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## ORNAMENTAL *HYPERICUM* IN CHINA

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There are 55 species and 8 subspecies of *Hypericum* native to China. In addition to ornamental value, other indigenous uses are documented when we conducted the ethnobotanical interviews. Some values are not recorded in literatures, such as substitute for tea, and use for oral healthcare. Five native species (*H. ascyron*, *H. choisianum*, *H. elliptifolium*, *H. kouytcheouense*, and *H. stellatum*) are recommended based on their higher ornamental values. Some suggestions on their protection and development are proposed.

**Key words:** *Hypericum*; ornamental plant; development and utilization; China.

### Introduction

The genus *Hypericum* comprises 484 species worldwide, occurring in a wide range of habitats from tropic to temperate, and exhibit a diversity of habit forms ranging from slender herb to large shrubs [1]. They extensively distribute in Europe, Asia, North of Africa and North of American. There are 55 species and 8 varieties in China, almost distributed all over the country and mainly in the Southwest [2]. Most species have been used for the treatment of trauma, burns, rheumatism, hemorrhoids, neuralgia, gastroenteritis, and hysteria. It also shows antidepressant, antioxidant, anti-inflammatory, anti-bacterial, anti-HIV and analgesic activities. In the past decade, various types of compounds have been isolated, included terpenoids, naphthodianthrones, xanthenes, flavonoids, prenylated acylphloroglucinols [3]. Except the medicinal values, the *Hypericum* plants also have great horticulture and ornamental values. Due to golden yellow polyandrous flowers, graceful shape, cute foliage and fruits, many species are widely introduction, cultivation and applied in horticulture. In Portugal, *H. monogynum* is used as green belt in downtown. In Japan, *Hypericum* species are applied in hedge, urban greenbelt system and flowers bed. In Israel, *H. monogynum* is cultivated in a large scale. In England, as the ornamental fruiting plants, *Hypericum* are widely used in flower arrangement. Some China-originated *Hypericum* species are cultivated in England, such as *H. forrestii*, *H. kouytchense*, *H. uralum*, *H. choisianum*, *H. pseudohenryi*, and *H. beanii*. Zhao reported that most of the horticultural *Hypericum* species in the world are shrubs originated from China and Africa [4].

### Objects and research methods

China is rich in *Hypericum*. Thirty-two species are endemic to China. It is worth studying and utilizing the resources for horticultural and garden uses. In this study, field botanical observations and ethnobotanical interviews had been conducted. *Hypericum* specimens and data were examined. The biological and ecological characteristics were analyzed so as to evaluate and discover the potential ornamental species of *Hypericum* native to China.

### Study Area and ethnic people

Based on the literature researches and herbarium data, Southwest China was regarded as the diversity center of *Hypericum*. Yuannan and Guizhou are two provinces in Southwest China with most *Hypericum* species. There are 27 species and 4 subspecies of *Hypericum* in

Yunnan, 19 species and 1 subspecies in Guizhou.

### **Yunnan**

Yunnan is located in the far southwest of China. Seven types of climate are appeared from the south to the north. With large daily temperature difference and small year temperature difference, illumination and rainfall are adequate [5]. Yunnan also has complex terrain, with 94% of mountainous lands and hills, while the rests are mainly river valleys and small basins. The distinctive climate and geography result in unusual full spectrum of species and vegetation types. There are 25 ethnic groups living in Yunnan. The local people have developed diverse plant culture, especially the flower culture.

### **Guizhou**

Guizhou is a mountainous region with subtropical monsoon climate type [6]. The humidity and temperature condition resulted in rich flora. It is considered as a natural plant germplasm resource center including ornamental plants. About 300 species of rare ornamental plants had been discovered, in which more than 120 plants belonged to rare and endangered species. There are some national forest parks and nature reserves with complex topography and abundant plant resources. We investigated several nature reserves including Leigongshan, Fanjingshan, Laoshechong and Yuntaishan, in addition to dozens of counties in 4 prefectures. In Guizhou, there are 18 native nationalities, of which Miao, Dong and Buyi are the largest ethnic groups in population. With colorful ethnic cultures, the local people have unique aesthetic opinion about ornamental plants.

### **Literature Researches**

The literature study covered the *Flora of China*, *Flora of Yunnan*, *Flora of Guizhou*, chorography, and ethnography. The geography, climate, vegetation, natural environment, socio-economy and traditional culture were analyzed. Meanwhile, the existing literatures related to *Hypericum* including morphological characteristics, habitat, distribution, geographical location, the current utilization of *Hypericum* have been collected and analyzed before field surveys.

### **Field Surveys**

Field surveys were carried out between December 2014 and December 2017 using ethnobotanical methods including participatory rural appraisal, semi-structured interviews, market surveys, and key informant interviews. In total 30 villages and national forest parks, natural reserve (Leigongshan National Forest Park, Fanjingshan National Natural Reserve, Laoshechong natural reserve), several local markets were investigated. More than 50 informants were interviewed, from 20 to 72 years old. The distribution of *Hypericum*, habitat, ornamental use, medicinal value and other values in local were acquired. Eight *Hypericum* species (*H. beanii*, *H. bellum*, *H. japonicum*, *H. monogynum*, *H. patulum*, *H. sampsonii*, *H. henryi*, and *H. stellatum*) were collected from different habitats with the permission of local administration. Voucher specimens were collected, identified and deposited in the Herbarium at the College of Life and Environmental Sciences of Minzu University of China, and the Kunming Institute of Botany.

