Ethnobotanical survey of plant species for herbal tea in a Yao autonomous county (Jianghua, China): results of a 2-year study of traditional medicinal markets on the Dragon Boat Festival

Bing Jin1, Yujing Liu2, Jiaxi Xie2, Binsheng Luo4 and Chunlin Long3,4*

Abstract

Background: Herbal tea is widely consumed in Jianghua, a Yao autonomous county in Hunan Province, China, to prevent and treat diseases. The materials in herbal tea at the traditional medicinal markets at the Dragon Boat Festival remain unknown. The aims of the paper were (1) to specifically investigate the materials of herbal tea used by Yao nationalities in Hunan Province, (2) to record the most common and the culturally important medicinal plant species in the markets, and (3) to compare the medical plant tradition both used for herbal tea between the Jianghua and Lingnan regions.

Methods: During 2016–2017, 215 vendors were interviewed at traditional medicinal markets at the Dragon Boat Festival in Jianghua to record plants used for herbal tea and to document traditional knowledge of their medicinal function, habitat, and conservation status. Bunches of medicinal plants were purchased to identify the species and to prepare voucher specimens. Cognitive salience (CS) based on free-lists and use value (UV) were calculated to analyze the cultural importance of medical plants; other quantitative methods (coefficient of similarity and chi-square analysis) were applied for comparison of herbal tea tradition between the Jianghua and Lingnan regions.

Results: A total of 169 species belonging to 66 families and 142 genera were recorded in herbal tea to treat health conditions in the study area. There were 30 health conditions that were recorded, with heat-clearing and detoxifying being the most common medicinal function, followed by treating rheumatism and promoting blood circulation. Of the 169 species, 97 were herbs. The whole plant was the most commonly used plant part in the preparation of herbal tea. According to the national evaluation criteria, three of these species are listed on “China’s red list” and registered as vulnerable (VU). By comparing the coefficient of similarity of herbal tea plants and the number of mentions for part(s) used in Jianghua and Lingnan, the medicinal plant tradition is different in two areas.

Conclusions: Herbal tea in Jianghua reflects the cultural diversity of the Yao people and the plant diversity of the region. Future research on the safety, efficacy, and the adulterants of herbal tea are needed for sustainable utilization.

Keywords: Herbal tea, Ethnomedicine, Yao people, Dragon Boat Festival, Quantitative methods
Background
The practice of drinking herbal tea is an ancient custom for Yao people. Herbal tea is produced from water infusions of a range of plant species other than *Camellia sinensis* (L.) O. Ktze. [1]. Plant material may consist of fresh or dried parts from a single species or from multiple species. For millennia, the Yao people have been famous for being good at identifying herbs [2]. However, no documentary records have survived from when Yao medicine originated.

The Yao nationality of China is mainly distributed in Guangxi, Hunan, Guangdong, Yunnan, Guizhou, and Jiangxi Provinces. The Yao people from Hunan Province are the birthplace of the Yao nationality; Jianghua Yao Autonomous County has the largest Yao population in Hunan Province, accounting for 53% of the population there [2]. Thus, Jianghua Yao Autonomous County plays an important part in the medicine and culture of the Yao people. For historical reasons, the Yao people live long in adverse circumstances, and in the long struggle against disease, the local people had to collect herbs from surrounding mountains and valleys, and they made herbal tea to treat associated health conditions. This tradition formed different, plentiful, and special medical customs, especially herbal tea and medicated baths.

The traditional medical market is a unique custom to celebrate the Dragon Boat Festival (May 5 in the Chinese lunar calendar) by Yao, Zhuang, and Han people in Jianghua (mostly Yao people). At every Dragon Boat Festival, people collect herbs from surrounding mountains and valleys and sell them at the medical market, which is a large-scale market, with more variety and larger trades. The traditional medical market has become a unique spectacle of Yao medicinal culture customs. In addition to buying and selling various herbs, people take this opportunity to exchange their experiences in the recognition and usage of herbs. Since the Dragon Boat Festival is at the end of spring and the beginning of summer, weather conditions are volatile and moist, which probably contribute to the disease rate. During this time, many Chinese herbal medicines are in the periods of harvesting or barking, so the timing forms the unique medicinal market of Yao nationality in Jianghua.

The traditional knowledge of herbs is the result of the accumulated experience by the Yao people's long-term struggle against disease; thus, many aspects of these treatments are probably scientific. However, like the loss of biodiversity, due to the influence of foreign culture, and not having their own written languages, with descendants inheriting their knowledge just by dictation, the traditional knowledge and culture of Yao medicine is also in danger of being lost. In fact, the vanishing of traditional knowledge has been a common phenomenon in the undeveloped country [3].

In order to protect the traditional knowledge of Yao medicine, guarantee food safety, and meet the increasingly globalized health supplement market, we started to document, explore, and research the herb materials for the preparation of herbal tea in Jianghua in 2016.

The study aims to not only document plant species used and commercialized as herbal tea in Jianghua but also make a comparison of herbal tea tradition between the Jianghua and Lingnan regions. This is the first study to document the plant species used as herbal tea in Jianghua; the medicinal plant tradition was recorded for future investigations and policy-making. As well as, if these plant materials are classified and used correctly, the opportunity to develop Yao medicine and expand the herbal tea culture will emerge.

Methods

Study area
The study was conducted in Jianghua, where herbal tea has a significant cultural value and it is traditionally consumed. This region is located in Yongzhou City, which borders Guangdong and Guangxi Provinces, between 110° 25’ S–112° 10’ S and 24° 38’ W–25° 15’ W (Fig. 1). It covers an area of 3248 km². The total population of Jianghua was 510,000 inhabitants in 2013. It is the only Yao autonomous county in Hunan Province, with the largest population of Yao nationality in the 13 Yao autonomous counties throughout the country. This area features a subtropical monsoon climate, and the weather is relatively moderate, with an annual average temperature of 18–18.5 °C, and plenty of rainfall. It owns the biggest and most famous medicinal market in Hunan Province and the surrounding region, that is, the traditional medicinal markets at the Dragon Boat Festival.

Traditional medicinal markets at the Dragon Boat Festival
The Dragon Boat Festival, or known as the Duanwu Festival, is a traditional Chinese cultural holiday. The festival occurs on the 5th day of May in the traditional Chinese calendar. There are three most well-known and widespread activities conducted to celebrate the Dragon Boat Festival, preparing and eating *zongzi*, drinking re-alga wine, and dragon boat racing. These customs could be dated back to over 2500 years ago [4]. The Dragon Boat Festival was held at the summer solstice which is a period of high incidence of disease. Many Chinese folklorists pointed out that the Dragon Boat Festival originated from the concept of people fighting diseases and exterminating evils [5, 6]. So, during the Dragon Boat Festival, some indigenous persons, country doctors, and herbalists collect various kinds of plant and sell them to customers, retailers, or formal vendors at the traditional medicinal market.
Ethnobotanical methods

Field surveys including informant interview, structured investigation, free-listing tasks, and voucher specimen collection were conducted during the Dragon Boat Festival in 2016 and 2017. A total of 215 vendors between 22 and 83 years of age were interviewed at the traditional medicinal markets at the Dragon Boat Festival in Jianghua, Hunan Province, to record plants used for herbal tea and to document traditional knowledge on their medicinal function, habitat, and conservation status. Of the vendors, 70% were over 50 years of age, and these vendors were almost equally male and female. The study was carried out following the International Society of Ethnobiology Code of Ethics [7], and all of the participants were informed of our intent prior to the start of the interviews. In addition, every vendor signed a benefit-sharing agreement. The majority of the vendors worked independently or in small groups, and when the vendors spoke only the Yao language, translation was required by an individual that we had hired. Vendors were asked to complete structured ethnobotanical questionnaires, which were answered willingly without payment, the questions included (1) Which species are used for herbal tea? (2) Where do you gather this plant? (3) What plant parts can be used for herbal tea? (4) What is the function of this plant in herbal tea? and (5) What plants do Yao people here use for herbal tea? Bunches of medicinal plants were purchased to identify the species and to prepare the voucher specimens followed by the Flora of China (http://frps.eflora.cn/) and the collections in PE (the Herbarium, Institute of Botany, Chinese Academy of Sciences), and KUN (the Herbarium, Kunming Institute of Botany, Chinese Academy of Sciences). We then deposited them in the Ethnobotanical Lab, Minzu University of China. Photographs were taken to record all of the plant species.

The conservation status of each plant was revised by the Information System of Chinese Rare and Endangered Plants (http://rep.iplant.cn/protlist/7) (Table 1).

Statistical analysis

Cognitive salience (CS) [8] and use value (UV) [9] were applied to determine the greatest cognitive and cultural importance of these medical plants in Jianghua.

