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RESEARCH ARTICLE

Conservation and applications of camphor tree (*Cinnamomum camphora*) in China: ethnobotany and genetic resources

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Abstract The camphor tree, *Cinnamomum camphora* (L.) J. Presl, is an arbor species in southern part of China. Many linguistic groups cultivate it for timber, medicine, pesticide, ornamental and other purposes. However, less ethnobotanical information about this important species had been reported in any international journal. This paper focused on the conservation and traditional uses of camphor tree, especially its cultural significance among different ethnic groups. The approaches including literature surveys, ethnobotany, semi-structured interviews and participatory observation were adopted in the study. Six sites from Hunan, Jiangxi and Guizhou provinces had been selected for fieldwork, and 127 informants in both rural and urban areas had been interviewed. The results showed traditional uses of *Cinnamomum camphora* covered garden and ornamental, timber (construction, furniture and sculpture), medicine, pesticide and repellents, and cultural purposes. The most important value is its application in culture and religion. One city, 13 townships and 75 villages in southern part of China have been named after it. Camphor tree has been elected as city tree by 2 provinces and 36 cities. Citizens with *C. camphora* as their city tree covered a population of 172.81 millions. A lot of ancient camphor trees have been maintained in both rural and urban areas. Some of these heritage trees were cultivated 2000 years ago. Many of them have been regarded as sacred trees. The local people worship and conserve these sacred trees. The fact that many heritage trees and sacred trees of *C. camphora* were maintained in southern part of China showed its irreplaceable position in traditional Chinese culture, which improved the conservation and sustainable uses of this species.

Keywords Camphor tree · *Cinnamomum camphora* · Conservation · Cultural values · Ethnobotany · Fragrant timber · Heritage tree · Ornamental plant

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Introduction

The camphor tree (*Cinnamomum camphora* (L.) J. Presl), a member in the family Lauraceae, is called *zhang*, *zhang shu*, *zhang mu*, *xiang zhang*, *fang zhang*, *you zhang*, *wu zhang*, *lao zhang*, *or chou zhang* in Chinese. It is widely distributed in East and

South Asia. Massive cultivation of camphor trees and the folk uses can be easily found in the Yangtze River basin and its southern part of China (Li et al. 2008). This tree is one of the most important arbor species in East Asia, economically and culturally. There are huge plantation areas in China, and many heritage trees of *Cinnamomum camphora* had been discovered. The camphor was derived from this species, mainly from its roots, wood, branches and leaves by distillation. This species has been traditionally used for timber, medicine, ornamental, pesticide, and many cultural purposes by different linguistic groups for thousands of years (Guan 2010). However, very few ethnobotanical surveys had been conducted. Little records could be found in recent literatures.

Modern studies revealed that camphor tree is an important plant species with great industrial, pharmaceutical and pesticidal development potentials. Chen et al. (2014) examined the fumigant toxicity of essential oil extracted from leaves of *Cinnamomum camphora*. Their research results indicated that the essential oil and its active compounds (including D-camphor and linalool) showed the potential to be developed as natural fumigants and insecticides for control of *Lasioderma serricorne*. Satyal et al. (2013) analyzed the bioactivities of essential oil from *C. camphora* leaves. The results revealed that leaf essential oil was phytotoxic to lettuce, antifungal to *Aspergillus niger*, and insecticidal, particularly toward midge and butterfly larvae, fruit flies, and fire ants. The oil was also toxic to brine shrimp and human breast tumor cells (Satyal et al. 2013). The *C. camphora* leaf oil composition and their antimicrobial activity had been studied through techniques of GC-FID, SPME-GC-FID, enantio-GC and GC/MS (Pragadheesh et al. 2013). The results showed that (1R)-(+)-camphor significantly inhibited *Choanephora cucurbitarum* while the oil showed better activity. It is suggested that *C. camphora* essential oil could be used for strong fungistatic agent against *C. cucurbitarum* infection (Pragadheesh et al. 2013). Li et al. (2014) examined the chemical composition of the extracts from the woody parts of *C. camphora* by various solvent extractions, and the antifungal activity . Their research results indicated that the major components of the extracts had antifungal activities, including anti-*Coriolus versicolor* and *Gloeophyllum trabeum*.

