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ACORACEAE PLANTS, POTENTIAL ORNAMENTALS

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Plants in Acoraceae are not only important traditional herbal medicines, but also beautiful ornamentals. In China, the history of Acoraceae used as ornamental can be tracked back to 2100 years ago. Initially, Acoraceae was a courtyard ornamental. Until Tang and Song dynasties（A.D.618-1279）, it was grown as an indoor ornamental such as potted plant. There are 3 species in the Acoraceae according to *Flora Republicae Popularis Sinicae*. *Acorus calamus* is widely distributed in the ponds and wetlands as an uncultivated or cultivated ornamental. *Acorus tatarinowii* and *Acorus gramineus* are widely used for indoor ornamental purposes. Acoraceae plants are perennial and evergreen, with aromatic leaves and rhizomes. Because of their unique biological characteristics, they are regarded as symbolic and holy plants which have been endowed with the exorcism roles in traditional Chinese culture. They are also praised as elegant ornamental plants symbolized the moral integrity of indifferent to fame and wealth and resist severe coldness. With strong viability and resistance to stress, Acoraceae can be transplanted at any time and grown easily in adequate humid and shady environments. Acoraceae plants have the functions of relieving eutrophication and purifying environment by absorbing the formaldehyde, benzene and other indoor decorating pollution. Therefore it is very suitable to grow Acoraceae plants as ornamentals. According to their horticultural characters and cultural values, we strongly recommend *Acorus tatarinowii* and *Acorus gramineus* being popularized as indoor ornamentals, and *A. calamus* can be cultivated as a courtyard ornamental plant. In this paper, based on literature studies and field investigations, their horticultural characters and cultural values were presented and analyzed. A proposal for their effective development strategy was also suggested.

Key words: *Acoraceae; ornamental uses; Acorus calamus; Acorus gramineus; Acorus tatarinowii*

Introduction

The Acoraceae, having an origin in Asia and North America, is widely distributed in the north hemisphere. There is only one genus in the family, i.e. *Acorus*. The name of ‘acorus’ was derived from the Greek word ‘acoron’. The genus of *Acorus* was once placed in the family Araceae, but now more researches show that it should be replaced in its own family Acoraceae, Acorales [4, 5]. Two species were recognized in genus *Acorus* in *Kew Checklist* and in *Flora of China*, namely *A. calamus* Linn. (including three varieties) and *A. gramineus* Solander ex Aiton [14]. But three species have been recorded in *Acorus* in *Flora Republicae Popularis Sinicae*. They are namely *Acorus calamus* Linn., *A. tatarinowii* Schott. and *A. gramineus* Solander ex Aiton [7]. In this paper, we adopted the taxonomic treatment in *Flora Republicae Popularis Sinicae* based on our field observations.

The Acoraceae plants are used as symbolic cultural plants, garnitures, spice or flavoring, traditional Chinese medicine [10], and for ritual uses, insecticidal properties and ecological restoration. Because of its aesthetic value, graceful shape, evergreen or semi-evergreen foliage, and pleasantly aromatic of the whole plant, they are commonly planted or cultivated on the lakes, and in rooms and gardens as ornamental and edible plants.

Objects and research methods

In this study, we adopted the methods of literature studies and ethnobotanical investigations to explore and evaluate the potential ornamental values of Acoraceae based on

their morphology, biological characteristics, distribution status and other characteristics and utility value.

Study area

Surveys were conducted in Guizhou, Yunnan, Sichuan, Guangxi, Guangdong, Hunan, Hubei, Jiangxi, Fujian, Jiangsu, Zhejiang, Henan, Anhui, and Chongqing of China (Figure 1). The areas were selected for investigation because the local people have frequent and multiple usage ways of Acoraceae plants. These areas have rich biological and cultural diversity, too.