Free-listing is a method to obtain cognitive salience from relatively large samples [10, 11]. Interviewers collected traditional knowledge from large samples of free-lists which reveal cognitive salience from individuals’ local knowledge. The measure of cognitive salience includes both list position and list frequency irrespective of list length or number of respondents [8, 12]. We interviewed 215 informants and recorded 215 free-lists; here, we calculated the mean cognitive salience (CS) for each listed species,

\[ CS = \frac{\sum B + F - 1}{2Z - 1} \]
| Family name | Scientific name | Chinese name | Yao name | Medicinal use | Part(s) used | Habitat | Originality | Conservation status | Use value | Frequency | Voucher number |
|-------------|-----------------|--------------|----------|---------------|--------------|---------|-------------|----------------------|-----------|-----------|-----------------|
| Acanthaceae | Andrographis paniculata (Burm. f.) Nees  | 穿心莲 | Chuan fin lian | Heat-clearing and detoxifying, eliminating inflammation | Whole plant | Herb | Chinese Pharmacopeia (2015) | NE | 1.10 | 16 | JH-141 |
| Aceraceae   | Acer mono Maxim. | 色木槭 | Se diang qie | Rheumatism | Stem, leaf | Tree | – | NE | 0.87 | 12 | JH-021 |
| Acoraceae   | Acorus tatarinowii Schott | 石菖蒲 | Lao bie chang pu | Cold | Whole plant | Herb | Chinese Pharmacopeia (2015) | NE | 0.87 | 65 | JH-202 |
| Adoxaceae   | Viburnum odoratissimum Ker-Gawl. | 珊瑚树 | Shan hu dang | Rheumatism | Whole plant | Shrub | – | NE | 0.85 | 39 | JH-035 |
| Amaranthaceae | Achyranthes aspera L. | 土牛膝 | Tu ong che bo | Heat-clearing and detoxifying, rheumatism, nourishing, relieve pain | Whole plant | Herb | Chinese Pharmacopeia (2015) | NE | 0.85 | 45 | JH-267 |
| Amaranthaceae | Achyranthes bidentata Blume | 牛膝 | Ong che bo | Nourishing | Root | Herb | Chinese Pharmacopeia (2015) | NE | 0.85 | 56 | JH-050 |
| Angiopteridaceae | Angiopteris fokiensis Heron. | 福建观音座莲 | Fu jian guan jin zao lian | Heat-clearing and detoxifying, promote blood circulation, relieve pain | Rhizome | Fern | – | NE | 1.25 | 18 | JH-222 |
| Annonaceae | Fissistigma polyanthum (Hook. f. et Thoms.) Merr. | 黑风藤 | Ji jia mei | Rheumatism | Whole plant | Shrub | Chinese Pharmacopeia (1977) | NE | 0.84 | 40 | JH-298 |
| Apocynaceae | Cynanchum paniculatum (Bunge) Kitagawa | 翠长春 | Xu chang qing | Heat-clearing and detoxifying, eliminating inflammation, relieve cough | Whole plant | Herb | Chinese Pharmacopeia (2015) | NE | 1.25 | 64 | JH-278 |
| Apocynaceae | Dioscorea opposita Thang et P. T. Li | 花叶望江南 | Lai nong mu ji | Eliminating inflammation, rheumatism | Whole plant | Wne | – | NE | 1.09 | 33 | JH-127 |
| Apocynaceae | Mandevia sinensis Hemsl. | 牛奶菜 | Ong you lai | Rheumatism, promote blood circulation, heatstroke | Stem | Wne | – | NE | 1.09 | 35 | JH-151 |
| Apocynaceae | Trachelospermum jasminoides (Lindl.) Lem. | 红娘 | Luo lao | Rheumatism | Whole plant | Wne | Chinese Pharmacopeia (2015) | NE | 0.84 | 30 | JH-045 |
| Aquifoliaceae | Ilex chinensis Sims | 冬青 | Dong men | Promote blood circulation | Bark, seed | Tree | Chinese Pharmacopeia (1977) | NE | 0.84 | 41 | JH-182 |
| Araceae | Pothos chinensis (Raf.) Merr. | 石柑子 | Lao bie gan zhi | Rheumatism | Whole plant | Wne | – | NE | 0.84 | 33 | JH-185 |
| Araceae | Typhonium flagelliforme (Lodd.) Blume | 瘤疤头 | Ban yan tou jian | Heat-clearing and detoxifying, relieve cough | Root | Herb | – | NE | 1.09 | 16 | JH-017 |
| Araliaceae | Acanthopanax evodolepis Franch. | 吴茱萸 | Wu zu you heng jia | Rheumatism | Rhizome | Shrub | – | NE | 0.84 | 39 | JH-102 |
| Araliaceae | Heteropanax fragrans (Roht) Seem. | 走青枫 | Huang fan jia | Rheumatism | Bark, pith | Tree | – | NE | 0.83 | 36 | JH-220 |
| Araliaceae | Panax japonicus (T. Nees) C. A. Mey. | 竹节参 | Lao a shen | Nourishing, eliminating phlegm, stop bleeding, relieve pain | Rhizome | Herb | Japanese Pharmacopeia 17 | NE | 1.48 | 15 | JH-244 |
| Family name    | Scientific name | Chinese name | Yao name | Medicinal use                                                                 | Part(s) used | Habitat | Originality | Conservation status | Use value | Frequency | Voucher number |
|---------------|-----------------|--------------|---------|--------------------------------------------------------------------------------|--------------|---------|-------------|---------------------|-----------|-----------|-----------------|
| Araliaceae    | Schefflera octophylla (Linn.) | 梓掌柴 | E zhuan zhan | Heat-clearing and detoxifying, rheumatism, relaxing tendons, and activating collaterals | Leaf, bark    | Shrub   | –           | NE                  | 1.47      | 40        | JH-081          |
| Aristolochiaceae | Asarum sagittarioides C. F. Liang | 山慈菇 | Geng d ju | Rheumatism, relieve pain | Whole plant | Herb | – | NE                  | 1.09      | 23        | JH-277          |
| Basellaceae   | Basella alba L. | 落葵 | Luo kui | Heat-clearing and detoxifying | Leaf, whole plant | Herb | – | NE                  | 1.08      | 37        | JH-119          |
| Berberidaceae | Dysosma versipellis (Hance) M. Cheng ex Ying | 八角莲 | Ba guo lian | Heat-clearing and detoxifying, promote blood circulation | Rhizome | Herb | – | VU                  | 1.08      | 12        | JH-235          |
| Berberidaceae | Mahoniafortunei (Lindl.) Fedde | 十大功劳 | Jie da gang luo | Heat-clearing and detoxifying | Root, stem | Shrub | – | NE                  | 0.83      | 60        | JH-241          |
| Caesalpiniaceae | Bauhinia championii (Benth.) Benth. | 龙须藤 | Long xu mei | Rheumatism, relaxing tendons, and activating collaterals, relieve pain | Stem | Vine | – | NE                  | 1.45      | 31        | JH-285          |
| Cannabaceae   | Humulus scandens (Lour.) Mei. | 蒿草 | Lv mi | Heat-clearing and detoxifying, induce diuresis | Whole plant | Herb | – | NE                  | 1.08      | 17        | JH-226          |
| Caprifoliaceae | Lonicera confusa (Sweet) DC | 华南忍冬 | Hua nan yin dong | Heat-clearing and detoxifying | Flower, stem, leaf | Vine | – | NE                  | 0.83      | 56        | JH-149          |
| Caprifoliaceae | Lonicera japonica Thunb | 忍冬 | Yin dong | Heat-clearing and detoxifying, promote blood circulation | Stem | Vine | – | NE                  | 1.08      | 48        | JH-085          |
| Gelsemaeae    | Celastrus orbiculatus Thunb. | 南蛇藤 | Nan nang mei | Heat-clearing and detoxifying, rheumatism | Fruit | Vine | – | NE                  | 1.07      | 34        | JH-287          |
| Gelsemaeae    | Euonymusfortunei (Turcz.) Hand-Mazz. | 刚毛藤 | Fu fang mei | Relaxing tendons and activating collaterals | Stem, leaf | Shrub | – | NE                  | 1.07      | 53        | JH-066          |
| Gelsemaeae    | Trapaengium wilfordii Hook. f. | 雷公藤 | Bu ong mei | Rheumatism | Whole plant | Shrub | – | NE                  | 0.80      | 48        | JH-118          |
| Chloranthaceae | Chloranthusfortunei (A. Gray) Salis-Laub. | 丝穗金粟兰 | Si sui jin su lan | Rheumatism, cold, heat-clearing and detoxifying, relieve cough | Whole plant | Herb | – | NE                  | 1.39      | 73        | JH-055          |
| Goldicaceae   | Disporum cantoniense (Lour.) Merr. | 万寿竹 | Wan shou lao | Relieve cough, promote digestion | Rhizome | Herb | – | NE                  | 1.06      | 40        | JH-214          |
| Commelinaceae | Murraviahensis Hook. (Hassk.) Hand-Mazz. | 珍草 | You ni | Heat-clearing and detoxifying, induce diuresis | Whole plant | Herb | – | NE                  | 1.05      | 34        | JH-093          |
| Compositae    | Achillea millefolium L. | 蒿 | Shi | Rheumatism, gynaecopathia | Leaf, flower | Herb | – | NE                  | 1.04      | 32        | JH-016          |
| Compositae    | Artemisia argyi Levl. et Van. | 艾 | Ai | Gynaecopathia | Whole plant | Herb | – | NE                  | 0.80      | 93        | JH-005          |
| Compositae    | Artemisia capillaris Thunb. | 青蓠蒿 | Yin chen hao | Promote digestion, eliminating inflammation | Leaf | Herb | – | Japanese Pharmacopoeia 17 | 1.02      | 35        | JH-062          |
Table 1 Medicinal plants used for herbal tea in the traditional medicinal market of Jianghua County on Dragon Boat Festival (Continued)