Recently our group studied the ecology of *Cinnamomum camphora*, focusing on its soil respiration. The camphor forests have played an important role in carbon cycling of forest ecosystems in subtropical China (Tian et al. 2010).

Ethnobotanical studies on a specific plant species will provide more information for better understanding the traditional knowledge, folk uses, management methods, and conservation status of an individual species. Thus policy for sustainable use, future development and conservation strategies can be proposed accordingly (Delgado-Lemus et al. 2014a, b; Rakotoarivelo et al. 2014; Feitosa et al. 2014). This paper aims to discover the traditional conservation and applications of camphor tree, including its cultural values, based on literature study and field investigation.

Materials and methods

There is a large distribution area of *Cinnamomum camphora* in China. It is a common arbor species both in rural and urban regions, although its wild population has been indexed in the "China Species Red List" (Wang and Xie 2004). We selected 6 sites in 3 provinces as our investigation areas, namely Changsha City and Xinshao County in Hunan Province, Zhangshu City and Wuyuan County in Jiangxi Province, and Congjiang and Leishan counties in Guizhou Province. They are located between 25 and 30 north latitude, and 105 and 118 east longitude. The elevation varies from 50 to 550 meters above sea level. These areas are typical subtropical climate zones with evergreen broadleaved forests. Other areas in difference provinces including Yunnan, Sichuan and Zhejiang have been tentatively observed.

Since camphor tree has become one of the most important arbor species in China for a long history, many records about camphor trees can be found in ancient Chinese literatures. Two Chinese electronic databases, VIP and Wanfang, have been used for searching and collecting Chinese literatures, in addition to the Library of Central South University of Forestry and Technology. Recent literatures were obtained through the tools of Web of Science, PubMed, Google Scholar, and Scopus. All references related to camphor tree had been analyzed and studied.

The ethnobotanical investigations were conducted in three provinces, Hunan, Jiangxi and Guizhou in the past 3 years. Some villages in Guangxi and Yunnan were also visited. Methods of semi-structured interviews and participatory observation were used in the field investigations. In total 127 informants were interviewed, in which 46 are women. The informants from urban areas referred those lived in the cities for more than 20 years, and their number was 39. The others (88 people) were from rural areas including those studying in universities or working temporarily in the cities but less than 20 years. Their ages vary from 14 to 82 years old. When investigating in the ethnic societies, local guides or translators were invited to assist our interviewing.

Results and discussions

Cinnamomum camphora is an arbor species with multiple uses. Traditionally it has been used for medicine and health care, ornamental and garden, building and furniture, aromatics, pesticide, and cultural uses as well (Table 1).

Timber for various uses

There are top-four famous species for precious timber production in China, namely *Cinnamomum camphora*, *Sassafras tzumu*, *Phoebe zhennan*, and *Cyclobalanopsis glauca*. The *Cinnamomum camphora* timber was evaluated as the best for its fragrant smell, brownish-yellow heartwood and yellowish sapwood. The timber is naturally decorated with good-looking threaded texture.

In old times, only the millionaires could use camphor trees for constructing the whole houses because the camphor timber was very expensive. People would only use camphor timber for a few pillars if it was available. In recent decades, the wild plants of *Cinnamomum camphora* have been listed in the "China Species Red List" (Wang and Xie 2004), and they are forbidden to cut camphor tree for construction.

The popular use of camphor timber is to make furniture. Because the wood smells fragrance, and can keep insects away from furniture, people love to make furniture with camphor timber. In particular, the cabinet made from camphor timber can keep clothes and other textiles for a long time.

The camphor timber was regarded as one of the best wood for sculptures. The timber is with middle hardness and little shrinkage rate. It can be easily dry, and does not change shape when drying, or dehisce easily. Therefore camphor timber has been used for different sculptures including Buddha figure (Fig. 1).