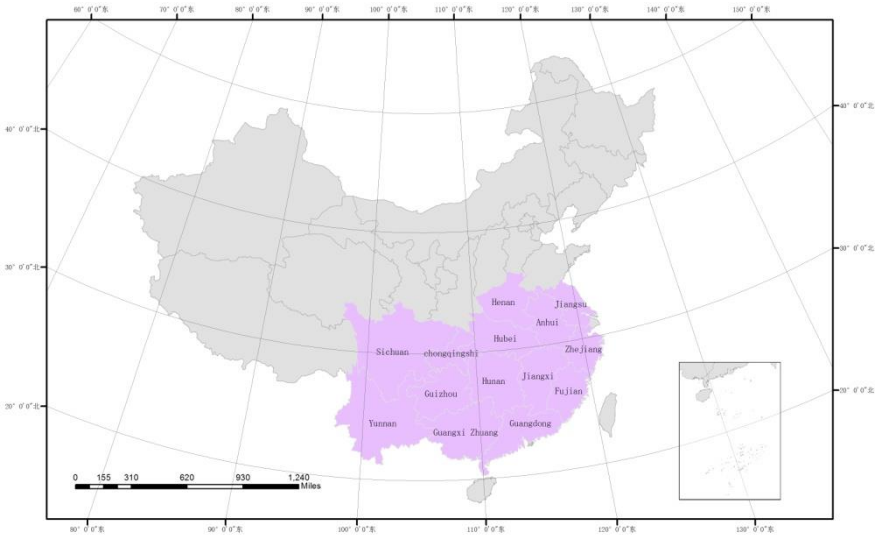

Figure 1. Study area in China

Literature Research

According to the books from ancient literatures and recent publications, we carried out our research. Firstly, we collected the literatures to find the distribution of Acoraceae plants and their biological and morphological characters. Secondly, we determined the study area, and analyzed the local natural environment, historical changes, traditional culture and socio-economy. Thirdly, we tried to explore and document the ancient and contemporary people's usage ways of the Acoraceae plants, especially its ornamental, cultural, ecological and economical values. In the end, based on the literature research, we tried to predict the development trends and draw up a field survey plan.

Ethnobotanical survey

Field studies on the application of Acoraceae were carried out from 2013 to 2017 in Guizhou, Chongqing, Sichuan, Yunnan and other parts of southern China. Ethnobotanical data were collected through different interview methods (participatory rural appraisal (PRA), direct observation, semi-structured interviews, key informant interviews, individual discussions and focal group discussions) [1, 2, 3, 9]. During our surveys, the local names and utility pattern of 3 species were recorded. Voucher specimens were collected from the local habitats around the study area and examined and identified by the authors and other taxonomists. They were deposited in the Herbarium of the Minzu University of China (Beijing).

Results and discussion

According to the literatures researches and field surveys, the history of the Acoraceae as ornamentals can be traced back to 2100 years ago in China. It also has a long history of cultivation and appreciation in Japan and Korean Peninsula. The Acoraceae plants not only are traditional ornamental plants in landscaping, but also are very popular potted admire, potted dispose, mix of fresh flowers and leaf. However, it does not receive due attention and development in nowadays. Here we will have a summary of the natural distribution condition, morphological and biological characteristics, utilization value of the Acoraceae plants. According to these description, we tried to analyze and evaluate the possibility of future growth as ornamentals in *Acorus calamus*, *A. tatarinowii* and *A. gramineus*.

***Acorus calamus* Linn.** In China, *A. calamus* Linn., or sweet flag, is called *Chang-pu*, *Shui Chang-pu* or *Xiang-pu*. It is found in the northern temperate and subtropical regions of Asia, North America, Europe and widely distributed in mostly provinces of China. The habitat is aquatic environments, wetland, shallow water, pond edges and island under 2600 m above sea level [11]. It is a semi-evergreen perennial hairless herb that can grow to two meters high with aromatic leaves. Each leaf has an obvious midrib. The inflorescence consists of a leaf-like spathe and a spike-like spadix, produced from the middle of the spathe, that is densely covered with yellow and green flowers [12]. Flowers of *A. calamus* have both male and female organs (Hermaphrodite), pollinated by insects. *Acorus calamus* has a far-reaching history of cultural and medical around the world. It is an important cultural plant on the Dragon-boat Festival in China [13, 15]. Because of its extremely extensive distribution and habitat on the bank of the pools, bogs and marshes, it can be used as the ornamental along the water edge to increase the biodiversity and landscape capacity of visiting degree. In addition, *Acorus calamus* can play the role of improving water quality so that it will generate some economic value.