| Family name | Scientific name | Chinese name | Yao name | Medicinal use | Part(s) used | Habitat | Originality | Conservation status | Use value | Frequency | Voucher number |
|-------------|----------------|--------------|----------|---------------|--------------|---------|-------------|---------------------|-----------|-----------|----------------|
| Compositae  | Artemisia dubia Wall. ex Bess. | 牛尾蒿 | Ong du hao | Rheumatism, heat-clearing and detoxifying, eliminating inflammation | Whole plant | Herb | Tibetan medicine 16 | NE | 1.25 | 34 | JH-156 |
| Compositae  | Artemisia princeps Pamp. | 魁蒿 | Kui hao | Rheumatism, nourishing, gynaecopathia, eliminating inflammation, stop bleeding | Leaf | Herb | – | NE | 1.74 | 9 | JH-245 |
| Compositae  | Aster tataricus L.f. | 紫苑 | Zi wan | Heat-clearing and detoxifying | Root | Herb | Chinese Pharmacopeial (2015) p342 | NE | 1.02 | 35 | JH-003 |
| Compositae  | Cirsium japonicum Fisch. ex DC. | 蔷薇 | Lao bie hui sui | Rheumatism, promote blood circulation, stop bleeding, eliminating inflammation | Whole plant, root | Herb | – | NE | 1.68 | 26 | JH-215 |
| Compositae  | Dendranthema lavandulifolium (Fisch. ex Trautv.) Ling & Shih | 甘菊 | Gan ju | Heat-clearing and detoxifying | Whole plant | Herb | – | NE | 0.80 | 39 | JH-166 |
| Compositae  | Dendranthema ×anandria (Sch.-Bip.) Tzvel. | 菊花 | Ju ban | Heat-clearing and detoxifying, rheumatism, improve eyesight | Flower | Herb | Chinese Pharmacopeial (2015) p310 | NE | 1.24 | 68 | JH-047 |
| Compositae  | Farfugium japonicum (L.) Kt. | 大吴风草 | Lu wu jia mi | Gynaecopathia, relieve cough | Root | Herb | – | NE | 1.01 | 34 | JH-280 |
| Compositae  | Gerbera anandria (L.) Sch.-Bip. | 大丁草 | Lu ding mi | Hepatitis | Whole plant | Herb | – | NE | 0.80 | 43 | JH-255 |
| Compositae  | Gerbera piloselloides (Linn.) Cass. | 毛大丁草 | Bie lu ding mi | Heat-clearing and detoxifying, eliminating inflammation, infantile malnutrition | Whole plant | Herb | – | NE | 1.24 | 43 | JH-223 |
| Compositae  | Grangea maderaspatana (L.) Poir. | 田基黄 | Lin ji yang | Heat-clearing and detoxifying | Whole plant | Herb | – | NE | 0.79 | 71 | JH-201 |
| Compositae  | Gynura japonica (Thunb.) Juel. | 菊三七 | Ju fang qie | Diabetes, infantile malnutrition | Whole plant | Herb | – | NE | 1.01 | 46 | JH-137 |
| Compositae  | Inula japonica Thunb. | 旋覆花 | Xuan fu ban | Infantile malnutrition | Root, leaf, flower | Herb | Chinese Pharmacopeial (2015) p305 | NE | 0.79 | 15 | JH-172 |
| Compositae  | Kalimeris indica (L.) Sch.-Bip. | 马兰 | Ma lan | Heat-clearing and detoxifying, relieve cough | Whole plant | Herb | – | NE | 1.00 | 38 | JH-188 |
| Compositae  | Smeetia scandena Buch.-Ham. ex D. Don | 千里光 | Qian lei guang | Skin disease, improve eyesight, heat-clearing and detoxifying | Whole plant | Herb | Chinese Pharmacopeial (2015) p33 | NE | 1.22 | 63 | JH-076 |
| Convolvulaceae | Cuscuta chinensis Lam. | 苒丝子 | Tu si zei | Nourishing | Seed | Herb | Chinese Pharmacopeial (2015) p309 | NE | 0.78 | 21 | JH-286 |
| Convolvulaceae | Dichondra repens Forst. | 马蹄金 | Ma dei jin | Heat-clearing and detoxifying | Whole plant | Herb | – | NE | 0.78 | 51 | JH-270 |
| Family name  | Scientific name | Chinese name | Yao name | Medicinal use | Part(s) used | Habitat | Originality | Conservation status | Use value | Frequency | Voucher number |
|--------------|-----------------|--------------|----------|---------------|--------------|---------|-------------|---------------------|-----------|-----------|----------------|
| Crassulaceae | Sedum emarginatum | 四叶景天 | Ao nong jing lu | Heat-clearing and detoxifying, stop bleeding, hepatitis | Whole plant | Herb | – | NE | 1.21 | 67 | JH-123 |
| Crassulaceae | Sedum kamtschaticum | 堪察加景天 | Kan cha jia jing lu | Eliminating inflammation, promote blood circulation, stop bleeding | Whole plant | Herb | – | NE | 1.21 | 2 | JH-242 |
| Cruciferae  | Ranippa indica (L.) Hiern. | 藁菜 | Han cai | Stop bleeding, relieve cough | Whole plant | Herb | Chinese Pharmacopoeia (1977) p624 | NE | 1.00 | 43 | JH-092 |
| Guurbitaeae | Hemsleya macro sperma C. Y. Wu ex C. Y. Wu et C. L. Chen | 罗锅底 | Luo ceng di | Heat-clearing and detoxifying, gastrointestinal disease | Tuber | Vne | – | NE | 0.99 | 37 | JH-283 |
| Guurbitaeae | Thladiantha dubia Bunge | 赤瓟 | Chi bo | Heat-clearing and detoxifying, promote blood circulation, relieve cough | Fruit, root | Shrub | – | NE | 1.21 | 18 | JH-187 |
| Dryaria     | Pseudodrynaria ovata (Wall. ex Mett.) Ching | 崖姜 | Ya su | Rheumatism, nourishing, relaxing tendons and activating collaterals | Rhizome | Fern | – | NE | 1.37 | 63 | JH-183 |
| Equisetaceae| Equisetum arvense L. | 问荆 | Nai jin | Stop bleeding | Whole plant | Fern | – | NE | 0.77 | 25 | JH-289 |
| Equisetaceae| Equisetum ramosissimum Desf. subsp. debilis (Raasch ex Vauch.) Hauke | 笔管草 | Ba gu mi | Improve eyesight, induce diuresis | Whole plant | Fern | – | NE | 0.97 | 42 | JH-197 |
| Euphorbiaceae | Glochidion puberum (L.) Hutch. | 算盘子 | Fu bian zai | Heat-clearing and detoxifying, promote digestion, promote blood circulation | Root | Shrub | – | NE | 1.20 | 39 | JH-091 |
| Fabaceae    | Callerya speciosa (Champ. ex Benth.) Schott | 美丽鸡血藤 | Hao zui jia jiang mei | Nourishing, heat-clearing and detoxifying, relaxing tendons and activating collaterals | Root | Vne | – | NE | 1.37 | 38 | JH-269 |
| Fabaceae    | Desmodium multiflorum DC. | 饿蚂蝗 | E ma huang | Heat-clearing and detoxifying, infantile malnutrition | Flower, branch | Shrub | – | NE | 0.97 | 36 | JH-144 |
| Fabaceae    | Entada phaseoloides (Linn.) Meis. | 椛藤 | Ke mei | Rheumatism, nourishing, promote blood circulation | Stem | Vne | – | NE | 1.20 | 15 | JH-143 |
| Fabaceae    | Flemingia philippinensis Meis. et Röffle | 千斤拔 | Qin jiang ben | Nourishing | Root | Shrub | – | NE | 0.77 | 51 | JH-012 |
| Fabaceae    | Gleditsia sinensis Lam. | 皂荚 | Zao jia | Eliminate phlegm, induce diuresis | Pod, seed, shoot thorn | Tree | – | NE | 0.95 | 42 | JH-256 |
| Fabaceae    | Indigofera decora Lindl. var. changmensis (Craib) Y. Y. Fang et C. Z. Zheng | 宜昌木蓝 | Yi chang mu lan | High fever | Root | Shrub | – | NE | 0.77 | 42 | JH-080 |
| Fabaceae    | Kummerowia striata (Thunb.) Schindl. | 鸡眼草 | Jia mu jin mi | Heat-clearing and detoxifying, promote blood circulation, promote | Whole plant | Herb | – | NE | 1.19 | 67 | JH-200 |
| Family name   | Scientific name | Chinese name | Yao name | Medicinal use                                                                 | Part(s) used | Habitat | Originality | Conservation status | Use value | Frequency | Voucher number |
|--------------|-----------------|--------------|---------|--------------------------------------------------------------------------------|--------------|---------|-------------|---------------------|------------|-----------|-----------------|
| Fabaceae     | Lespedeza cuneata G. Don | 截叶铁扫帚   | Jie nong li bu gan dao | Heat-clearing and detoxifying, improve eyesight, infantile malnutrition       | Whole plant  | Shrub   | –           | NE                  | 1.19       | 18        | JH-292          |
| Gramineae    | Lophatherum gracile Brong. | 淡竹叶     | Cuan lao nong | Heat-clearing and detoxifying, relieve cough, induce diuresis                | Root         | Herb    | –           | NE                  | 1.19       | 72        | JH-243          |
| Gramineae    | Pennisetum alopecuroides (L.) Spreng. | 狼尾草     | Lang dui mi | Heat-clearing and detoxifying, relieve cough                               | Whole plant  | Herb    | –           | NE                  | 0.95       | 28        | JH-106          |
| Gramineae    | Saccharum spontaneum L. | 甜根子草   | Gan mi zi mi | Heat-clearing and detoxifying, cold, relieve cough                     | Rhizome, stem | Herb    | –           | NE                  | 1.18       | 57        | JH-276          |
| Guttiferae   | Hypericum japonicum Thunb. ex Murray | 地耳草     | Dao mu nong mi | Heat-clearing and detoxifying, promote blood circulation, promote digestion | Whole plant  | Herb    | Chinese Pharmacopeial (1977) p198 | NE          | 1.18       | 42        | JH-189          |
| Guttiferae   | Hypericum monogynum L. | 金丝桃     | Jin si tao | Rheumatism, relieve cough, stomachache                                   | Root         | Shrub   | –           | NE                  | 1.18       | 48        | JH-140          |
| Guttiferae   | Hypericum sampsonii Hance | 元宝草     | Yuan bao mi | Gynaecopathia, heat-clearing and detoxifying, relaxing tendons and activating collaterals | Whole plant  | Herb    | Chinese Pharmacopeial (1977) p79 | NE          | 1.37       | 52        | JH-131          |
| Juncaceae    | Juncus effusus L. | 灯心草     | Dang fen mi | Heat-clearing and detoxifying, induce diuresis, respiratory disease, relieve cough | Spith        | Herb    | Chinese Pharmacopeial (1975 p147 | NE          | 1.36       | 60        | JH-262          |
| Labiatae     | Leonurus artemisia (Laur.) S. Y. Hu | 益母草     | Yi mu cao | Heat-clearing and detoxifying                                                 | Whole plant  | Herb    | Chinese Pharmacopeial (2015 p290 | NE          | 0.77       | 67        | JH-075          |
| Labiatae     | Lycopodium lucidum Turcz. | 地笋     | Dao bia | Rheumatism                                                                 | Whole plant  | Herb    | –           | NE                  | 0.76       | 38        | JH-033          |
| Labiatae     | Mosla chinensis Maxim. | 石香薷   | Shi xiang ru | Heatstroke                                                                 | Whole plant  | Herb    | –           | NE                  | 0.76       | 9         | JH-019          |
| Labiatae     | Pogostemon auricularius (L.) Kass. | 珍珠菜     | Zhen zhu lai | Heat-clearing and detoxifying                                                | Whole plant  | Herb    | –           | NE                  | 0.74       | 40        | JH-239          |
| Labiatae     | Prunella vulgaris L. | 夏枯草     | Xia ku cao | Improve eyesight, promote blood circulation                                | Fruit cluster, flower | Herb    | Chinese Pharmacopeial (2015 p280 | NE          | 0.74       | 67        | JH-179          |
| Labiatae     | Scutellaria barbata D. Don | 半枝莲   | Dan zhi lian | Heat-clearing and detoxifying, induce diuresis, cold                      | Whole plant  | Herb    | Chinese Pharmacopeial (2015 p118 | NE          | 1.18       | 36        | JH-042          |
| Lauraceae    | Cinnamomum aromaticum Schwee | 毛桂     | Mao gui | Rheumatism                                                                 | Bark, root   | Tree    | –           | NE                  | 0.73       | 42        | JH-088          |
| Liliaceae    | Anemarrhena asphodeloides Bunge | 知母     | Zei ma | Promote digestion, gynaecopathia                                           | Rhizome | Herb    | Chinese Pharmacopeial (2015 p212 | NE          | 0.94       | 13        | JH-113          |
| Liliaceae    | Aspidistra elatior Blume | 乌蛇抱蛋     | Geng you luo jiao | Nourishing, promote blood circulation, relieve                               | Rhizome | Herb    | –           | NE                  | 0.94       | 62        | JH-174          |
Table 1: Medicinal plants used for herbal tea in the traditional medicinal market of Jianghua County on Dragon Boat Festival (Continued)