Medicine

The roots, wood, bark, leaves and fruits of *Cinnamomum camphora* are used as traditional herbal medicine by various ethnic groups and Han Chinese in many communities of southern part of China. The roots and wood are medicinal materials to treat fever, headache, rheumatism, traumatic injury, and Keshan disease. The bark and leaves are used for ulcer of

Table 1 Category of traditional uses of *Cinnamomum camphora* in China

Category of use	Part used	Traditional uses
Timber (wood)	Stem	Building, furniture, boat, sculpture, firewood, incense
Medicine	Roots, stems, branches, leaves, fruits, seeds, camphor and essential oil extracted from leaves and stems	Medicine, diet supplement, perfume, health care, incense
Pesticide	Bark and leaves	Pesticide and repellent
Smell	Whole plant	Fragrant smell
Ornamental	Whole plant	Ornamental and garden, landscape, house and campus decoration
Cultural uses	Whole plant	City tree, heritage tree, sacred tree, symbol of villages, naming, fortune, intelligence, better education and talent

Fig. 1 Buddha sculpture made from *Cinnamomum camphora* wood by artist Sheng Jiang. Photographed by Xiaodong Xu

lower limb, and skin pruritus. The fruits are used to treat digestion disorder and gastroenteritis (Li et al. 2008; Editorial Group of Collection of Chinese Herbal Medicines 1975).

The camphor and oil were distilled from roots, stems, branches and leaves of *Cinnamomum camphora*. The method to extract camphor and oil from *C. camphora* is similar to liquor distillation. They are also traditional medicine for treating different problems (Li et al. 2008). The camphor has been used for treating pain, rheumatism, cholera, traumatic injury, indigestion and others by local healers. In ancient times, women brought camphor kept in a small bottle with them for refreshment. The Atayal women in Taiwan used camphor for postpartum renovation by taking baths with camphor. The oil has been used for bronchitis, cold, cough, fever, insect bites, back pain, rheumatism, and traumatic injury in traditional Chinese medicine and ethnomedicine (Editorial Group of Collection of Chinese Herbal Medicines 1975).

Pesticides and repellents

The small camphor balls are the most common pest-repellents for household uses in the whole country. Particularly in the southern part of China, it is warm and very humid. The insect outbreaks can easily happen in clothes if storing at home. People put one or two camphor balls in the cabinets containing clothes, quilts, and other textiles. Thus pests will be away from the cabinets and the clothes can be preserved very well.

In the countryside of southern part of China, farmers collect the leaves of *Cinnamomum camphora*, and put into the paddy fields. Some pests will be controlled when rice or other crops are grown in the fields. The fruits are harvested in October. After a few weeks of fermentation, the seeds will be obtained for germination to get seedlings, and the remains can be used to kill pests in homegardens.

Ornamentals

The camphor tree is good-building, large canopy, evergreen, fragrant, and elegant. It is an ideal arbor species for gardens and ornamental purposes. The history of *Cinnamomum camphora* cultivation for ornamental purpose could be tracked back to 2000 years ago. People like to grow it on (in) roadsides, village sides, parks, school campus, scenic spots, and temple yards.

The massive *Cinnamomum camphora* trees would highly beautify the landscape of parks, gardens, campus and villages. The camphor trees on roadsides in countryside and streets in urban areas could provide pedestrians and walking trails with comfortable shades, nice views, and fragrant smells. They can also improve the visibilities of a house, a temple, a village, or a town.

A lot of *Cinnamomum camphora* trees, including some heritage camphor trees, have become scenic spots for tourism because of their horticultural and ornamental values. In Anfu County of Jiangxi Province, for instance, the camphor trees scattered in different villages have become scenic sites and attracted many tourists (Wang and Dong 2013).

Named after *Cinnamomum camphora*

In southern part of China, many places have been named after the camphor tree, including one city, 13 townships (Table 2), 75 villages (Table 3), and numerous areas or objectives such as hills, streams, valleys, gardens, bridges, roads, buildings, ponds and forests. The Han Chinese character of camphor tree, 樟 (*zhang*), has been used in given names of people,

