~2000	Beijing, Hebei, Jilin, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, Henan, Hubei, Hunan, Guangdong, Guangxi, Hainan, Chongqing, Sichuan, Guizhou, Yunnan, Ningxia, Taiwan
19	<i>Impatiens bahanensis</i> Hand.-Mazz.		✓	300~3000	Yunnan, Tibet
20	<i>Impatiens baishaensis</i> B.Ding & H.P.Deng		✓	2100~2300	Sichuan
21	<i>Impatiens balansae</i> Hook.f.			300~1400	Yunnan
22	<i>Impatiens baokangensis</i> Q.L.Gan & X.W.Li		✓	1430~1450	Hubei
23	<i>Impatiens barbata</i> H.F.Comber		✓	2000~3000	Sichuan, Yunnan
24	<i>Impatiens begoniifolia</i> S.Akiyama & H.Ohba		✓	1000~1400	Yunnan, Guangxi
25	<i>Impatiens bellula</i> Hook.f.		✓	1000~2900	Chongqing, Hubei

Table A1. Cont.

No.	Scientific Name	Synonym	China Specific	Altitudinal Limits (m)	Distribution in China
26	<i>Impatiens bicornuta</i> Wall.			2400~2800	Tibet
27	<i>Impatiens bijieensis</i> X.X.Bai & L.Y.Ren		✓	1915~2800	Guizhou
28	<i>Impatiens biluoxueshanensis</i> S.Akiyama & S.K.Wu		✓	2540	Yunnan
29	<i>Impatiens blepharosepala</i> E.Pritz.	<i>Impatiens silvestrii</i> Pamp.	✓	200~2280	Guizhou, Anhui, Fujian, Hubei, Hunan, Jiangxi, Guangdong, Guangxi, Zhejiang, Sichuan, Yunnan, Henan, Jiangsu
30	<i>Impatiens blinii</i> H.Lév.		✓	880~2800	Yunnan, Hunan, Guangxi
31	<i>Impatiens bodinieri</i> Hook.f.		✓	700~2345	Guizhou, Sichuan, Hubei, Guangxi, Yunnan
32	<i>Impatiens bomiensis</i> Y.Y.Cong & Y.C.Peng		✓	3035	Tibet
33	<i>Impatiens brachycentra</i> Kar. & Kir.			800~2100	Xinjiang
34	<i>Impatiens bracteata</i> Colebr. ex Wall.	<i>Impatiens fimbriata</i> Hook.		2700	Tibet
35	<i>Impatiens bracteolata</i> Hook.f.			1500~2200	Tibet
36	<i>Impatiens brevipes</i> Hook.f.		✓	1500~1800	Sichuan, Chongqing
37	<i>Impatiens bullatisepala</i> G.W.Hu, Y.Y.Cong & Q.F.Wang		✓	1027	Guizhou
38	<i>Impatiens cavaleriei</i> X.X.Bai & R.X.Huang		✓	1151	Guizhou
39	<i>Impatiens ceratophora</i> H.F.Comber			1700~2950	Yunnan
40	<i>Impatiens chashanensis</i> H.Y.Bi & S.X.Yu		✓	2500	Sichuan
41	<i>Impatiens chekiangensis</i> Y.L.Chen		✓	160~1000	Zhejiang, Jiangxi, Fujian
42	<i>Impatiens chekiangensis</i> Y.L.Chen var. <i>cangnanensis</i> Y.L.Xu & X.F.Jin		✓	180~260	Zhejiang
43	<i>Impatiens chekiangensis</i> Y.L.Chen var. <i>multiflora</i> Y.L.Xu & X.F.Jin		✓	200~800	Anhui, Zhejiang
44	<i>Impatiens chenmoui</i> Zheng W.Wang, Xiao C.Li & Q.Wang ter		✓	1639	Yunnan
45	<i>Impatiens chimiliensis</i> H. F. Comber			2354~3700	Tibet, Yunnan
46	<i>Impatiens chinensis</i> L.	<i>Impatiens crassicornu</i> Hook.f. <i>Impatiens cosmia</i> Hook.f.		10~3100	Anhui, Fujian, Guangdong, Hainan, Jiangxi, Yunnan, Zhejiang, Hong Kong, Guangxi, Hunan, Sichuan, Macao
47	<i>Impatiens chishuiensis</i> Y.X.Xiong		✓	398~950	Guizhou

Table A1. Cont.