| Family name    | Scientific name                          | Chinese name | Yao name | Medicinal use                                      | Part(s) used | Habitat | Originality | Conservation status | Use value | Frequency | Voucher number |
|----------------|------------------------------------------|--------------|----------|---------------------------------------------------|--------------|---------|-------------|----------------------|-----------|-----------|----------------|
| Liliaceae      | Aglittia retusa K. Y. Lang et S. Z. Huang | 广西蝴蝶拖蛋 | 广西蝴蝶拖蛋 | Nourishing, promote blood circulation, relieve cough | Rhizome      | Herb    | –           | NE                   | 0.93      | 37        | JH-130         |
| Liliaceae      | Uribe phyllula Wang et Tang              | 刺叶山麦冬 | 刺叶山麦冬 | Nourishing                                        | Tuber        | Herb    | –           | NE                   | 0.73      | 59        | JH-271         |
| Liliaceae      | Ophiopogon baidianiv Lev.                | 麦冬      | 麦冬      | Heat-clearing and detoxifying                      | Tuber        | Herb    | –           | NE                   | 0.72      | 57        | JH-069         |
| Liliaceae      | Ophiopogon japonicus f. Ker-Gawl.        | 麦冬      | 麦冬      | Nourishing                                        | Tuber        | Herb    | Chinese Pharmacopeial (2015) p155 | NE 0.72 | 61        | JH-217         |
| Liliaceae      | Polygonatum sibiricum Delar. ex Redoute  | 黄精      | 黄精      | Nourishing                                        | Rhizome      | Herb    | Chinese Pharmacopeial (2015) p306 | NE 0.71 | 59        | JH-236         |
| Loranthaceae   | Rehavia cannea (Andr.) Kunth             | 吉祥草     | 吉祥草     | Heat-clearing and detoxifying, relieve cough      | Whole plant  | Herb    | –           | NE                   | 0.93      | 59        | JH-251         |
| Loranthaceae   | Viscum articulatum Burm. f.              | 扁枝寄生   | 扁枝寄生   | Rheumatism, respiratory disease, promote blood circulation | Branch, leaf | Shrub   | –           | NE                   | 1.18      | 49        | JH-211         |
| Loranthaceae   | Viscum diospyrocolicum Hayata            | 植枝寄生   | 植枝寄生   | Rheumatism, heat-clearing and detoxifying, eliminating inflammation, relaxing tendons and activating collaterals | Whole plant  | Phytoparasite | – | NE 1.60 | 43 | JH-111 |
| Loranthaceae   | Viscum liguidanbrocolum Hayata           | 林香寄生   | 林香寄生   | Rheumatism, relaxing tendons and activating collaterals, promote blood circulation, resolve phlegm to relieve cough | Branch, leaf | Phytoparasite | – | NE 1.60 | 37 | JH-107 |
| Lycopodoaceae  | Diplazium complanatum (L.) Holub         | 细枝石松   | 细枝石松   | Rheumatism                                        | Whole plant  | Herb    | –           | NE                   | 0.68      | 65        | JH-297         |
| Lygodiacae     | Lygodium japonicum (Thurb.) Sw.          | 海金沙     | 海金沙     | Induce diuresis, calculus, rheumatism             | Spore, whole plant | Herb    | Chinese Pharmacopeial (2015) p294 | NE 1.17 | 59        | JH-216         |
| Lythraceae     | Lythrum salicaria L.                     | 千屈菜     | 千屈菜     | Infantile marnution, stop bleeding                | Whole plant  | Herb    | –           | NE                   | 0.93      | 13        | JH-148         |
| Lythraceae     | Rotula natundifolia (Buch.-Harr. ex Rokib) Koehne | 槲叶节菜   | 槲叶节菜   | Heat-clearing and detoxifying                      | Whole plant  | Herb    | –           | NE                   | 0.67      | 33        | JH-272         |
| Melastomataceae | Melastoma deiodenium Lour.               | 地菍       | 地菍       | Promote digestion                                 | Whole plant  | Shrub   | –           | NE                   | 0.67      | 71        | JH-263         |
| Melastomataceae | Memeyiyib scutellatum (Lour.) Hook. et Am. | 细叶谷木   | 细叶谷木   | Heart disease                                     | Flower       | Shrub   | –           | NE                   | 0.67      | 4         | JH-157         |
| Melastomataceae | Ovirthia opora C. Y. Wu et C. Chen       | 朝天镰     | 朝天镰     | Eliminating inflammation, promote digestion, heat-clearing and detoxifying, stop bleeding | Whole plant, root | Shrub   | Chinese Pharmacopeial (1977) p574 | NE 1.34 | 42        | JH-115         |
| Family name | Scientific name | Chinese name | Yao name | Medicinal use | Part(s) used | Habitat | Originality | Conservation status | Use value | Frequency | Voucher number |
|-------------|-----------------|--------------|----------|---------------|-------------|---------|-------------|---------------------|-----------|-----------|----------------|
| Menispermaceae | Stephania cepharantha Hayata | 金线吊乌龟 | Jin sui di wu gui | Eliminating inflammation | Tuber | Vine | – | NE | 0.66 | 39 | JH-168 |
| Menispermaceae | Stephania incanensis Lo et M. Yang | 临沧地不容 | Lin cang dao en rong | Heat-clearing and detoxifying, promote blood circulation, relieve pain | Tuber | Vine | – | NE | 1.17 | 3 | JH-053 |
| Menispermaceae | Tinospora sagittata (Oliv.) Gagnep. | 青牛胆 | Men ong dan | Heat-clearing and detoxifying, promote blood circulation, relieve pain | Tuber | Vine | – | NE | 1.16 | 46 | JH-231 |
| Moraceae | Ficus pumila Linn. | 薇荔 | Xue li | Nourishing, rheumatism | Fruit | Shrub | – | NE | 0.92 | 40 | JH-002 |
| Moraceae | Musa basjoo Sieb. & Zucc. | 芭蕉 | Ba jiao | Heart disease, rheumatism, cold | Flower | Herb | – | NE | 0.65 | 26 | JH-006 |
| Myrsinaceae | Ardisia affinis Hemsl. | 细罗伞 | Fai luo fan | Promote blood circulation | Root | Shrub | – | NE | 0.63 | 56 | JH-095 |
| Myrsinaceae | Ardisia chinensis Benth. | 小紫金牛 | Fai zi jin ong | Promote blood circulation, heat-clearing and detoxifying, eliminating inflammation, stop bleeding | Whole plant | Shrub | – | NE | 1.34 | 59 | JH-001 |
| Myrsinaceae | Ardisia crenata Sims var. bicolor (Walker) C. Y. Wu et C. Chen | 朱砂根 | Zhu sha jiang | Rheumatism, respiratory disease | Whole plant | Shrub | Chinese Pharmacopeia (2015) p138 | NE | 0.92 | 53 | JH-254 |
| Myrsinaceae | Ardisia japonica (Thunb) Blume | 紫金牛 | Zi jin ong | Rheumatism, promote blood circulation, cold, relieve cough | Whole plant, root | Shrub | – | NE | 1.33 | 62 | JH-121 |
| Myrsinaceae | Embelia rubi Hand.-Mazz. | 网脉酸藤子 | Wang me sui mei | Respiratory disease, infantile malnutrition, relax tendons and activate collaterals, eliminating inflammation | Whole plant | Shrub | – | NE | 0.62 | 38 | JH-004 |
| Orchidaceae | Bulbophyllum odoratissimum (J. E. Smith) Lindl | 密花石豆兰 | Mi ban lao bie de lan | Respiratory disease, infantile malnutrition, relax tendons and activate collaterals, eliminating inflammation | Whole plant | Herb | – | LC | 1.57 | 41 | JH-264 |
| Orchidaceae | Bulbophyllum pectinatum Finet | 长足石豆兰 | Long zhu lao bie de lan | Respiratory disease, relieve cough | Whole plant | Herb | – | VU | 0.91 | 41 | JH-041 |
| Orchidaceae | Dendrobium nobile Lindl. | 石斛 | Lao bie hu | Diabetes, improve eyesight, nourishing, promote digestion | Stem | Herb | Chinese Pharmacopeia (2015) p92 | VU | 1.33 | 66 | JH-101 |
| Orchidaceae | Dendrobium officinale Kimura et Migo | 铁皮石斛 | Li lao bie hu | Stomachache | Stem | Herb | Chinese Pharmacopeia (2015) p282 | VU | 0.61 | 41 | JH-265 |
| Orchidaceae | Galeola lindleyana (Hook. f. et Thoms) Hoch. f. | 毛萼山珊瑚 | Mao e shan san hu | Rheumatism, headache | Whole plant | Shrub | – | LC | 0.91 | 52 | JH-058 |
| Orchidaceae | Luisia morsei Rolfe | 铁子藤 | Chai zi gu | Rheumatism, respiratory disease, cold, cancer | Whole plant | Herb | – | LC | 1.33 | 13 | JH-133 |
| Orchidaceae | Spiranthes sinensis (Pers) Ames | 细草 | Shou mi | Nourishing, heat-clearing and detoxifying | Whole plant | Herb | – | LC | 1.16 | 11 | JH-122 |
| Papaveraceae | Eomecon chinonantha Hance | 血水草 | Jie shin mi | Promote blood circulation | Root, rhizome | Herb | – | NE | 0.59 | 14 | JH-219 |
| Phyllanthaceae | Phyllanthus urinaria L. | 叶下珠 | Nong di zhu | Improve eyesight, heat-clearing and detoxifying, promote digestion | Whole plant, root | Herb | – | NE | 1.15 | 69 | JH-083 |
| Family name | Scientific name | Chinese name | Yao name | Medicinal use | Part(s) used | Habitat | Originality | Conservation status | Use value | Frequency | Voucher number |
|-------------|-----------------|--------------|----------|---------------|-------------|---------|-------------|---------------------|-----------|-----------|---------------|
| Pipperaceae | Piper betle L.  | 麝叶         | Lou nong | Heat-clearing and detoxifying, eliminating inflammation, cold | Stem, leaf  | Vine    | –           | NE                  | 1.15      | 40        | JH-029        |
| Pittosporaceae | Pittosporum glabratum Lind. | 银叶海桐     | Jiang nong hai tong | Tuberculosis | Seed, bark | Shrub   | –           | NE                  | 0.58      | 40        | JH-173        |
| Polygalaceae | Polygala japonica Houtt. | 瓜子金       | Jin gua zei | Eliminating phlegm, heat-clearing and detoxifying | Whole plant | Herb    | NE          | Chinese Pharmacopoeial (2015) p112 | 0.91      | 38        | JH-037        |
| Polygalaceae | Polygala tenuifolia Willd. | 远志         | Gu zei | Nourishing, eliminating phlegm, strengthen muscles and bones | Bark      | Herb    | NE          | Chinese Pharmacopoeial (2015) p156 | 1.14      | 39        | JH-191        |