Table 2 List of 13 townships with camphor tree as their names

Township name	Location
Zhangcunpingzhen 樟村坪镇	Yiling District, Yichang City, Hubei Province
Zhangcunzhen 樟村镇	Yushan County, Shangrao City, Jiangxi Province
Zhangmuxiang 樟木乡	Xingguo County, Ganzhou City, Jiangxi Province
Zhangmuxiang 樟木乡	Hengyang County, Hengyang City, Hunan Province
Zhangmuxiang 樟木乡	Qintang District, Guigang City, Guangxi Region
Zhangmuzhen 樟木镇	Fumian District, Yulin City, Guangxi Region
Zhangshizhen 樟市镇	Guiyang County, Chenzhou City, Hunan Province
Zhangmuzhen 樟木镇	Qinxi County, Wuzhou City, Guangxi Region
Zhangshuxiang 樟树乡	De'an County, Jiujiang City, Jiangxi Province
Zhangshuxiang 樟树乡	Zhangshu City, Yichuan City, Jiangxi Province
Zhangshuxiang 樟树乡	Hengyang County, Hengyang City, Jiangxi Province
Zhangshuxiang 樟树乡	Anren County, Chenzhou City, Jiangxi Province
Zhangshuzhen 樟树镇	Xiangyin County, Yueyang City, Hunan Province

particularly for the males. The newly named objectives are emerging out in many cities of southern part of China, especially for streets, resident zones, parks, companies, hotels and restaurants.

In Changsha City of central China, according to our investigation, there are several famous places with the name of *zhang* or *zhang shu* or *xiang zhang*. A street named *Xiang Zhang* Road is located in the urban district, covered with beautiful camphor trees on both sides of the street. A forest on Hunan Normal University campus named *Zhang Yuan* or *Cinnamomum camphora* Garden with both old and young camphor trees is regarded as one of the best public zones for students and professors. Other cities also established parks with *C. camphora* as their names, like *Zhang Shu* Park (camphor tree park) in Wuyishan City of Fujian Province, and *Zhang Shulin* Park (camphor forest park) in Zhongshan City of Guangdong Province.

Zhangshu City is located in central Jiangxi Province, which is a city named after the Chinese name of *Cinnamomum camphora*. This ancient city was established ca. 4500 years ago. The population was estimated as 0.63 million by the end of 2012. It is famous for its herbal medicines. In addition to camphor, *Tetradium ruticarpum*, *Gardenia jasminoides*, *Poncirus trifoliata*, *Plantago asiatica* and many other medicinal plants have been cultivated in the city. The total cultivation area was 12,000 hectares in 2012, and the yearly income from cultivation and production of medicinal plants reached 0.857 billion US dollars (http://www.zhangshu.gov.cn/).

Townships named after camphor tree were 13 in China, with *zhang* in their names according to Chinese literatures (Ji 2010) (Table 2). A Tibetan township is also named with the characters "*zhang mu*" where is a Chinese land port from Tibet to Nepal, but it is not the same meaning as camphor tree. This name was translated from Tibetan, which means "a port nearby". Most townships named after camphor tree are from Jiangxi Province with 6 townships, followed by Hunan Province with 4, while there are 2 in Guangxi and 1 in Hubei.

As for the villages named after camphor tree, the number reached at least 75 according to our statistics (Table 3). There are 20 villages named after camphor tree in Hunan Province, followed by Jiangxi Province with 19 villages and then Sichuan Province with 11 villages. In these provinces, a lot of ancient camphor trees are reported. In particular, the villagers like to grow *Cinnamomum camphora* trees close to their living environments because they believe these trees would bring luck and fortune to their descendants. Therefore, it is not surprise that so many villages have been named after camphor tree.

Yunnan and Guizhou provinces are also famous for their camphor products and old camphor trees. However very few places, neither township nor village, have been named after camphor tree, except