No.	Scientific Name	Synonym	China Specific	Altitudinal Limits (m)	Distribution in China
48	<i>Impatiens chiulungensis</i> Y.L.Chen		✓	2700~2900	Sichuan, Yunnan
49	<i>Impatiens chlorosepala</i> Hand.-Mazz.		✓	250~1610	Guizhou, Guangdong, Guangxi, Hunan, Jiangxi
50	<i>Impatiens chungtienensis</i> Y.L.Chen	<i>Impatiens badrinathii</i> Pusalkar & D.K.Singh		3200~3300	Yunnan
51	<i>Impatiens citrina</i> Hook.f.			1000~1560	Tibet
52	<i>Impatiens clavicuspis</i> Hook.f. ex W.W.Sm.			700~3500	Yunnan, Guangxi
53	<i>Impatiens clavicuspis</i> Hook.f. var. <i>brevicuspis</i> Hand.-Mazz.		✓	2400~3450	Yunnan
54	<i>Impatiens clavigera</i> Hook.f.			1000~1800	Guangxi, Yunnan, Guangdong, Guizhou
55	<i>Impatiens clavigera</i> Hook.f. var. <i>auriculata</i> S.H.Huang		✓	370~1200	Guizhou, Yunnan, Guangxi
56	<i>Impatiens commelinoides</i> Hand.-Mazz.		✓	300~1500	Guizhou, Fujian, Guangdong, Hunan, Jiangxi, Zhejiang, Sichuan, Guangxi, Chongqing
57	<i>Impatiens compta</i> Hook.f.		✓	1400~2200	Chongqing, Hubei
58	<i>Impatiens conaensis</i> Y.L.Chen		✓	2700~2800	Tibet
59	<i>Impatiens conchibracteata</i> Y.L.Chen & Y.Q.Lu		✓	900~2800	Sichuan
60	<i>Impatiens corchorifolia</i> Franch.		✓	1200~4000	Sichuan, Yunnan
61	<i>Impatiens cornucopia</i> Franch.		✓	1900~2700	Sichuan, Yunnan
62	<i>Impatiens cornutisepala</i> S.X.Yu, Y.L.Chen & H.N.Qin		✓	100~1300	Guangxi
63	<i>Impatiens crassicaudex</i> Hook.f.		✓	3000~4100	Sichuan, Tibet, Yunnan
64	<i>Impatiens crenulata</i> Hook.f.		✓	1900~2400	Chongqing
65	<i>Impatiens cyanantha</i> Hook.f.		✓	850~2550	Guizhou, Yunnan, Fujian, Chongqing, Sichuan, Hunan, Guangxi
66	<i>Impatiens cyathiflora</i> Hook.f.		✓	1000~2720	Guizhou, Yunnan, Chongqing, Sichuan, Guangxi, Jiangxi
67	<i>Impatiens cyclosepala</i> Hook.f.		✓	1555~2700	Tibet, Yunnan
68	<i>Impatiens cymbifera</i> Hook.f.			2500~3500	Tibet
69	<i>Impatiens daguanensis</i> S.H.Huang		✓	1700~1750	Yunnan
70	<i>Impatiens dalaiensis</i> Gogoi & Borah			2052	Yunnan
71	<i>Impatiens damingensis</i> S.X.Yu, Chang Y.Xia & H.P.Deng		✓	1120	Guangxi
72	<i>Impatiens damrongii</i> T.Shimizu	<i>Impatiens wenshanensis</i> S.H.Huang <i>Impatiens clavigeroides</i> S.Akiyama, H.Ohba & S.K.Wu		1700~2200	Yunnan, Guangxi

Table A1. Cont.

No.	Scientific Name	Synonym	China Specific	Altitudinal Limits (m)	Distribution in China
73	<i>Impatiens dasyoexilla</i> Q.L.Gan & X.W.Li		✓	700~1477	Hubei
74	<i>Impatiens davidii</i> Franch.		✓	300~2000	Guizhou, Anhui, Fujian, Hubei, Hunan, Jiangxi, Zhejiang, Guangdong, Sichuan
75	<i>Impatiens delavayi</i> Franch.		✓	600~4200	Sichuan, Tibet, Yunnan
76	<i>Impatiens deqinensis</i> S.H.Huang		✓	3680	Yunnan
77	<i>Impatiens desmantha</i> Hook.f.	<i>Impatiens valbrayana</i> H.Lév. <i>Impatiens gracilipes</i> Hook.f. <i>Impatiens recticalcarata</i> S.Akiyama <i>Impatiens recticalcarata</i> f. <i>alba</i> S.Akiyama		1550~4000	Tibet, Yunnan, Chongqing, Sichuan
78	<i>Impatiens devolii</i> T.C.Huang		✓	2000~2100	Taiwan
79	<i>Impatiens diaphana</i> Hook.f.		✓	1200~2100	Chongqing
80	<i>Impatiens dicentra</i> Franch. ex Hook.f.		✓	200~2800	Guizhou, Yunnan, Henan, Hubei, Shaanxi, Sichuan, Hunan, Chongqing, Jiangxi, Guangxi
81	<i>Impatiens dichroa</i> Hook.f.		✓	1200~2900	Guizhou, Yunnan, Sichuan
82	<i>Impatiens dichroocarpa</i> H.Lév.		✓	2700	Yunnan
83	<i>Impatiens dimorphophylla</i> Franch.		✓	2410~3400	Sichuan, Yunnan
84	<i>Impatiens distracta</i> Hook.f.		✓	1400~2000	Sichuan
85	<i>Impatiens divaricata</i> Franch.		✓	2000~3200	Yunnan, Sichuan
86	<i>Impatiens dolichoceras</i> E.Pritz.		✓	1200~2100	Guizhou, Chongqing, Hubei
87	<i>Impatiens dorjeekhandui</i> Chowlu, S.S.Dash & Gogoi		✓	1719	Tibet
88	<i>Impatiens drepanophora</i> Hook.f.			950~2960	Tibet, Yunnan
89	<i>Impatiens duclouxii</i> Hook.f.	<i>Impatiens jurpioides</i> T.Shimizu <i>Impatiens jurpia</i> var. <i>jurpioides</i> (T.Shimizu) T.Shimizu		400~2700	Guizhou, Yunnan, Sichuan, Guangxi, Guangdong, Zhejiang
90	<i>Impatiens epilobioides</i> Y.L.Chen		✓	800~2500	Guizhou, Sichuan, Chongqing, Yunnan
91	<i>Impatiens ernstii</i> Hook.f.		✓	1000~2500	Sichuan, Yunnan
92	<i>Impatiens exiguiflora</i> Hook.f.		✓	800~1600	Hubei
93	<i>Impatiens extensifolia</i> Hook.f.		✓	1090~1900	Yunnan
94	<i>Impatiens faberi</i> Hook.f.		✓	1200~2323	Sichuan
95	<i>Impatiens falcifera</i> Hook.f.			2007~3600	Sichuan, Tibet

Table A1. Cont.