| Polygonaceae | Fagopyrum dibotrys (D. Don) Hara | 金荞麦      | Jin qiao me | Heat-clearing and detoxifying, promote blood circulation, calculus | Root, rhizome | Herb    | NE          | Chinese Pharmacopoeial (2015) p218 | LC         | 52        | JH-230        |
| Polygonaceae | Fallopia multiflora (Thunb.) Harald. | 何首乌       | Huo shou wu | Nourishing | Tuber      | Herb    | NE          | Chinese Pharmacopoeial (2015) p175 | 0.52      | 55        | JH-192        |
| Polypodiaceae | Lepidogrammitis drymoglossoides (Baker) Ching | 贼石莲       | Luo lao bie lian | Heat-clearing and detoxifying, induce diuresis, stop bleeding | Whole plant | Fern    | –           | NE                  | 1.13      | 54        | JH-057        |
| Polypodiaceae | Lepisoria shunbergianus (Keuff.) Ching | 瓦韦         | Wa wei | Heat-clearing and detoxifying, induce diuresis, relieve cough | Whole plant | Fern    | –           | NE                  | 1.13      | 52        | JH-116        |
| Polypodiaceae | Microsorum fortunii (T. Moore) Ching | 江南星蕨     | Jiang nan xing jue | Rheumatism | Whole plant | Fern    | –           | NE                  | 0.52      | 62        | JH-059        |
| Portulacaceae | Portulaca oleracea L. | 马齿苋       | Ma chi xian | Heat-clearing and detoxifying, eliminating phlegm | Whole plant | Herb    | NE          | Chinese Pharmacopoeial (2015) p49 | 0.91      | 37        | JH-007        |
| Primulaceae | Plantago asiatica L. | 车前         | Qi dan men | Heat-clearing and detoxifying, eliminating phlegm | Whole plant | Herb    | –           | NE                  | 1.13      | 69        | JH-018        |
| Ranunculaceae | Clematis henryi Oliv. | 单叶铁线莲   | Dan nong li sui lian | Eliminating phlegm, relieve pain, relieve cough | Root, leaf | Vine    | NE          | 1.13      | 1        | JH-026        |
| Ranunculaceae | Clematis uncinata Champ. | 柱果铁线莲   | Zhu guo li sui lian | Rheumatism, stop bleeding, toothache, relieving tendons and activating collaterals | Root, leaf | Vine    | NE          | 1.32      | 1        | JH-135        |
| Rhamnaceae | Rhamnus cematis Sieb. et Zucc. | 长叶决明   | Nong da dong lu | Heat-clearing and detoxifying | Whole plant | Shrub   | –           | NE                  | 0.48      | 2         | JH-071        |
| Rhamnaceae | Rhamnus globosa Bunge | 圆叶鼠李     | Jun nong na jun li | Heat-clearing and detoxifying | Fruit     | Shrub   | –           | NE                  | 0.47      | 9         | JH-273        |
| Rhamnaceae | Sageretia thea (Obl. & Johnt.) | 喜梅藤       | Que mei mei | Eliminating phlegm, rheumatism | Aerial part | Shrub   | –           | NE                  | 0.47      | 41        | JH-198        |
| Rosaceae | Geum deppicum Jaq. | 路边香       | Jiao leng men | Rheumatism, heat-clearing and detoxifying, relieve pain | Whole plant | Herb    | NE          | 1.13      | 60        | JH-100        |
| Family name | Scientific name | Chinese name | Yao name | Medicinal use | Part(s) used | Habitat | Originality | Conservation status | Use value | Frequency | Voucher number |
|-------------|----------------|--------------|----------|---------------|-------------|---------|-------------|---------------------|-----------|-----------|-----------------|
| Rosaceae    | Potentilla discolor Bge. | 翻白草 | Bian bei mi | Heat-clearing and detoxifying, stop bleeding, diabetes | Whole plant | Herb | Chinese Pharmacopeia (2015) p383 | NE | 1.12 | 45 | JH-190 |
| Rosaceae    | Sanguisorba officinalis L. | 地榆 | Di yu | Heat-clearing and detoxifying, stop bleeding, relieve pain | Root | Herb | Chinese Pharmacopeia (2015) p126 | NE | 1.11 | 35 | JH-209 |
| Rubiaceae   | Dianmcanthus indicus Gaertn. | 虎刺 | Hu ci | Infantile malnutrition, nourishing, relieve pain, cold, hepatitis | Whole plant | Shrub | Chinese Pharmacopeia (1977) p341 | NE | 1.29 | 72 | JH-234 |
| Rubiaceae   | Hedvoto auricularis L. | 耳草 | Tu nong mi | Heat-clearing and detoxifying, promote digestion, relieve cough, cold, promote blood circulation | Leaf | Herb | – | NE | 1.54 | 62 | JH-206 |
| Rubiaceae   | Paederia scandens (Lour.) Merr. | 鸡矢藤 | Jia gai mei | Rheumatism, promote digest, heat-clearing and detoxifying | Whole plant | Vine | – | NE | 1.11 | 31 | JH-074 |
| Rubiaceae   | Senisa sertissoides (DC.) Druce | 白马骨 | Bei ma mei | Rheumatism, heat-clearing and detoxifying, relax tendons and activate collaterals | Whole plant | Shrub | – | NE | 1.11 | 60 | JH-051 |
| Saunuraceae | Houtuyina cordata Thunb | 花衣 | Ji lai | Heat-clearing and detoxifying, respiratory disease, hepatitis | Root, leaf | Herb | – | NE | 1.11 | 9 | JH-089 |
| Saunuraceae | Saururus chinensis (Lour.) Baill. | 三白草 | Bu bei mi | Gynaecompatia | Whole plant | Herb | Chinese Pharmacopeia (2015) p12 | NE | 0.46 | 65 | JH-061 |
| Saxifragaceae | Astrile rivularis Buch.-Ham. ex O. Don | 溪畔落新妇 | Xi pan luo xin fu | Rheumatism, promote blood circulation, relieve pain, promote digestion | Rhizome | Herb | – | NE | 1.29 | 16 | JH-032 |
| Stachyuraceae | Stachyurus chinensis Fanch. | 中国镇节花 | Zhong guo zheng jie hua | Gynaecompatia, heat-clearing and detoxifying, eliminating inflammation, induce diuresis | Pith | Shrub | – | NE | 1.29 | 35 | JH-068 |
| Stemonaceae | Stemona tuberosa Lour. | 大百部 | Dong bei bo | Respiratory disease | Tuber | Vine | – | NE | 0.45 | 78 | JH-281 |
| Sterculiaceae | Pterospermum heterophyllum Hance | 翻白叶树 | Bian bei nong diang | Rheumatism, relax tendons and activate collaterals, relieve pain | Whole plant | Tree | – | NE | 1.11 | 39 | JH-109 |
| Taccaceae   | Schizocapsa plantaginea Hance | 裹果薯 | Nong hu duo | Heat-clearing and detoxifying, eliminating inflammation, stop bleeding | Rhizome | Herb | – | NE | 1.11 | 54 | JH-011 |
| Trilliaceae | Paris polyphylla Sm. | 七叶一枝花 | Qi ye yi zhi hua | Heat-clearing and detoxifying, relieve cough | Rhizome | Herb | – | NE | 0.91 | 30 | JH-260 |
| Umbelliferae | Angelica Chinese DC. | 北柴胡 | Bei chai hu | Eliminating inflammation, heat-clearing and detoxifying, cold fever | Root | Herb | – | NE | 1.28 | 31 | JH-030 |
| Umbelliferae | Hydracosyle striboedioides Lam. | 天胡荽 | Tian hu sui | Heat-clearing and detoxifying, promote digest, infantile | Whole plant | Herb | – | NE | 1.10 | 69 | JH-060 |
| Family name | Scientific name | Chinese name | Yao name | Medicinal use | Part(s) used | Habitat | Originality | Conservation status | Use value | Frequency | Voucher number |
|-------------|-----------------|--------------|----------|---------------|--------------|---------|-------------|---------------------|-----------|-----------|---------------|
| Umbelliferae | Peucedanum guangxiense | 广西前胡 | Jiang fa qian hu | Cold, rheumatism | Root | Herb | – | NE | 0.90 | 36 | JH-024 |
| Umbelliferae | Sanicula chinensis | 变豆菜 | Ben de lai | Relieve cough, promote digestion, heat-clearing and detoxifying, eliminating inflammation | Whole plant | Herb | – | NE | 1.28 | 19 | JH-025 |
| Urticaceae | Boehmeria nivea (L.) | 英麻 | Zhu ma | Heat-clearing and detoxifying, induce diuresis, stop bleeding, nourishing | Rhizome, leaf | Shrub | – | NE | 1.26 | 33 | JH-291 |
| Urticaceae | Parietaria micrantha Ledeb. | 墙草 | Jiong mi | Heat-clearing and detoxifying, promote digestion | Whole plant | Herb | – | NE | 0.90 | 9 | JH-099 |
| Urticaceae | Pila cavaelevi Lev. | 波叶冷水花 | Bo yuan wen ran ban | Relieve cough, heat-clearing and detoxifying | Whole plant | Herb | – | NE | 0.90 | 41 | JH-194 |
| Urticaceae | Pila cavaelevi Lev. subsp. vallida C. J. Chen | 石油茅 | Lao bie you lai | Heat-clearing and detoxifying, relieve pain | Whole plant | Herb | – | NE | 0.90 | 37 | JH-063 |
| Urticaceae | Ureia diffusata (Vain.) | 松萝 | Song luo | Rheumatism | Whole plant | Thallus | Uygur medicine | NE | 0.33 | 71 | JH-147 |
| Verbenaceae | Clerodendrum philippinum Schauer var. simplex | 臭茉莉 | Zui mo li | Rheumatism, promote blood circulation, relieve pain, heat-clearing and detoxifying, promote digestion | Root, leaf, whole plant | Shrub | – | NE | 1.52 | 46 | JH-164 |
| Verbenaceae | Clerodendrum cyrophyllum Turz. | 大青 | Dong qin | Heat-clearing and detoxifying, rheumatism | Root, leaf | Shrub | – | NE | 0.89 | 51 | JH-142 |
| Verbenaceae | Verbena officinalis L. | 马鞭草 | Ma bian mi | Rheumatism, heat-clearing and detoxifying, promote blood circulation, eliminating inflammation | Whole plant | Herb | Chinese Pharmacopeia (2015) p52 | NE | 1.25 | 45 | JH-135 |
| Violaceae | Viola inconspicua Blume | 长萼堇菜 | Da e jin lai | Heat-clearing and detoxifying, promote blood circulation | Whole plant | Herb | – | NE | 0.89 | 10 | JH-252 |
| Vitaceae | Ampelopsis grossedentata (Hand-Mazz) W. T. Wang | 易吉蛇葡萄 | Xian chi nian pu zao | Respiratory disease, heat-clearing and detoxifying, hypertension | Stem, leaf | Wine | – | NE | 1.10 | 46 | JH-120 |
| Vitaceae | Cayratia japonica (Thunb.) Gagnep. | 乌蔹莓 | Wu lian mei | Heat-clearing and detoxifying, induce diuresis | Whole plant | Wine | – | NE | 0.88 | 39 | JH-108 |
| Vitaceae | Euphorbia humifusa Wild.ex Schlect. | 地锦 | Dao jin | Rheumatism, promote blood circulation | Root, stem, fruit | Wine | – | NE | 0.88 | 9 | JH-266 |
| Xanthorrhoeaceae | Hemerocallis citrina Baroni | 黄花菜 | Yang ban lai | Heat-clearing and detoxifying, nourishing | Root, flower | Herb | – | NE | 0.87 | 19 | JH-090 |