## **Results and discussion**

### **1. Ornamental characteristics of *Hypericum* in China**

Based on our study, a total 29 species have been applied in ornamental horticulture and gardening in China. The flowering period of *Hypericum*, types, ornamental characteristics, ornamental part, and landscape utility were recorded based on the literature studies and field investigations (Table 1). In field investigations, we found that the *Hypericum* species concentrate to distribute in southwest region, including Yunnan, Guizhou, Sichuan, and SE Tibet. The habitat and climate diversity contributed to the species diversity and large resource stocks. In ornamental horticulture, the shrub type (19 species) used more often than herbaceous type (10 species) because the shrub type have stronger adaptability to the

environment. Ornamental characteristic concentrated in the flower, stamens, plant gesture and their fruits, are widely applied in flower bed, green fence, flower border, cutting flower, ground cover. Horticulturists make full use of its aesthetic and ecological value. At present, *H. patulum* and *H. monogynum* are two species widely used in horticulture, applied in flower bed, flower border, and cutting flower, and flower arrangement. Considering the function of ecological remediation, the *H. lagarocladum* and *H. kouytcheouense* are planted in Guizhou (mountainous area, with fragile karst landscape, rocky desertification) highway greenbelt to enhance landscape and for erosion control of water and soil.

## 2. Other traditional uses of *Hypericum* in China

Except the ornamental value, other local uses are also recorded when we conducted the ethnobotanical interviews. In Yunnan, the local people use *Hypericum* species as the substitute for tea. They collected the root, leaves and stem of *H. ascyron* to make a decoction for treatment of heatstroke, which is also useful to livestock. *Hypericum* species have been also applied for the treatment of oral diseases, such as stomatitis, aphtha, and toothache. In Yunnan and Guizhou, *Hypericum* are widely used to treat hepatitis with significantly effectively. They collect the roots to make a decoction.

The wild resource harvest without limitation, it is not good for sustainable utilization of *Hypericum*. During the flowering phase, *H. beanni* and *H. patulum* abundant in pollen, are good nectariferous plant. As the indicator of the phenology, *H. beanni* guide local people's farming activities.

## 3. Evaluation and selection of potential ornamental species

Based on the field investigations and literature studies, 5 indigenous species in China are recommended as potential ornamentals.

### 3.1. *H. ascyron*

It is widely distributed in Heilongjiang, Northeast China, most in the drippy meadow, riverine marsh, forest edge, sides of hill, the tussock, and roadside. It was fond of wetness and light [7]. Large flower, brightly color, and long flower period make it a good perennial flower. At present, the wild resource research and application has not yet been received extensive attention. It can be developed and utilized for future uses.

### 3.2. *H. choisianum*

It is a native species in Tibet and Yunnan. It is a good flowering plant and easy to manage because of simple nursery technique[8], fewer pests and diseases and low management cost. The temperature is a key factor during the course of nursery.

### 3.3. *H. elliptifolium*

Distributed in Gongshan, Yunnan, it grows under the evergreen broad-leaf forest [9], in the marshland and riverside. The resource is scanty. Its white flower is rarely seen in *Hypericum*, and will be a good germplasm resource for breeding.

### 3.4. *H. kouytcheouense*

It is widely distributed in the karst topography in Guizhou province [10]. This species can adapt for the harsh environment and can be used for rehabilitation of degraded ecosystems..

### 3.5. *H. stellatum*

In Majiang County, Qiandongnan Prefecture, Guizhou, the bright flower and graceful shape of *H. stellatum* attract our attention. The local healer told us it is widely used to treat rheumatism, hemorrhoids, gastroenteritis, ulcers, hysteria, and hepatitis. Many *Hypericum* species show great values in medicinal and ornamental. The seedling propagation and medicinal plant cultivation can be combined for sustainable use of *Hypericum*.