No.	Scientific Name	Synonym	China Specific	Altitudinal Limits (m)	Distribution in China
96	<i>Impatiens fanjingshanica</i> Y.L.Chen		✓	680~1500	Guizhou
97	<i>Impatiens fargesii</i> Hook.f.		✓	1300~1600	Chongqing, Hubei, Guizhou
98	<i>Impatiens fenghwaiana</i> Y.L.Chen		✓	310~1248	Jiangxi, Zhejiang, Hubei, Hunan
99	<i>Impatiens fissicornis</i> Maxim.		✓	440~2100	Gansu, Hubei, Shaanxi, Sichuan
100	<i>Impatiens forrestii</i> Hook.f.			2600~3300	Sichuan, Yunnan
101	<i>Impatiens fragicolor</i> C. Marquand & Airy Shaw			2600~4000	Tibet, Yunnan, Sichuan
102	<i>Impatiens fugongensis</i> K.M.Liu & Y.Y.Cong			1450~2500	Yunnan
103	<i>Impatiens furcillata</i> Hemsl.			700~1100	Hebei, Heilongjiang, Jilin, Liaoning, Inner Mongolia, Tianjin
104	<i>Impatiens gamblei</i> Hook.f.			2400~3600	Tibet
105	<i>Impatiens gammiei</i> Hook.f.			3000~3600	Tibet
106	<i>Impatiens gasterocheila</i> Hook.f.		✓	900	Sichuan
107	* <i>Impatiens glandulifera</i> Royle			160	Heilongjiang
108	<i>Impatiens gongchengensis</i> Z.C.Lu, B.Pan & Yan Liu		✓	1100~1200	Guangxi
109	<i>Impatiens gongshanensis</i> Y.L.Chen			1200~1500	Yunnan, Sichuan
110	<i>Impatiens guiqingensis</i> S.X.Yu		✓	2440	Gansu
111	<i>Impatiens guizhouensis</i> Y.L.Chen		✓	700~1120	Guizhou, Yunnan, Sichuan, Hubei, Hunan
112	<i>Impatiens hainanensis</i> Y.L.Chen		✓	1200~1300	Hainan, Hunan
113	<i>Impatiens hancockii</i> C.H.Wright		✓	1000~1400	Yunnan
114	<i>Impatiens harae</i> H.Ohba & S.Akiyama			1500~2800	Tibet
115	<i>Impatiens henanensis</i> Y.L.Chen		✓	1200~1500	Henan, Shanxi, Jiangsu
116	<i>Impatiens hengduanensis</i> Y.L.Chen		✓	1266~1500	Yunnan
117	<i>Impatiens henryi</i> E.Pritz.		✓	1000~2253	Hubei, Jiangsu, Chongqing
118	<i>Impatiens holocentra</i> Hand.-Mazz.			1150~3105	Yunnan, Sichuan
119	<i>Impatiens hongkongensis</i> Grey-Wilson		✓	100~300	Hong Kong, Guangdong
120	<i>Impatiens huangyanensis</i> X.F.Jin & B.Y.Ding		✓	200~700	Fujian, Zhejiang
121	<i>Impatiens huangyanensis</i> X.F.Jin & B.Y.Ding subsp. <i>attenuata</i> X.F.Jin & Z.H.Chen		✓	150	Zhejiang
122	<i>Impatiens hunanensis</i> Y.L.Chen		✓	450~800	Guizhou, Guangdong, Guangxi, Hunan, Jiangxi



Table A1. Cont.

No.	Scientific Name	Synonym	China Specific	Altitudinal Limits (m)	Distribution in China
123	<i>Impatiens imbecilla</i> Hook.f.		✓	1300~2300	Sichuan
124	<i>Impatiens infirma</i> Hook.f.		✓	2700~3600	Sichuan, Tibet, Yunnan
125	<i>Impatiens jinggangensis</i> Y.L.Chen		✓	500~1240	Jiangxi, Hunan, Fujian, Guangdong
126	<i>Impatiens jinpingensis</i> Y.M.Shui & G.F.Li		✓	1650	Yunnan
127	<i>Impatiens jiulongshanica</i> Y.L.Xu & Y.L.Chen		✓	878~1800	Guizhou, Zhejiang, Jiangxi, Hunan
128	<i>Impatiens jurpia</i> Buch.-Ham.			1100~2200	Tibet
129	<i>Impatiens kamtilongensis</i> Toppin			500~1248	Yunnan, Guangxi
130	<i>Impatiens kerriae</i> Craib			600~2100	Yunnan
131	<i>Impatiens labordei</i> Hook.f.		✓	1400	Guizhou
132	<i>Impatiens lacinulifera</i> Y.L.Chen		✓	1400~1600	Gansu, Sichuan, Shaanxi
133	<i>Impatiens lancisepala</i> S.H.Huang		✓	300~1720	Yunnan
134	<i>Impatiens laojunshanensis</i> S.H.Huang		✓	1830	Yunnan
135	<i>Impatiens lasiophyton</i> Hook.f.		✓	585~2700	Guizhou, Guangxi, Yunnan, Jiangxi, Hunan
136	<i>Impatiens latebracteata</i> Hook.f.		✓	300~2200	Sichuan, Shaanxi, Anhui
137	<i>Impatiens lateristachys</i> Y.L.Chen & Y.Q.Lu		✓	990~2500	Sichuan
138	<i>Impatiens latiflora</i> Hook.f. & Thomson			400~1000	Tibet
139	<i>Impatiens latipetala</i> S.H.Huang		✓	1300	Yunnan
140	<i>Impatiens laxiflora</i> Edgew.	<i>Impatiens sunkoshiensis</i> S.Akiyama, H.Ohba & Wakab. <i>Impatiens leggei</i> Pusalkar & D.K.Singh		2550~4200	Tibet, Yunnan, Sichuan
141	<i>Impatiens lecomtei</i> Hook.f.			1420~3000	Guizhou, Yunnan, Sichuan
142	<i>Impatiens lemeei</i> H.Lév.	<i>Impatiens hookeriana</i> H.Lév.	✓	1181~3000	Yunnan, Sichuan
143	<i>Impatiens lepida</i> Hook.f.		✓	1000~2500	Guizhou, Yunnan
144	<i>Impatiens leptocaulon</i> Hook.f.		✓	188~3000	Guizhou, Henan, Hubei, Hunan, Sichuan, Yunnan, Chongqing, Jiangxi, Guangxi
145	<i>Impatiens leveillei</i> Hook.f.		✓	1200~1300	Guizhou
146	<i>Impatiens liangshanensis</i> Q.Luo		✓	2100~3100	Sichuan
147	<i>Impatiens liboensis</i> K.M.Liu & R.P.Kuang		✓	450~520	Guizhou
148	<i>Impatiens lihengiana</i> Y.Y.Cong & G.W.Hu		✓	517	Hunan
149	<i>Impatiens lilacina</i> Hook.f.		✓	1900	Yunnan
150	<i>Impatiens linearisepala</i> S.Akiyama, H.Ohba & S.K.Wu		✓	400~2000	Guizhou, Yunnan, Guangxi
151	<i>Impatiens linghziensis</i> Y.L.Chen		✓	2500~2700	Tibet

Table A1. Cont.