Table 3 Category of villages with camphor tree as names in Mainland China

Province name	City name	Number of villages
Anhui Province 安徽省	Chizhou City 池州市	3
	Anqing City 安庆市	1
Guangdong Province 广东省	Dongguan City 东莞市	1
	Jieyang City 揭阳市	1
	Shenzhen City 深圳市	1
Fujian Province 福建省	Longyan City 龙岩市	1
	Nanping City 南平市	1
	Quanzhou City 泉州市	1
Guizhou Province 贵州省	Anshun City 安顺市	1
Hubei Province 湖北省	Huangshi City 黄石市	3
	Yichang City 宜昌市	1
Hunan Province 湖南省	Changde City 常德市	4
	Changsha City 长沙市	2
	Chenzhou City 郴州市	2
	Hengyang City 衡阳市	4
	Loudi City 娄底市	1
	Shaoyang City 邵阳市	2
	Xiangtan City 湘潭市	2
	Yueyang City 岳阳市	1
	Zhangjiajie City 张家界市	1
	Zhuzhou City 株洲市	1
Jiangxi Province 江西省	Fuzhou City 抚州市	1
	Ganzhou City 赣州市	8
	Ji'an City 吉安市	1
	Jiujiang City 九江市	4
	Shangrao City 上饶市	3
	Yichun City 宜春市	2
Sichuan Province 四川省	Bazhong City 巴中市	1
	Chengdu City 成都市	1
	Deyang City 德阳市	1
	Liangshan Prefecture 凉山州	1
	Luzhou City 泸州市	1
	Mianyang City 绵阳市	1
	Nanchong City 南充市	1
	Suining City 遂宁市	2
	Yibin City 宜宾市	1
	Ziyang City 资阳市	1
Zhejiang Province 浙江省	Hangzhou City 杭州市	2
	Jinhua City 金华市	1
	Lishui City 丽水市	1
	Ningbo City 宁波市	4
	Wenzhou City 温州市	1

a village in Anshun of Guizhou Province. In the west parts of Hunan and Hubei, we never find any village named with *zhang*. Our field investigation, however, revealed some villages in Yunnan, Guizhou, west Hunan and west Hubei were named after camphor tree, but without *zhang* in their names. It is because most people in these areas are ethnic minorities, particularly in the Miao, Dong, Buyi, Shui, Zhuang, Yi, Yao, Molao, and Maonan communities. The village names we obtained from these areas were translated from ethnic names to Chinese names. Thus it is impossible to find *zhang* in their village names recorded in Chinese literatures.

Heritage tree

The heritage tree (other names are ancient tree, old tree, or age-old tree) refers to the tree surviving for a long time (at least 100 years) with various values. Their cultural values had been highly evaluated (Dong 1989).

There are a lot of ancient or old camphor trees in China, both in the urban areas (such as Shanghai and Hangzhou) and in the countryside. Most of them were cultivated by the ancestors of different ethnic groups and Han Chinese.

According to ancient literature records, some of the old camphor trees were cultivated more than 1000 years ago and they still survive. For example, in Anfu County of Fujian Province, three old camphor trees were cultivated in Han Dynasty (BC 202–AD 220) and their age should be over 2000 years old. In Masha Township of Mingyang County in Fujian Province, an old camphor tree was planted in Tang Dynasty (AD 618–907). A camphor tree in Duxiangqiao, Qiyang County of Hunan Province, was cultivated by famous painter Li Tang (AD 1066–1150) in North Song Dynasty (AD 960–1127). A special name, *Ziyang Zhang*, was dedicated to an old camphor tree grew in Yuelu Shuyuan, the oldest university in China and even in the world, located in Changsha. It was recorded that the camphor tree was planted by Xi Zhu (AD 1130–1200), a famous ideologist and educationist in Chinese history.

In addition to individual ancient camphor trees, some very old *Cinnamomum camphora* forests have been maintained in China (Fig. 2). In Jiangxi Province only, over 300 pieces of old camphor forests have been recorded. In Jintan Village, Tangzhou Township, Taihe County, the ancient camphor forest with an area of 15 hectares was

Fig. 2 An old camphor forest in Guizhou Province

estimated as old as 800 years. In Shuinan Village, Niutian Township, Le'an County, a big forest consisting of more than 10,000 heritage camphor trees was discovered. About 3000 ancient camphor trees (at least 500 years old) live in this forest, in which the oldest one reaches 6 meters at DBH (diameter at breast height) and it was estimated more than 1000 years old.

In ethnic communities, old camphor forests were discovered in Guizhou, Guangxi and Yunnan provinces. For example, Gaojia is a village dominated by the Dong people located in Xishan Township, Congjiang County, Guizhou Province. This Dong village is surrounded by the old *Cinnamomum camphora* forest (Fig. 3).