Table 1

Inventory of Ornamental *Hypericum* in China

No.	Species	Blooming time (month)	Habit	Ornamental characteristics	Ornamental parts	Garden and landscape uses
1	<i>H. forrestii</i>	June to July	shrub	flower with many stamens, large corymb	flower, corolla	bedding flower, green fence
2	<i>H. monanthemum</i>	July to August	perennial herb	golden flower	flower	potted plant
3	<i>H. japonicum</i>	March to September	perennial herb	upright stem, white, light yellow and orange-yellow flower	flower stem	ground cover potted plant
4	<i>H. addingtonii</i>	April to May	shrub	upright and tawny stem, thick leaves	stem leaves	green fence
5	<i>H. choisianum</i>	June to July	shrub	brightly golden yellow flower, dense and long filament, the shape of corolla like peach blossom, outstretched branch	flower corolla	flowering shrub
6	<i>H. attenuatum</i>	June to August	shrub	petals are golden yellow, tinged red in bud	flower	potted plant
7	<i>H. perforatum</i>	May to August	perennial herb	stoloniferous or sarment , golden flower, dense leaves	flower leaves	bedding flower border herb
8	<i>H. kouytcheouense</i>	June to September	shrub	opposite leaf, thick papery, red capsule	flower, leaves, fruit	highway afforestation plant
9	<i>H. ascyron</i>	July to August	perennial herb	upright stem, numerous golden flower	flower	cut flower, bedding flower
10	<i>H. augustinii</i>	September to October	shrub	red brown branch, numerous stamens	flower, branch	bedding flower
11	<i>H. patulum</i>	May to June	shrub	graceful branch, leaves brightly green, large and beautiful flower	flower, branch and stem	potted plant, group plant, flowering shrub
12	<i>H. monogynum</i>	May to June	shrub	clump leaves, brightly flower, thin and long filament, red fruit	flower, leaves, fruit	group plant, cut flower, potted plant, garden tree
13	<i>H. subsessile</i>	August to September	shrub	long and narrow leaves, cup and stellate flower	flower, leaves	green fence

Table 1 continuation

14	<i>H. cohaerens</i>	May to July	shrub	long period of flowering, stellate flower, stretched branch	flower	bedding flower, potted plant, flower border
15	<i>H. bellum</i>	June to August	shrub	straight and upright stem and branch, large leaves, butter yellow to golden yellow flower, brightly color corolla	flower, branch, leaves	flowering shrub
16	<i>H. seniawinii</i>	July to August	perennial herb	upright stem, ovoid capsule	fruit	potted plant
17	<i>H. pseudoheury</i>	June to July	shrub	golden flower and anther, ovoid capsule	flower, fruit	bedding flower
18	<i>H. uralum</i>	July to September	shrub	obovate and yellow flower, numerous stamens	flower	green fence
19	<i>H. elodeoides</i>	July to September	perennial herb	cylindrical stem, yellow flower	flower	cut flower
20	<i>H. przewalskii</i>	May to August	shrub	cylindrical stem, ovoid capsule	fruit	green fence
21	<i>H. elliptifolium</i>	August to September	shrub	upright stem, numerous stamens, white flower	flower	bedding flower
22	<i>H. henryi</i>	May to July	shrub	cylindrical stems, golden flower with many stamens, brightly red fruits.	stems, flower, fruit	bedding flower
23	<i>H. acnosepalum</i>	May to July	shrub	golden and obovate flower	flower	flowering shrub
24	<i>H. lagarocladum</i>	April to May	shrub	soft and yellow red branch	branch	highway greenbelt
25	<i>H. erectum</i>	June to July	perennial herb	upright stem, less branch, the base of leaves embrace the stem	leaves	ground cover
26	<i>H. stellatum</i>	June to July	shrub	cylindrical branch, stellate flower, long and plentiful stamens	flower, branch	flowering shrub, flowering border, cut flower
27	<i>H. faberi</i>	June to July	perennial herb	stolon, opposite leaves, ovoid capsule	leaves	ground cover
28	<i>H. sampsonii</i>	May to September	perennial herb	upright stem, leaves concrescent in the base, cute golden flower	flower, stem, leaves	cut flower
29	<i>H. petiolulatum</i>	June to July	perennial herb	stolomiferous or sarmentose, small and cute yellow flower	flower, stem	potted plant

### Conclusions

There are abundant wild *Hypericum* resource in China, particularly in southwest China. *Hypericum* species have great ornamental and medicinal values, and have widely been used in various ways by local people in Yunnan and Guizhou, such as substitute for tea, indicator of farming calendar, and for vegetation rehabilitation. It is well-known and effective to treat hepatitis. Local people collected the wild resources without restrictions, which resulted in the reduction of wild populations. Based on the filed works, 5 indigenous species in China are recommended as the prior species for development as ornamentals in the future. These species are multi-functional wild plant resources with aesthetic, genetic, medicinal, ecological, and economic values.

As an endemic medicinal plant, phytochemical study on *H. stellatum* had been conducted to explain its effective treatment of hepatitis. Our future studies should focus on comprehensive and sustainable use of *Hypericum* species native to China.

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**Юанюан Йи, Хинбо Жанг, Ижоу Шанг, Ханг Шу, Биншенг Луо, Чунлин Лонг Декоративный *Hypericum* L. в Китае // Works of the State Nikit. Botan. Gard. – 2017. – V. 145 – P. 132–137.**

Имеется 55 видов и 8 подвидов природного *Hypericum* в Китае. В дополнение к декоративным, другие природные свойства были описаны, когда мы приступили к нашим этно-ботаническим исследованиям. Некоторые ценные свойства не были описаны в литературе, такие как возможная замена чая, или использование в качестве средства по уходу за полостью рта. Пять природных видов (*H. ascyron*, *H. choisianum*, *H. elliptifolium*, *H. kouytcheouense*, and *H. stellatum*) рекомендованы к использованию, в основном из-за их декоративных свойств. Предложены рекомендации по защите и развитию растения.

**Ключевые слова:** *Hypericum*; декоративное растение; развитие и использование; Китай.