No.	Scientific Name	Synonym	China Specific	Altitudinal Limits (m)	Distribution in China
152	<i>Impatiens linocentra</i> Hand.-Mazz.		✓	800~1800	Henan, Shaanxi, Hunan
153	<i>Impatiens liupanshuiensis</i> X.X.Bai & T.H.Yuan		✓	2730~2887	Guizhou
154	<i>Impatiens lixianensis</i> S.X.Yu		✓	2680~3000	Sichuan
155	<i>Impatiens lizipingensis</i> Q.Luo		✓	2506~2850	Sichuan
156	<i>Impatiens lobulifera</i> S.X.Yu, Y.L.Chen & H.N.Qin		✓	700~1000	Guangxi
157	<i>Impatiens longialata</i> E.Pritz.		✓	500~2500	Guizhou, Hubei, Sichuan, Chongqing, Hunan, Yunnan
158	<i>Impatiens longiaristata</i> S.Peng, G.W.Hu & Q.F.Wang		✓	2680	Sichuan
159	<i>Impatiens longicornuta</i> Y.L.Chen		✓		Hunan
160	<i>Impatiens longipes</i> Hook.f. & Thomson			1300~4100	Tibet, Yunnan
161	<i>Impatiens longirostris</i> S.H.Huang		✓	1850~2700	Yunnan
162	<i>Impatiens longlinensis</i> S.X.Yu		✓	1780	Guangxi
163	<i>Impatiens longshanensis</i> Y.Y.Cong & Y.X.Song		✓	1194~1336	Hunan
164	<i>Impatiens longyangensis</i> Y.Y.Cong, G.W.Hu & S.Peng		✓	2391	Yunnan
165	<i>Impatiens loulanensis</i> Hook.f.		✓	700~3750	Guizhou, Yunnan, Guangdong, Sichuan
166	<i>Impatiens luchunensis</i> S.Akiyama, H.Ohba & S.K.Wu		✓	250~2500	Yunnan
167	<i>Impatiens lucorum</i> Hook.f.		✓	800~2800	Sichuan, Guizhou
168	<i>Impatiens lushiensis</i> Y.L.Chen	<i>Impatiens heterosepala</i> S.Y.Wang	✓	500~1200	Henan, Anhui
169	<i>Impatiens macrantha</i> S.X.Yu & Ying Qin		✓	300~574	Guangxi
170	<i>Impatiens macrovexilla</i> Y.L.Chen		✓	100~1640	Guangxi, Hunan
171	<i>Impatiens macrovexilla</i> Y.L.Chen var. <i>yaoshanensis</i> S.X.Yu, Y.L.Chen & H.N.Qin		✓	100~1640	Guangxi, Hunan, Guizhou, Jiangxi
172	<i>Impatiens maculifera</i> S.X.Yu & Chang Y.Xia			1000~1200	Yunnan
173	<i>Impatiens maguanensis</i> S.Akiyama, H.Ohba & S.K.Wu		✓	1350~2500	Yunnan, Guangxi
174	<i>Impatiens mairei</i> H.Lév.		✓	2600~2700	Yunnan
175	<i>Impatiens malipoensis</i> S.H.Huang		✓	700~1500	Yunnan, Guangxi

Table A1. Cont.

No.	Scientific Name	Synonym	China Specific	Altitudinal Limits (m)	Distribution in China
176	<i>Impatiens margaritifera</i> Hook.f.		✓	1500~3940	Yunnan, Tibet, Sichuan
177	<i>Impatiens margaritifera</i> Hook.f. var. <i>humilis</i> Y.L.Chen			2700~4200	Sichuan, Yunnan, Tibet, Hubei
178	<i>Impatiens margaritifera</i> Hook.f. var. <i>purpurascens</i> Y.L.Chen		✓	2600	Tibet
179	<i>Impatiens marianae</i> Van Geert			400	Tibet
180	<i>Impatiens martinii</i> Hook.f.		✓	700~2000	Guizhou, Chongqing, Sichuan
181	<i>Impatiens medogensis</i> Y.L.Chen		✓	2800~3600	Tibet
182	<i>Impatiens membranifolia</i> Franch. ex Hook.f.		✓	1100~1600	Chongqing, Hubei
183	<i>Impatiens</i> <i>menghuochengensis</i> Q.Luo		✓	2751~2769	Sichuan
184	<i>Impatiens meyana</i> Hook.f.		✓	1800~3000	Yunnan
185	<i>Impatiens microcentra</i> Hand.-Mazz.		✓	2200~3500	Yunnan
186	<i>Impatiens microstachys</i> Hook.f.		✓	2000~2500	Sichuan
187	<i>Impatiens minimisepala</i> Hook.f.		✓	1900	Yunnan
188	<i>Impatiens morsei</i> Hook.f.			220~1000	Guangxi, Yunnan, Jiangxi
189	<i>Impatiens muliensis</i> Y.L.Chen		✓	1450~3500	Sichuan, Chongqing
190	<i>Impatiens multiramea</i> S.H.Huang		✓	1000~1300	Yunnan
191	<i>Impatiens mussotii</i> Hook.f.		✓	1400~3000	Sichuan
192	<i>Impatiens musyana</i> Hook.f.			800~1900	Yunnan
193	<i>Impatiens</i> <i>namcharwensis</i> R.J.Morgan, Y.M.Yuan & X.J.Ge		✓	900~1000	Tibet
194	<i>Impatiens nanlingensis</i> A.Q.Dong & F.W.Xing		✓	1000~1050	Guizhou, Guangdong
195	<i>Impatiens napoensis</i> Y.L.Chen			800~1780	Guizhou, Guangxi, Yunnan
196	<i>Impatiens nasuta</i> Hook.f.		✓	1200~2500	Chongqing, Hubei, Shaanxi
197	<i>Impatiens neglecta</i> Y.L.Xu & Y.L.Chen		✓	1000~1200	Anhui, Zhejiang, Jiangxi
198	<i>Impatiens nobilis</i> Hook.f.		✓	1900	Yunnan Guizhou, Anhui, Beijing, Gansu, Hebei, Henan, Heilongjiang, Jilin, Liaoning, Inner Mongolia, Shandong, Shanxi, Shaanxi, Zhejiang, Qinghai, Guangdong, Hubei, Hunan, Ningxia, Tianjin, Jiangxi, Sichuan, Chongqing, Guangxi
199	<i>Impatiens noli-tangere</i> L.			300~2800	

Table A1. Cont.