All these heritage trees and old forests of *Cinnamomum camphora* have been protected by local people. It is because in Chinese culture, people believe *C. camphora* trees can bring happiness, luck and fortune to the residents close to the camphor trees. The customary regulations in the villages or communities ruled the local people to respect and conserve the old camphor trees. In case someone destroyed an old camphor tree, he or she would be punished by the local community.

City tree

The city trees in China were normally proposed by people's representatives based on their investigations as well as the local people's attitude to native trees in the cities. Sometimes they would accept proposals from professionals or publics. All proposals for city trees were selected or evaluated by the panel based on miscellaneous criteria such as horticultural significance, cultural significance, aesthetic purposes, economic values, environmental harmony, disaster resistance and others. The final result of city trees should be confirmed by elections of the city general assemblies of the people's representatives based on their proposals, and then issued officially. One arbor species, occasionally two species can be elected as the city tree.

Among China's 292 cities (prefectural level or above), 167 cities had elected or voted their city trees by the end of 2009 (Wu et al. 2009).

According to our recent statistics, 36 cities in China officially recognized *Cinnamomum camphora* as their city tree (Table 4). It is a big number of cities that the local people elected the same arbor species as city tree. The total population of these cities reaches 172.81 millions (from census between 2010 and

Fig. 3 Gaojia, a Dong village in Guizhou Province surrounding by old camphor trees

Table 4 List of Chinese cities with *Cinnamomum camphora* as city tree

City name	Location	Population	Elevation*
Anqing 安庆	Anhui Province, East China	6.19	20
Changde 常德	Hunan Province, Central China	5.72	50
Changsha 长沙	Hunan Province, Central China	8.58	80
Chenzhou 郴州	Hunan Province, Central China	4.58	420
Chizhou 池州	Anhui Province, East China	1.62	400
Deyang 德阳	Sichuan Province, Southwest China	3.87	500
Ezhou 鄂州	Hubei Province, Central China	1.08	55
Guiyang 贵阳	Guizhou Province, Southwest China	4.68	1070
Hangzhou 杭州	Zhejiang Province, East China	8.84	40
Hengyang 衡阳	Hunan Province, Central China	7.31	120
Huangshi 黄石	Hubei Province, Central China	2.53	60
Ji'an 吉安	Jiangxi Province, East China	4.67	110
Jiaxing 嘉兴	Zhejiang Province, East China	4.89	4
Jinhua 金华	Zhejiang Province, East China	4.71	160
Jingdezhen 景德镇	Jiangxi Province, East China	1.61	32
Jiujiang 九江	Jiangxi Province, East China	4.85	20
Longyan 龙岩	Fujian Province, Southeast China	2.98	650
Loudi 娄底	Hunan Province, Central China	4.38	170
Ma'anshan 马鞍山	Anhui Province, East China	1.27	20
Mianyang 绵阳	Sichuan Province, Southwest China	5.45	510
Nanchang 南昌	Jiangxi Province, East China	4.92	25
Ningbo 宁波	Zhejiang Province, East China	5.81	5
Quzhou 衢州	Zhejiang Province, East China	2.44	80
Shangrao 上饶	Jiangxi Province, East China	6.76	60
Shaoyang 邵阳	Hunan Province, Central China	7.25	230
Shiyan 十堰	Hubei Province, Central China	3.44	410
Suzhou 苏州	Jiangsu Province, East China	13.16	5
Taizhou 台州	Zhejiang Province, East China	5.97	35
Xiangtan 湘潭	Hunan Province, Central China	3.75	90
Xinyu 新余	Jiangxi Province, East China	5.45	25
Wuhu 芜湖	Anhui Province, East China	3.85	10
Wuxi 无锡	Jiangsu Province, East China	6.38	8
Yibin 宜宾	Sichuan Province, Southwest China	5.43	360
Yingtan 鹰潭	Jiangxi Province, East China	1.13	25
Zhuzhou 株洲	Hunan Province, Central China	3.96	80
Zigong 自贡	Sichuan Province, Southwest China	3.30	300

* Meters above sea level

2014), which is close to the number of whole south Europe (17 countries, ca. 180.00 millions).