VU vulnerable, LC least concern, NE not evaluated
\[ B = \frac{[K-r(i)]}{[K-1]} \]

\( F \) is the number of lists where the particular species is mentioned in all lists while \( Z \) is the number of informants. \( B \) determines how one plant precedes other plants mentioned in a respondent’s list. \( K \) is the number of listed species in one informant, and \( r(i) \) is the \( i \)th order of each plant’s list position.

The closer to the first position (or rank) the item(s) are, the greater the cognitive salience of item(s) is deemed to be.

The use value (UV) is to quantitatively evaluate the relative importance of species \([13–15]\) used by Yao people,

\[ UV = \sum \frac{U_i}{N} \]

where \( U_i \) refers to the number of medical use cited by an informant for per species and \( N \) is the total number of all informants. When there are many use reports mentioned for one plant, it indicates the use value of this plant is high.

The coefficient of similarity (\( S \)) of herbal tea plants between Jianghua and Lingnan regions was calculated by the following formula: \( S = \frac{2c}{a+b} \) \((a\text{ and } b\text{ are species used by Jianghua and Lingnan regions, respectively; } c\text{ are species in common use})\) [16].

Chi-square analysis was applied to find whether the traditional knowledge of herbal tea such as plant life form and plant part(s) used varied considerably between Jianghua and Lingnan.

**Results**

**Medicinal plant species sold for herbal tea at the traditional medicinal markets**

**Plant species and life form**

According to the results of the taxonomical identification, the medicinal plants used for herbal tea belong to 169 species, grouped into 142 genera and 66 families. In alphabetical order of the family, they are presented in Table 1. Further analyses on the plant families show that Compositae has 18 species, making it the dominant family. Liliaceae, Leguminosae, Orchidaceae, Labiatae, and Myrsinaceae are represented by 11, 9, 7, 6, and 5 species, followed by Urticaceae, Umbelliferae, Rubiaceae, and Araliaceae, with 4 species each, and 13 families containing 3 species, 14 families containing 2 species, and 29 families containing 1 species (Fig. 2).

Of the 169 species, the most frequent habits of medicinal plants were herbs (97 spp.), followed by shrubs (35 spp.), vines (22 spp.), ferns (7 spp.), trees (6 spp.), phytoparasites (2 spp.), and thalli (1 sp.) (Fig. 3).

**Part(s) used**

In this study, the analysis revealed that there were 16 kinds of plant parts that were used for herbal tea as medicinal materials. The whole plant was the most commonly used plant part (38.4%), followed by root (14.2%), leaf (9.13%), stem (7.76%), rhizome (7.76%), and tuber (5.02%) (Fig. 4). The study also found that some other plant parts, such as the flower, fruit, bark, pod, seed, pith, branch, shoot thorn, shoot, and fruit cluster, are used less frequently.