No.	Scientific Name	Synonym	China Specific	Altitudinal Limits (m)	Distribution in China
200	<i>Impatiens notolopha</i> Maxim.		✓	1500~3600	Guizhou, Gansu, Henan, Shaanxi, Sichuan, Yunnan, Ningxia
201	<i>Impatiens nubigena</i> W.W.Smith		✓	2700~4050	Sichuan, Tibet, Yunnan
202	<i>Impatiens nushanensis</i> Zi Wang, P.P.Wu & S.X.Yu		✓	3200~3300	Yunnan
203	<i>Impatiens nyimana</i> C.Marquand & Airy Shaw		✓	2380~3600	Tibet
204	<i>Impatiens obesa</i> Hook.f.	<i>Impatiens eramosa</i> Tutcher	✓	144~800	Guangdong, Hunan, Jiangxi, Guangxi
205	<i>Impatiens oblongipetala</i> K.M.Liu & Y.Y.Cong		✓	2700~2900	Yunnan
206	<i>Impatiens occultans</i> Hook.f.			950~4050	Tibet
207	<i>Impatiens odontopetala</i> Maxim.		✓	1800	Gansu, Sichuan
208	<i>Impatiens odontophylla</i> Hook.f.		✓	800~2400	Hubei, Sichuan, Chongqing
209	<i>Impatiens oligoneura</i> Hook.f.		✓	2600~2900	Sichuan
210	<i>Impatiens omeiana</i> Hook.f.		✓	900~1300	Sichuan
211	<i>Impatiens oxyanthera</i> Hook.f.		✓	1036~2663	Hubei, Sichuan, Chongqing, Yunnan
212	<i>Impatiens pandurata</i> Y.H.Tan & S.X.Yu		✓	1200~1250	Yunnan
213	<i>Impatiens paradoxa</i> C.S.Chu & H.W.Yang		✓	780~1800	Henan, Hubei
214	<i>Impatiens paramjitiana</i> Gogoi & Borah			300~400	Tibet
215	<i>Impatiens parviflora</i> DC.			1200~1700	Xinjiang
216	<i>Impatiens parvisepala</i> S.X.Yu & Y.T.Hou			250~503	Guangxi, Yunnan
217	<i>Impatiens pasighatensis</i> D.Borah, R.Kr.Singh & Taram		✓	380~550	Tibet
218	<i>Impatiens pathakiana</i> Gogoi & Borah			1591	Tibet
219	<i>Impatiens pianmaensis</i> S.H.Huang		✓	2080~3400	Yunnan
220	<i>Impatiens pinetorum</i> Hook.f. ex W.W.Smith		✓	1900~2768	Sichuan, Yunnan
221	<i>Impatiens pingxiangensis</i> H.Y.Bi & S.X.Yu		✓	200~600	Guangxi
222	<i>Impatiens piufanensis</i> Hook.f.		✓	200~2916	Guizhou, Chongqing, Jiangxi, Hubei, Guangxi, Hunan, Yunnan
223	<i>Impatiens piufanensis</i> Hook.f. var. <i>villosa</i> G.W.Hu, S.X.Ding & S.Peng		✓	700~1000	Hubei, Hunan

Table A1. Cont.

No.	Scientific Name	Synonym	China Specific	Altitudinal Limits (m)	Distribution in China
224	<i>Impatiens platyceras</i> Maxim.		✓	2000~3200	Gansu, Hubei, Sichuan
225	<i>Impatiens platychlaena</i> Hook.f.		✓	700~2500	Guizhou, Sichuan
226	<i>Impatiens platysepala</i> Y.L.Chen		✓	50~1000	Jiangxi, Zhejiang, Fujian, Hunan
227	<i>Impatiens platysepala</i> Y.L.Chen var. <i>chloroxantha</i> (Y.L.Chen) X.F.Jin & Y.L.Xu		✓	484~700	Zhejiang, Fujian
228	<i>Impatiens plicatisepala</i> C.Y.Zou, Yan Liu & S.X.Yu		✓	1071~1462	Guangxi
229	<i>Impatiens poculifer</i> Hook.f.		✓	2800~3640	Yunnan
230	<i>Impatiens polyceras</i> Hook.f. ex W.W.Smith		✓	2279~3500	Guizhou, Yunnan, Sichuan
231	<i>Impatiens polyneura</i> K.M.Liu		✓	400~420	Hunan
232	<i>Impatiens porphyrea</i> Toppin			1700~1900	Yunnan
233	<i>Impatiens porrecta</i> Wall.			600~3048	Yunnan, Tibet
234	<i>Impatiens potaninii</i> Maxim.	<i>Impatiens potaninii</i> Maxim. f. <i>rubrobrunnea</i> E. Pritz. <i>Impatiens taronensis</i> Hand.-Mazz.	✓	1200~2300	Gansu, Shaanxi, Sichuan
235	<i>Impatiens prainii</i> Hook.f.	<i>Impatiens mallae</i> S.Akiyama, H.Ohba & M.Suzuki		1800~3600	Tibet, Yunnan, Sichuan
236	<i>Impatiens principis</i> Hook.f.		✓	800~2500	Yunnan, Guangxi
237	<i>Impatiens pritzelii</i> Hook.f.		✓	200~1800	Guizhou, Hubei, Sichuan, Hunan, Chongqing
238	<i>Impatiens procumbens</i> Franch.	<i>Impatiens atherosepala</i> Hook.f. <i>Impatiens crassiloba</i> Hook.f. <i>Impatiens ganpiuana</i> Hook.f. <i>Impatiens reptans</i> Hook.f. <i>Impatiens rhombifolia</i> Y. Q. Lu & Y.L.Chen	✓	1500~2700	Yunnan, Guizhou, Guangxi, Sichuan, Hunan,
239	<i>Impatiens pseudocitrina</i> Hareesh, M.Sabu & Gogoi		✓	1000	Tibet
240	<i>Impatiens pseudokingii</i> Hand.-Mazz.		✓	2000~2600	Yunnan
241	<i>Impatiens pseudolaevigata</i> Gogoi, B.B.T.Tham & Lidén		✓	1800	Tibet
242	<i>Impatiens pseudolongipes</i> Gogoi, Sherpa & Borah		✓	2400	Tibet
243	<i>Impatiens pterocaulis</i> S.X.Yu & L.R.Zhang		✓	1284	Guangxi
244	<i>Impatiens pterosepala</i> Hook.f.		✓	450~1700	Anhui, Guangxi, Henan, Hubei, Hunan, Shaanxi, Sichuan, Jiangxi, Chongqing, Fujian, Guangdong