The locations with *Cinnamomum camphora* as city tree are mostly less than 500 meters above sea level. Only four cities are located at the higher elevation areas in which Guiyang, the capital city of Guizhou Province, stays at the highest elevation at 1070 m. This indicates the camphor trees can grow very well at the lower elevation areas, and the local people in these areas adore camphor trees.

In addition to city tree, camphor tree has also been elected as provincial tree by Zhejiang and Jiangxi provinces. Zhejiang is a province with 51.16 millions of people in east China with Hangzhou as its capital city. Jiangxi is located between Zhejiang and Hunan, with a population of 45.22 millions.

Sacred tree

The sacred trees have been recorded all over the world, both in developed societies (e.g. Greece, Italy and Japan) and in developing regions (e.g. China, India and sub-Saharan Africa) (Anderson et al. 2005; Dafni 2006, 2007; Dafni et al. 2006; Gruca et al. 2014; Majupuria 2009; Morton 1998; Quiroz and van Andel 2015). They were sometimes described as possessing supernatural powers or characters. Sacred trees have been worshiped in many religions including Buddhism, Christian, Hinduism, Jews, Muslim, Taoism, and others. Annual (or seasonal) rituals or ceremonies will be arranged for these trees (Gruca et al. 2014; Quiroz and van Andel 2015). Any behavior to violate or destroy a sacred tree must be punished according to local regulations (Dafni 2007).

In China, many *Cinnamomum camphora* trees have been worshiped by different groups according to literature studies and our field investigations. Both Han Chinese and ethnic people treated some camphor trees as sacred or holy trees. The sacred camphor trees have been protected by customary laws or regulations, or by their own supernatural powers. Most of these trees are very old camphor trees.

A lot of camphor trees were recorded as sacred trees in ancient Chinese literatures. The earliest record was found in Shuo Dongfang's book named *Shen Yi Jing* written in West Han Dynasty (about 2100 years ago). He described the sacred camphor tree was very high and covered a large area, on which black apes and fox-like animals lived. *Min Zaji*, a book complied by Hongbao Shi in Qing Dynasty (1878), recorded an interesting sacred camphor tree. Only when the officials were honest, two white cranes would make a nest to foster their babies on this sacred camphor tree. *The Chronicle of Luling County* (now Ji'an County) in Ming Dynasty (AD 1368–1644) reported that a heritage camphor tree was located in front of the Chang-gang Temple. People liked to take rests under this camphor tree canopy but never harmed it because it was a very smart sacred tree.

Nowadays, people in different ethnic groups are still worshiping sacred camphor trees. In Xiaoqi Village, Wuyuan County of Jiangxi Province, there are 70 heritage camphor trees. These old trees are called *Zhang Shu Dashen* (means camphor tree god) and regarded as sacred trees by the local people. They are very powerful and can drive illness away from the old people or children. A small shrine was established in the heritage camphor forest. Rituals are held close to the shrine by contributing sacrifices such as pork, chicken, half-ready rice, and tofu. On the trunks of sacred camphor trees, local villagers pasted red papers with words or phrases to bless good wishes. In Xishe Community, Zhanlong Township, Puning City of Guangdong Province, a heritage camphor tree was regarded as a sacred tree. It grows close to the temple called Ding Niang Palace. A story told the bark of this old camphor tree had controlled an epidemic disease.

The Zhuang people in Guangxi worship the camphor tree god. They believe *Cinnamomum camphora* was the first tree emerged in the world, which grew on the earth when cosmos was created. Therefore, camphor tree was the god to support the sky at the early stage of cosmos. In Wujie Township of Nanhua County, Yunnan Province, the Yi ethnic people treat the old camphor trees as gods. All these heritage trees have been strictly protected by the villagers. Any offence to the heritage camphor trees, including leaf-collecting or fruit-picking, had been prohibited, and should be punished in case happened. The Shezu ethnic people in Zhejiang Province have a tradition to assign a camphor tree to be godmother of a baby child. When a baby gets sick, his or her parents will implore the camphor tree god to protect the poor child. A ritual ceremony will be organized in front of the camphor tree, and the god tree will be worshiped to be godmother of the baby patient. The baby will be endowed a name with *zhang* (camphor tree). After that, sacrifices including rice, wheat, or edible nuts will be dedicated for worships during festivals.