**Conservation status**

According to the evaluation criteria established by the International Union for Conservation of Nature (http://
rep.iplant.cn/protlst), three of these species are listed on “China’s red list” and registered as vulnerable (VU), which means that they are at the highest risk for endangerment, namely, *Dysosma versipellis*, *Bulbophyllum pectinatum*, and *Dendrobium nobile*. In addition, five species are categorized under least concern (LC), which is a lower category of risk; they are *Bulbophyllum odoratissimum*, *Galeola lindleyana*, *Luisia morsei*, *Spiranthes sinensis*, and *Fagopyrum dibotrys*, and 159 species were not evaluated (NE) while *Paris polyphylla* is listed as second degree national protective plants and *Dendrobium officinale* is listed as first degree national protective plants. There is a need to investigate and provide proper management to avoid a shortage.

**Medicinal uses**

In our study, a total of 30 medicinal uses were recorded, and heat-clearing and detoxifying was the most common medicinal function, followed by treating rheumatism and promoting blood circulation (Fig. 5). In Jianghua, 49.11% of the medicinal plant species (83 spp.) are used for heat-clearing and detoxifying, 30.18% for treating rheumatism, 17.75% for promoting blood circulation, and 15.38% for relieving cough.

**Cultural and medical significance of species**

The cognitive salience of 169 species ranked from 0.012 to 0.343 (Table 1); 10 species listed as the most salient are *Artemisia argyi* Levl. et Van., *Stemona tuberosa* Lour., *Chloranthus fortunei* (A. Gray) Solms-Laub., *Grangea maderaspatana* (L.) Poir., *Lophatherum gracile* Brongn., *Usnea diffracta* (Vain.) Articus, *Melastoma dodecandrum* Lour., *Damnacanthus indicus* Gaertn., *Plantago asiatica* L., and *Leonurus artemisia* (Laur.) S. Y. Hu. The most 20 salient species are listed in Table 2.

The greater the value of cognitive salience, the more...
culturally important the species is. For example, the highest value refers to *Artemisia argyi* Levl. et Van., which is a fundamental medicinal plant to local people. The least value of cognitive salience is *Clematis uncinitata* Champ.

The use value of 169 species ranked from 0.33 to 1.74. They are *Artemisia princeps* (1.74), *Viscum liquidambaricola* (1.68), *Viscum diospyrosecola* (1.60), *Hedyotis auricularia* (1.60), *Clerodendrum chinense* var. *simplex* (1.57), *Cirsium japonicum* (1.54), *Achyranthes aspera* L. (1.52), *Schefflera octophylla* (Linn.) Frodin (1.51), *Panax japonicus* (T. Nees) C. A. Mey. (1.48), and *Pseudodrynaria coronans* (1.47), which are widely and frequently used by local people.

Comparison of medicinal plant tradition in Jianghua and Lingnan

A comparison of plant materials commonly used for herbal tea in Jianghua and Lingnan shows that there are 23 plant species in total used for herbal tea (Table 3), and Compositae is the predominant family in two regions. For part(s) used for herbal tea, no matter whether they are from Lingnan or Jianghua, the vendors like to use whole plants and roots to prepare herbal tea. By comparing, we found that the common functions of the herbal tea produced by the people both in Jianghua and

| Scientific name | Chinese name | Cognitive salience |
|-----------------|--------------|--------------------|
| Artemisia argyi Levl. et Van. | 艾 | 0.343 |
| Stemona tuberosa Lour. | 大百部 | 0.278 |
| Chloranthus fortunei (A. Gray) Solms-Laub. | 丝穗金粟兰 | 0.264 |
| Grangea maderaspatana (L.) Poir. | 田基黄 | 0.261 |
| Lophatherum gracile Brongn. | 淡竹叶 | 0.251 |
| Usnea diffrecta (Vain.) Articus | 松萝 | 0.251 |
| Melastoma dodecandrum Lour. | 地菍 | 0.249 |
| Dammacanthus indicus Gaertn. | 虎刺 | 0.247 |
| Plantago asiatica L. | 车前 | 0.242 |
| Leonurus artemisia (Laur.) S. Y. Hu | 益母草 | 0.241 |
| Prunella vulgaris L. | 夏枯草 | 0.239 |
| Kummerowia striata (Thunb.) Schindl. | 鸡眼草 | 0.238 |
| Hydrocotyle sibthorpioides Lam. | 天胡荽 | 0.237 |
| Dendranthema morifolium (Ramat.) Tzvel. | 菊花 | 0.237 |
| Sedum emarginatum Migo | 凹叶景天 | 0.236 |
| Phyllanthus urinaria L. | 叶下珠 | 0.233 |
| Dendrobium nobile Lindl. | 石斛 | 0.230 |
| Saururus chinensis (Lour.) Baill. | 三白草 | 0.224 |
| Diphasiastrum complanatum (L.) Holub | 屎枝石松 | 0.224 |
| Acorus tatarinowii Schott | 石菖蒲 | 0.223 |
Table 3 A comparison of plant materials commonly used for herbal tea in Jianghua and Lingnan

| Plant species | Jianghua                                           | Lingnan                                           |
|---------------|---------------------------------------------------|---------------------------------------------------|
| Consistency in efficacy | Heat-clearing and detoxifying, rheumatism, nourishing, relieve pain | Clear heat and purge fire |
| Achyranthes aspera | Whole plant | Root |
| Achyranthes bidentata | Nourishing | Root |
| Mahonia fortunei | Heat-clearing and detoxifying | Root, stem |
| Lonicera confusa | Heat-clearing and detoxifying, promote blood circulation | Stem |
| Lonicera japonica | Root, stem | Nourish yin and clear heat, warm lung and stop cough |
| Cirsium japonicum | Whole plant, root | Cool the blood and stop bleeding, eliminate toxic materials to treat carbuncle |
| Dendranthema moniliforum | Heat-clearing and detoxifying, rheumatism, improve eyesight | Flower |
| Lophatherum gracile | Root, stem | Clear heat, sedative |
| Juncus effusus | Heat-clearing and detoxifying, induce diuresis | Spith |
| Prunella vulgaris | Fruit cluster, flower | Clear away liver-heat and lower the fire |
| Gleditsia sinensis | Pod, seed, shoot | Pith |
| Anemarrhena asphodeloides | Promote digestion, gynaecopathia | Rhizome |
| Ophiopogon japonicus | Nourishing | Tuber |
| Dendrobium nobile | Diabetes, improve eyesight, nourishing, promote digestion | Stem |
| Plantago asiatica | Heat-clearing and detoxifying, induce diuresis, eliminating phlegm | Whole plant |
| Fagopyrum dibotrys | Root, rhizome | Clear heat and detoxifying |
| Artemisia argyi | Gynaecopathia | Whole plant |
| Falciparia multiflora | Nourishing | Tuber |
| Parthenocissus tricuspidata | Rheumatism, promote blood circulation | Root, stem, fruit |
| Acorus tatarinowii | Cold | Whole plant |
| Trachelospermum Jasminoides | Rheumatism | Whole plant |
| Hypericum japonicum | Heat-clearing and detoxifying, promote blood circulation, promote digestion | Whole plant |
| Leonurus artemisia | Heat-clearing and detoxifying | Whole plant |

Inconsistency in efficacy

| Plant species | Jianghua                                           |
|---------------|---------------------------------------------------|
| Inconsistency in efficacy | Stop bleeding, expel cold and alleviate pain by warming meridians |
| Fallopia multiflora | Tuber |
| Parthenocissus tricuspidata | Root, stem, fruit |
| Acorus tatarinowii | Whole plant |
| Trachelospermum Jasminoides | Rhizome |
| Hypericum japonicum | Whole plant |
| Leonurus artemisia | Whole plant |

Jin et al. Journal of Ethnobiology and Ethnomedicine (2018) 14:58 Page 17 of 21
Lingnan are heat-clearing, detoxifying, and treating rheumatism.

By comparing the herbal tea plants commonly used in Jianghua and Lingnan, there are 23 common plant species among which 6 species have different functions (Table 3). They are Fallopia multiflora, Parthenocissus tricuspidata, Acorus tatarinowii, Trachelospermum jasminoides, Hypericum japonicum, and Leonurus artemisia.

The coefficient of similarity of herbal tea plants commonly used in Jianghua and Lingnan is 11.2%. Using chi-square analysis, the number of mentions for part(s) used varied significantly between the two culturally distinct communities ($p$ value < 0.05).

**Discussion**

**Prospective value of herbal tea plants used by Yao people**

Herbal tea in Lingnan region is based on the theory of traditional Chinese Medicine (TCM); many recipes used in herbal tea are evolved from prescriptions of TCM [17]. However, Yao people in Jianghua did not record their traditional knowledge of herbal tea with books or scripts instead of folksongs and teaching generations by experience and dictation. We compared herbal tea plant in Jianghua with Drug Standard Database (http://www.drugfuture.com/standard/), including Chinese Pharmacopoeial (2015 and 1977 versions), Tibetan medicinel, Uygur medicine, and Japanese Pharmacopoeia, and 124 species are not listed in Pharmacopoeia (Table 1). Among these 124 species, the medicinal use of not all species can be supported by literatures. For example, Yao people in Jianghua indicated that Achyranthes aspera can relieve pain, which was verified by Barua et al. In 2010, they verified the antinoceptive activity of the methanolic extract of leaves of A. aspera in animal models of nociception [18]. Cirsiurn japonicum stops bleeding, which was verified by Chen Qi et al. in 2012 [19]. However, most of these 124 species cannot be found in the supporting literatures. Yao people in Jianghua generally believed that Clematis henryi is a good medicine for relieving pain, Heteropanax fragrans can treat rheumatism, and Marsdenia sinensis can treat heatstroke. There is a great need to further study these plant species.