Table A1. Cont.

No.	Scientific Name	Synonym	China Specific	Altitudinal Limits (m)	Distribution in China
245	<i>Impatiens puberula</i> DC.			1500~3000	Tibet, Yunnan
246	<i>Impatiens pudica</i> Hook.f.		✓	1300~2200	Sichuan
247	<i>Impatiens pulchra</i> Hook.f. & Thomson	<i>Impatiens mengtszeana</i> Hook.f. <i>Impatiens monticola</i> Hook.f.			Guangxi, Guizhou, Sichuan, Yunnan, Hunan, Chongqing
248	<i>Impatiens purpurea</i> Hand.-Mazz.		✓	2000~3300	Yunnan, Tibet
249	<i>Impatiens purpureifolia</i> S.H.Huang & Y.M.Shui			1411~1533	Yunnan
250	<i>Impatiens pyrorrhiza</i> Lidén & Bharali		✓	3400	Tibet
251	<i>Impatiens qingchengshanica</i> Y.M.Yuan, Y.Song & X.J.Ge		✓	700~1400	Sichuan
252	<i>Impatiens quadriloba</i> K.M.Liu & Y.L.Xiang		✓	1200~3520	Sichuan
253	<i>Impatiens quintadecimacopii</i> G.W.Hu & Q.F.Wang		✓	1540	Yunnan
254	<i>Impatiens racemosa</i> DC.	<i>Petalonema racemosum</i> (DC.) Peter <i>Impatiens micrantha</i> D.Don <i>Impatiens microsciadia</i> Hook.f. <i>Impatiens racemosa</i> var. <i>ecalcarata</i> Hook.f. <i>Impatiens trigonopteris</i> Hook.f. ex Arisdason & Gogoi		1100~3642	Tibet, Yunnan, Guangxi, Sichuan
255	<i>Impatiens radiata</i> Hook.f.	<i>Impatiens centiflora</i> H.Lév.		1150~3970	Guizhou, Tibet, Yunnan, Sichuan
256	<i>Impatiens rapiformis</i> Y.Y.Cong & Y.X.Song		✓	1150~1300	Yunnan
257	<i>Impatiens rectangula</i> Hand.-Mazz.		✓	1430~3700	Yunnan, Sichuan
258	<i>Impatiens rectirostrata</i> Y.L.Chen & Y.Q.Lu		✓	1800~1900	Sichuan
259	<i>Impatiens recurvicornis</i> Maxim.		✓	500~1200	Hubei, Sichuan, Chongqing
260	<i>Impatiens robusta</i> Hook.f.		✓	1500	Sichuan
261	<i>Impatiens roingensis</i> Hareesh, A.Joe & M.Sabu		✓		Tibet
262	<i>Impatiens rostellata</i> Franch.		✓	980~2400	Sichuan, Shaanxi, Yunnan, Gansu
263	<i>Impatiens rubrostriata</i> Hook.f.			1130~3500	Guizhou, Yunnan, Guangxi, Sichuan
264	<i>Impatiens rugata</i> S.H.Huang & Y.M.Shui		✓	300~560	Yunnan
265	<i>Impatiens rugosipetala</i> Gogoi & Borah		✓	2600	Tibet
266	<i>Impatiens ruiliensis</i> S.Akiyama & H.Ohba		✓	200~2000	Yunnan, Tibet, Guangxi
267	<i>Impatiens rupestris</i> K.M.Liu & X.Z.Cai		✓	350	Hunan

Table A1. Cont.