Village symbol

In many areas of southern part of China, villagers treat camphor trees as their village symbol. These camphor trees were cultivated around the villages by the ancestors of local villagers. They are both

heritage trees and village symbols as well. It is also why there are so many villages named after camphor tree (*zhang* in Chinese), as mentioned previously.

There are about 2000 villages in Fu'an County, Jiangxi Province. Every village in this county is symbolized by camphor trees. In Huangchaling Township, Hengyang City, Hunan Province, a heritage camphor tree occupies an area of 500 square meters and was estimated to be more than 1000 years old. It has become the symbol of Huangchaling Township. The symbol of some villages with the same family names in Hengyang and Hengnan counties is also camphor trees. In ethnic communities, people take camphor trees as their village symbol too. For example, villagers of a Miao village in Xijiang Township, Leishan County of Guizhou Province, also treat camphor tree as their village symbol (Fig. 4).

Some old camphor trees have become both village symbols and geomancy (*Fengshui* in Chinese) trees or forests. Shangye is a village in Fotang Township, Yiwu City, Zhejiang Province. All people in the village share the same family name "Ye". The Ye's ancestors planted camphor seedlings surrounding the village when they moved to Shangye Village about 800 years ago. Later the camphor trees became geomancy forest, and village symbol as well. An ancient camphor tree in front of Xie Village, Xiongcun Township, Huangshan of Anhui Province, is the village symbol. It is also regarded as a geomancy tree. This heritage tree has been protected by the village regulations for many centuries.

Public attitude

The local people in southern part of China have cultivated various native arbor species in cities and around the villages for different purposes for a long history. For example, they grew timber species (mainly China fir, *Cunninghamia lanceolata*) for construction and furniture, *Gingko biloba* for medicine and ornamental, *Osmanthus* and plums for gardening. However, camphor tree has been endowed with the highest reputation by the public, according to our field investigation. Most informants insisted camphor tree occupied advantages in various aspects and properties. The comprehensive evaluation of camphor tree was much higher than other species. Other species with important values are *Osmanthus fragrans* (Oleaceae), *Prunus persica* (Rosaceae),

Fig. 4 Camphor tree as village symbol in Xijiang, a Miao community in Leishan County, Guizhou Province

Citrus grandis (Rutaceae), *Toona sinensis* (Meliaceae) and *Platycladus orientalis* (Cupressaceae).

In traditional culture of southern part of China, the camphor tree implies intelligence, better education and talent. All people respect these properties and bless camphor trees would bring good wishes to their family members, especially their next generations. The fragrant smell of timber, anti-insects of camphor and oil, evergreen and long-life trees, and other properties improved public attitude to cultivate, conserve and use *Cinnamomum camphora*.

Conclusions

Cinnamomum camphora is one of the most valuable arbor species in traditional societies of southern part of China. Although camphor tree has been traditionally used for multiple purposes, the most important value is its cultural function. Its modern use in garden and horticulture was derived from its cultural and evergreen properties. Thirty-six cities with a population of 172.81 millions of people have elected *C. camphora* as their city tree. Two provinces with a total population of 96.38 millions also elected camphor tree as their provincial tree. The public showed great positive attitudes to this tree species.

There are many ancient camphor trees in rural and urban areas of China. A great proportion of these old trees have been treated as sacred trees with supernatural powers or characters. They have been protected carefully by customary laws. The traditional power provides beneficial assistance for the government conservation system and will improve sustainable development of such species.

To compare with other arbor species in southern part of China, *Cinnamomum camphora* becomes very special. From the horticultural or medicinal point of views, its values are much less than other species. This phenomenon can be easily explained by ethnobotanical approaches. The local people would appraise a species from different aspects, while scientists often ignore some properties such as cultural and religious values. Therefore we cannot evaluate plant species like *C. camphora* by a single criterion. Ethnobotany provided a comprehensive evaluation method.

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