***Acorus tatarinowii* Schott.** It is usually called *Shi Chang-pu* or *Yao Chang-pu* in China. It distributed in the south of Yellow River watershed in China. It grows at an elevation from 20 m to 2000 m in wetlands, banks or stones of brooks with clear water, especially in the big vertical drop, with torrents. It is a evergreen perennial hairless herb. Its morphology is similar to *A. calamus*, but without midrib on the leaf. The whole plant has fragrance, it is commonly used as traditional Chinese medicine [6]. It is often cultivated as ornamental plant both in rooms and gardens. *Acorus tatarinowii* Schott as ornamental planted in gardens since the Xihan Dynasty (B.C.201–A.D.9), at that time, it just planted in royal garden. Since the Beisong Dynasty (A.D.960–1127), it was planted in containers for potted admire. This plant pattern was very popular in scholars and officials to express their mood of decorous and indifferent. Besides, it can adsorb noisome fumes in the room. Nowadays, *Acorus tatarinowii* Schott as a potted ornamental plants is very popular all over China. When we did the field survey, we found that the local people mixed it with other plants for the landscape design [8].

Because of *Acorus tatarinowii* have high ornamental and medicinal values, and most of them come from wild collection, their price are more expensive than the ordinary potted ornamental plants 5–10 times. Thus, it is necessary take some steps to increase its output to better meet the market demand, such as plant tissue culture and other ways. And these steps is helpful to better protect wild germplasm resources.

***Acorus gramineus* Solander ex Aiton.** It is called *Jin Xian-pu* or *Jin Qian-pu*. It grows in wetlands or stones below 1800 m [4]. It also is an evergreen perennial hairless herb. The leaves are short and slim with yellow-green color. The whole plant is aromatic. It is also used as an edible plant for increasing the flavour of cooking. Due to its special morphological and biological character, it is commonly planted or cultivated in rooms and gardens as ornamental and edible plants.

Conclusions

The Acoraceae plants have favorable smell and potential ornamental values due to their biological and morphological characteristic, multiple uses and ecological functions. *Acorus calamus* can be planted alongside the pool and riverfront as ornamental plants. It can not only beautify the environment, but also purify water and reduce pests and diseases. *Acorus tatarinowii* and *Acorus gramineus* can be widely used as potted plants in the houses. They can also be used with other ornamentals for the landscaping in a smaller environment.

Gratitudes

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Ханг Шу, Шуанг Жанг, Юанюан Йи, Биншенг Луо, Чунлин Лонг Растения Acoraceae с декоративным потенциалом // Works of the State Nikit. Botan. Gard. – 2017. –V. 145 – P. 114-118.

Растения Acoraceae - не только традиционно важные лекарственные растения, но и имеют прекрасные декоративные свойства. В Китае история Acoraceae, используемых в качестве декоративных растений, уходит своими корнями на 2100 лет назад. Поначалу Acoraceae являлись украшениями внутренних двориков. Вплоть до времени правления династий Тан и Сон (618-1279 н.э.), растение выращивали как внешнее украшение в горшочках. Имеется 3 вида Acoraceae согласно *Flora Republicae Popularis Sinicae*. *Acorus calamus* широко распространено в прудах и на влажных почвах как дикорастущее или культивируемое декоративное растение. *Acorus tatarinowii* и *Acorus gramineus* широко используются как декоративные растения для убранства внутренних помещений. Растения Acoraceae многолетние и вечнозеленые с ароматическими листьями и корневищами. Из-за их уникальных биологических характеристик растения считаются священными, поскольку считаются имеющими способность к изгнанию дьявола в традиционной китайской культуре. Их также почитают как элегантные декоративные растения, символизирущие целомудрие и чистоту, безразличие к пустой славе и богатству, стойкость к суровым холодам. Обладая сильной жизнеспособностью и сопротивляемостью к внешним воздействиям, Acoraceae могут быть пересажены и легко выращиваться в подходящих влажных и тенистых условиях. Растения Acoraceae обладают свойствами снижать загрязнение водоемов водорослями и очищать окружающую среду путем абсорбции формальдегидов, бензина и других факторов загрязнения. Следовательно, Acoraceae весьма удобны для выращивания в качестве декоративных растений. В соответствии с их ботаническими свойствами и культурной ценностью мы настойчиво рекомендуем *Acorus tatarinowii* и *Acorus gramineus* в качестве декоративных растений для внутренних помещений, *A. calamus* может быть использовано для украшения внутренних двориков. В этой статье, основанной на изучении литературы и полевых исследованиях, представлены и проанализированы ботанические свойства и культурная ценность растений. Предложена также эффективная стратегия их развития.

Ключевые слова: *Acoraceae; декоративное использование,; Acorus calamus; Acorus gramineus; Acorus tatarinowii.*