No.	Scientific Name	Synonym	China Specific	Altitudinal Limits (m)	Distribution in China
268	<i>Impatiens sakwinensis</i> S.H.Huang		✓	3200~3400	Yunnan
269	<i>Impatiens scabrida</i> DC.	<i>Balsamina cristata</i> (Wall.) Ser. <i>Impatiens calycina</i> Wall. <i>Impatiens cristata</i> Wall. <i>Impatiens hamiltoniana</i> D.Don		2300~3400	Tibet
270	<i>Impatiens scitula</i> Hook.f.			3000~3600	Tibet
271	<i>Impatiens scullyi</i> Hook.f.			700~2400	Tibet
272	<i>Impatiens scutisepala</i> Hook.f.		✓	1800~3800	Yunnan
273	<i>Impatiens serrata</i> Benth.	<i>Impatiens serrulata</i> Hook.f.		2900~3300	Tibet
274	<i>Impatiens shangjiangensis</i> Y.Y.Cong & J.Z.Gu		✓	2600~2850	Yunnan
275	<i>Impatiens shenglanii</i> Q.L.Gan & X.W.Li		✓	1100~1450	Hubei
276	<i>Impatiens shennongensis</i> Q.Wang & H.P.Deng		✓	2300~3000	Hubei
277	<i>Impatiens shimianensis</i> G.C.Zhang & L.B.Zhang		✓	2300	Sichuan
278	<i>Impatiens shiyomiensis</i> Hareesh & M.Sabu		✓	1200	Tibet
279	<i>Impatiens siangensis</i> Gogoi		✓	300~600	Tibet
280	<i>Impatiens siculifera</i> Hook.f.			300~3400	Guizhou, Tibet, Fujian, Guangdong, Guangxi, Hubei, Hunan, Jiangxi, Sichuan, Yunnan, Chongqing, Taiwan
281	<i>Impatiens siculifera</i> Hook.f. var. <i>mitis</i> Lingelsh. & Borza		✓	1445~3500	Yunnan, Guizhou
282	<i>Impatiens siculifera</i> Hook.f. var. <i>porphyrea</i> Hook.f.			1431~3900	Yunnan, Guangxi, Hunan, Guizhou
283	<i>Impatiens sigmoidea</i> Hook.f.		✓	1200~1700	Guizhou
284	<i>Impatiens sikaiensis</i> Q.Luo & Ying Yuan		✓	2468	Sichuan
285	<i>Impatiens souliciana</i> Hook.f.			1400~3000	Sichuan
286	<i>Impatiens spathulata</i> Y.X.Xiong		✓	300~800	Guizhou, Guangxi
287	<i>Impatiens spirifera</i> Hook.f. & Thomson			1400~2500	Tibet
288	<i>Impatiens stenantha</i> Hook.f.	<i>Impatiens asymmetrica</i> Hook.f.		900~3900	Tibet, Yunnan
289	<i>Impatiens stenosepala</i> E. Pritz.		✓	500~2600	Guizhou, Shanxi, Gansu, Henan, Hubei, Hunan, Shaanxi, Sichuan, Chongqing, Yunnan
290	<i>Impatiens stenosepala</i> E. Pritz. var. <i>parviflora</i> E.Pritz.		✓	1000~1100	Chongqing
291	<i>Impatiens sterilis</i> Y.Y.Cong & Y.X.Song		✓	3296	Yunnan

Table A1. Cont.

No.	Scientific Name	Synonym	China Specific	Altitudinal Limits (m)	Distribution in China
292	<i>Impatiens subcalcarata</i> (Hand.-Mazz.) Y.L.Chen	<i>Impatiens delavayi</i> var. <i>subcalcarata</i> Hand.-Mazz.	✓	1700~3800	Sichuan, Yunnan, Chongqing
293	<i>Impatiens suichangensis</i> Y.L.Xu & Y.L.Chen		✓	1100~1600	Zhejiang
294	<i>Impatiens suijiangensis</i> S.H.Huang		✓	800	Yunnan
295	<i>Impatiens sulcata</i> Wall.	<i>Impatiens gigantea</i> Edgew. <i>Impatiens sulcata</i> var. <i>minor</i> Hook.f.		2700~4000	Sichuan, Tibet
296	<i>Impatiens sunii</i> S.H.Huang		✓	900	Yunnan
297	<i>Impatiens sutchuenensis</i> Franch. ex Hook.f.		✓	1000~1900	Hubei, Shaanxi, Sichuan, Chongqing, Gansu
298	<i>Impatiens taishunensis</i> Y.L.Chen & Y.L.Xu		✓	100~523	Zhejiang, Hubei, Hunan
299	<i>Impatiens tatoensis</i> Gogoi & W.Adamowski		✓	1800	Tibet
300	<i>Impatiens tayemonii</i> Hayata		✓	1700~3000	Taiwan
301	<i>Impatiens tenerrima</i> Y.L.Chen		✓	2800	Sichuan
302	<i>Impatiens tenuibracteata</i> Y.L.Chen		✓	2100~2400	Tibet, Yunnan
303	<i>Impatiens textorii</i> Miq.	<i>Impatiens atrosanguinea</i> (Nakai) B.U.Oh & W.P.Hong <i>Impatiens hypophylla</i> var. <i>koreana</i> (Nakai) Nakai <i>Impatiens japonica</i> Franch. & Sav. <i>Impatiens kojeensis</i> Y.N.Lee <i>Impatiens koreana</i> Nakai <i>Impatiens textorii</i> var. <i>atrosanguinea</i> Nakai <i>Impatiens textorii</i> var. <i>koreana</i> (Nakai) Nakai <i>Impatiens textorii</i> f. <i>minuscula</i> Hayashi <i>Impatiens textorii</i> var. <i>pallescens</i> Honda <i>Impatiens textorii</i> f. <i>pallescens</i> (Honda) H.Hara		1000~1350	Jilin, Liaoning, Shandong, Zhejiang, Anhui
304	<i>Impatiens thiochroa</i> Hand.-Mazz.		✓	1790~3770	Yunnan
305	<i>Impatiens thomsonii</i> Hook.f.			3700	Tibet
306	<i>Impatiens tianlinensis</i> S.X.Yu & L.J.Zhang		✓	300~1260	Guangxi, Guizhou
307	<i>Impatiens tienchuanensis</i> Y.L.Chen		✓	1100~1400	Sichuan
308	<i>Impatiens tienmushanica</i> Y.L.Chen		✓	500~1000	Zhejiang



Table A1. Cont.

No.	Scientific Name	Synonym	China Specific	Altitudinal Limits (m)	Distribution in China
309	<i>Impatiens tienmushanica</i> Y.L.Chen var. <i>longicalcarata</i> Y.L.Xu & Y.L.Chen		✓	900~1000	Zhejiang
310	<i>Impatiens tirbinensis</i> Hareesh & M.Sabu		✓	787	Tibet
311	<i>Impatiens tomentella</i> Hook.f.		✓	500~3300	Yunnan, Guangxi, Sichuan
312	<i>Impatiens tongbiguanensis</i> S.Akiyama & H.Ohba		✓	1000~1400	Yunnan
313	<i>Impatiens tortisepala</i> Hook.f.		✓	1500~2900	Sichuan
314	<i>Impatiens torulosa</i> Hook.f.		✓	3000~3330	Sichuan
315	<i>Impatiens toxophora</i> Hook.f.		✓	1700~2400	Sichuan
316	<i>Impatiens trichopoda</i> Hook.f.		✓	1900~2000	Chongqing
317	<i>Impatiens trichosepala</i> Y.L.Chen		✓	500~1600	Guizhou, Yunnan, Guangxi
318	<i>Impatiens tricornis</i> Lindl.	<i>Balsamina tricornis</i> (Lindl.) Ser. <i>Impatiens praetermissa</i> Hook.f. <i>Impatiens punctata</i> Wall. ex Hook.f. & Thomson		2000~3100	Tibet
319	<i>Impatiens trigonosepala</i> Hook.f.		✓	1200~1300	Sichuan, Chongqing
320	<i>Impatiens tripetala</i> Roxb. ex DC.			627~1400	Tibet, Yunnan
321	<i>Impatiens tropaeolifolia</i> Griff. ex Hook.f.			1400	Tibet
322	<i>Impatiens tsangshanensis</i> Y.L.Chen		✓	2000~3460	Yunnan
323	<i>Impatiens tuberculata</i> Hook.f. & Thomson			2800~3800	Tibet
324	<i>Impatiens tubulosa</i> F.B.Forbes & Hemsl.		✓	200~1390	Guizhou, Hunan, Fujian, Guangdong, Zhejiang, Jiangxi, Guangxi, Yunnan
325	<i>Impatiens uliginosa</i> Franch.		✓	200~2800	Guizhou, Yunnan, Guangxi
326	<i>Impatiens uncipectala</i> C.B.Clarke ex Hook.f.	<i>Impatiens yui</i> S.H.Huang		1800~2900	Tibet, Yunnan
327	<i>Impatiens undulata</i> Y.L.Chen & Y.Q.Lu		✓	1300~2258	Sichuan, Chongqing
328	<i>Impatiens unguiculata</i> K.M.Liu & Y.Y.Cong		✓	950~1100	Tibet
329	<i>Impatiens uniflora</i> Hayata		✓	1350~3000	Taiwan
330	<i>Impatiens urticifolia</i> Wall.			2300~3600	Tibet
331	<i>Impatiens vaniotiana</i> H.Lév.		✓	2500~3200	Yunnan
332	<i>Impatiens verrucifer</i> Hook.f.			800	Yunnan
333	<i>Impatiens vittata</i> Franch.		✓	1500~2900	Sichuan, Yunnan
334	<i>Impatiens waldheimiana</i> Hook.f.		✓	2200~2500	Sichuan, Zhejiang

Table A1. Cont.

No.	Scientific Name	Synonym	China Specific	Altitudinal Limits (m)	Distribution in China
335	* <i>Impatiens walleriana</i> Hook.f.	<i>Impatiens bruantii</i> Pynaert <i>Impatiens episcopi</i> H.J.Veitch <i>Impatiens holstii</i> Engl. & Warb. <i>Impatiens lujae</i> De Wild. <i>Impatiens petersiana</i> Gilg ex Grignan <i>Impatiens sultani</i> Hook.f.			Taiwan
336	<i>Impatiens walongensis</i> Hareesh, M.Sabu & Borah	<i>Impatiens arguta</i> var. <i>walongensis</i> (Hareesh, M.Sabu & Borah) R.Kr.Singh & D.Borah			Tibet
337	<i>Impatiens wawuensis</i> Bo Ding & S.X.Yu		✓	2300~2400	Sichuan
338	<i>Impatiens weihsiensis</i> Y.L.Chen		✓	2300~3600	Yunnan, Sichuan
339	<i>Impatiens wilsonii</i> Hook.f.		✓	450~1800	Guizhou, Sichuan, Chongqing, Guangdong, Hunan
340	<i>Impatiens wuchengyihii</i> S.Akiyama, H.Ohba & S.K.Wu		✓	700~2128	Yunnan, Guangxi
341	<i>Impatiens wutaishanensis</i> R.L.Liao & Lei Cai		✓	1311~1650	Yunnan
342	<i>Impatiens wuyiensis</i> J.S.Wang, Y.F.Lu & X.F.Jin		✓	420	Fujian
343	<i>Impatiens wuyuanensis</i> Y.L.Chen		✓	200~500	Jiangxi, Hunan, Anhui
344	<i>Impatiens xanthina</i> H.F.Comber			1200~2800	Tibet, Yunnan, Sichuan
345	<i>Impatiens xanthina</i> H.F.Comber var. <i>pusilla</i> Y.L.Chen		✓	1200~2500	Yunnan
346	<i>Impatiens xanthinoides</i> G.W.Hu.		✓	939	Yunnan
347	<i>Impatiens xanthocephala</i> W.W.Smith		✓	2900~3200	Sichuan, Yunnan
348	<i>Impatiens</i> <i>xishuangbannaensis</i> S.H.Huang		✓	1200~1350	Yunnan
349	<i>Impatiens yangshanensi</i> A.Q.Dong & F.W.Xing		✓	740~810	Guangdong
350	<i>Impatiens yaojiapingensis</i> Y.Y.Cong, G.W.Hu & T.Hu		✓	2464	Yunnan
351	<i>Impatiens yaoshanensis</i> K.M.Liu & Y.Y.Cong		✓	2000~2600	Yunnan, Sichuan
352	<i>Impatiens yilingiana</i> X.F.Jin		✓	900~1000	Zhejiang
353	<i>Impatiens yingjiangensis</i> S.Akiyama & H.Ohba		✓	800~1400	Yunnan
354	<i>Impatiens yongshanensis</i> S.H.Huang		✓	2450	Yunnan
355	<i>Impatiens yunlingensis</i> S.X.Yu, Chang Y.Xia & J.H.Yu		✓	2500	Yunnan

Table A1. Cont.

No.	Scientific Name	Synonym	China Specific	Altitudinal Limits (m)	Distribution in China
356	<i>Impatiens yunnanensis</i> Franch.		✓	1500~2500	Yunnan
357	<i>Impatiens zhaojueensis</i> Q.Luo		✓	2416	Sichuan
358	<i>Impatiens zhuxiensis</i> Q.L.Gan & X.W.Li		✓	700~1500	Hubei
359	<i>Impatiens zironiana</i> Gogoi, Hareesh & W.Adamowski		✓	1560	Tibet
360	<i>Impatiens zixishanensis</i> S.H.Huang		✓	200~2000	Yunnan

\* Not native to China.

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