**The efficacy and safety of species used in Jianghua**

In Jianghua, heat-clearing and detoxifying is the most common medicinal function, followed by treating rheumatism, because the Dragon Boat Festival is at the end of spring and the beginning of summer, weather conditions are hot and humid, so the main plant materials used for herbal tea are focused on heat-clearing and detoxifying and treating rheumatism. In Jianghua, 22 species were involved in eliminating inflammation; however, of the 83 species used for heat-clearing and detoxifying, 14 species were involved in eliminating inflammation; it shows that 63.6% of the medicinal plant species sold to eliminate inflammation are also used for heat-clearing and detoxifying, so it is important to conduct some studies to understand the dual effect and discover the possible relationship, which is useful for the theoretical construction of the traditional Chinese medicine (TCM).

Over the past 20 years, the safety [20] and pharmacological efficacy [21–24] of herbal drinks have drawn attention. Findings have elucidated that some phytochemicals in herbal tea are beneficial to human health [25–28], while some are risky to humans [29–34]. Therefore, further research is needed to analyze the bioactivity and toxicity of herbal tea. Among 169 species, two of them are forbidden as raw materials for food based on an announcement from The National Health Commission of the People’s Republic of China (http://www.nhfpc.gov.cn/). They are Dysosma versipellis (Hance) M. Cheng ex Ying and Tripterygium wilfordii Hook. f.

Dysosma versipellis: Podophyllotoxin, a chemical compound isolated from D. versipellis, is recorded to show cytotoxicity resulting emesis, diarrhea, and hepatic and central nerve system lesion [35–38]. However, due to its chemical function similar to colchicine, podophyllotoxin and its derivatives have been synthesized and utilized as anti-tumor drugs [39]. Besides, it was recorded to be used as an antiviral material for treating condyloma acuminate caused by human papilloma virus (HPV) [40]. D. versipellis is largely be utilized for clearing heat and detoxification, rheumatism, and promoting blood circulation by Yao people in Jianghua. However, due to excessive consumption, the conservation status of D. versipellis on “China’s red list” is registered as vulnerable. At present, D. versipellis is cultivated in Jianghua.

Tripterygium wilfordii: The extract of T. wilfordii, a Chinese herb, has anti-inflammatory and immunosuppressive activities and an established history of use in the treatment of rheumatoid arthritis [41, 42]. However, the most common side effects of T. wilfordii are gastrointestinal tract disturbances, such as diarrhea, leukopenia, thrombocytopenia, rash, skin pigmentation, and malfunction of the male and female reproductive system [43].

**Comparison of plant materials used for herbal tea in Jianghua and Lingnan**

The resurgence of interest in natural products has fueled the global herbal tea market. In 2013, Yujing Liu recorded 241 species used for herbal tea in Lingnan Region (China) [1]. By comparing the herbal tea plants commonly used by Jianghua and Lingnan, there are 23
common plant species, among which, there were 17 species that had consistent function and 6 species have different functions.

By comparing the 6 species having different functions in Jianghua and Lingnan, we cannot confirm that they have various medical functions. 

**Achyrantes aspera**, *Fagopyrum dibotrys*, *Lonicera confusa*, *Lonicera japonica*, *Dendranthema morifolium*, and *Juncus effusus* are heat-clearing and detoxifying herbs. In Chinese medicine, the lower the fire is equal to clear heat. We found that there may be a relationship between detoxifying and antibacterial or anti-inflammation properties, because most of the plants with detoxifying properties have antibacterial or anti-inflammation effects (Table 3) [44–52]. For *Gleditsia sinensis*, Jianghua people pointed out that it can induce diuresis, and the Lingnan people indicated that it can relieve pathological heat and remove dampness through diuresis. This may represent a direction for our study of the activity of Chinese herbs. So it will be necessary to verify the pharmacological activity in the future.

By comparing the herbal tea plants commonly used by Jianghua and Lingnan, the coefficient of similarity of herbal tea plants is 11.2%, which is low. We compared all plant parts used in the Jianghua and Lingnan regions. The common used plant parts are whole plant, root, leaf, stem, rhizome, tuber, flower, fruit, bark, seed, pith, branch, and shoot thorn. In Lingnan region, there are several particular used plant parts. They were aerial part, bulb, kernel, bud, peel, stigma, stem node with horns, and pollen. However, in Jianghua region, the particular used parts are pod, shoot, and fruit cluster. We selected all common used parts to do statistical analysis with chi-square analysis; the results ($\chi^2 = 61.333$) show the used plant parts varied significantly between these two different regions. Hence, the variation of used plant part in two regions accounts not only for the particular mentioned used parts but for varied usage rate of each common used part. For example, in Lingnan region, root (20.78%) is the most frequently mentioned used part, while in Lingnan region, it is whole plant (38.36%). The variation of plant part used suggests that the medical plant tradition is far different between the Lingnan and Jianghua regions. The low coefficient of similarity and the variation of plant part used reflect a relatively great difference of herbal tea plant tradition between Jianghua and Lingnan.

**The traditional medicinal market is a bit unstructured**

In the ethnobotanical surveys, we found that there are 14 poisonous species, which need to be paid attention. They are *Pothos chinensis* (Raf.) Merr., *Typhonium flagelliforme* (Lodd.) Blume, *Trachelospermum jasminoides* (Lindl.) Lem., *Asarum sagittarioides* C. F. Liang, *Dysoxylum versipellis* (Hance) M. Cheng ex Ying, *Celastrus orbiculatus* Thunb., *Trierygium wilfordii* Hook. f., *Senecio scandens* Buch.-Ham. ex D. Don, *Hemsleya macroperma* C. Y. Wu ex C. Y. Wu et C. L. Chen, *Reineckia carnea* (Andr.) Kunth, *Eomecon chionantha* Hance, *Fallopia multiflora* (Thunb.) Harald., *Stemona tuberosa* Lour., and *Schizocapsa plantaginea* Hance. In addition, we do not know if there is a phenomenon of substitutes or adulterants in Jianghua traditional market. Based on the Drug Standard Database, we listed the originality of all of the species (Table 1). So, the plants that are nonexistent in the Drug Standard Database need to be scientifically investigated for their efficacy and safety in the future.

**Conclusions**

The traditional medical market in Jianghua Yao Autonomous County reflects the plant species richness and cultural diversity. Traditional knowledge of herbal tea is the result of the accumulated experience by the Yao people’s long-term struggle against disease, so many aspects must be scientific. With the rise of natural product drugs, there is the need to analyze the chemical composition and activity of the materials of herbal tea. Future research is also needed to understand the safety and efficacy of the recorded herbal tea. For sustainable utilization, the production of herbal tea should be monitored.

In addition, uniform standards of practice and licensing of herbal vendors is required to produce a safer herbal tea market. It is very important for them to have the knowledge to select the proper plants since some herbs are hard to identify due to similar morphological characteristics.

**Abbreviations**

CS: Cognitive salience; LC: Least concern; NE: Not evaluated; S: Coefficient of similarity; UV: Use value; VU: Vulnerable

**Acknowledgements**

Many thanks to the 215 vendors from the traditional medicinal market in Jianghua, a Yao autonomous county; their spirits of sharing the traditional knowledge were critical to this study. We would like to sincerely thank Liu Sizhao and Zhang Beixi; they supplied valuable assistance in recording the information during our interviews. A particular thank to Wang Changxin and Jiang Chunrun who are local Yao people for providing us with translation assistance.

**Funding**

Funding was received from the National Natural Science Foundation of China (Grant Nos. 21505075, 31600254, and 31761143001), the Fundamental Research Funds for the Central Universities (KJQN201630), Natural Science Foundation of Jiangsu Province of China (Grant No. BK20150491), National Science Foundation for Post-doctoral Scientists of China (Grant No. 2016M591810), Jiangsu Postdoctoral Sustentation Fund (Grant No. 17010708), the Start-Up Fund for Advanced Talents of Jiangsu University (Grant No. 14JDG150), the Key Laboratory of Ethnomedicine (Minzu University of China) of Ministry of Education of China (KLEM-ZZ201806), the School of Agricultural Equipment Engineering at Jiangsu University, and the Priority Academic Program Development of Jiangsu Higher Education Institutions (PAPD, 2014)37).
Availability of data and materials
We are willing to share the data generated or analyzed during the current study.

Authors’ contributions
BJ and YL conceived of and designed the study, conducted the data collection, and analyzed the data. Literature retrieval was done by BJ and JX. Field surveys were conducted by YL, BL, and CL. BJ and YL drafted the manuscript. CL revised the manuscript and in particular the inventory. All authors read and approved the final manuscript.

Ethics approval and consent to participate
We followed the ethical guidelines adopted by the International Society of Ethnobiology (2008) and Convention on Biological Diversity (CBD). Permissions were verbally informed by all vendors in this study. The human subject approval was obtained from the Institute of Ethnology and Anthropology, Minzu University of China, prior to beginning the work.

Consent for publication
Not applicable.

Competing interests
The authors declare that they have no competing interests.

Publisher’s Note
Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Author details
1. College of Sciences, Nanjing Agricultural University, Nanjing 210095, China. 2. Ecological Institute, Jiangsu University, Zhenjiang 212013, China. 3. Kunming Institute of Botany, Chinese Academy of Sciences, Kunming 650201, China.

Received: 8 February 2018 Accepted: 22 August 2018
Published online: 05 September 2018

References
1. Liu YJ, Ahmed S, Long CL. Ethnobotanical survey of cooling herbal drinks from southern China. J Ethnobiol Ethnomed. 2013;9:62.
2. Yi X, Ji X, Cai Y. A study on the medicinal use of Cirsium japonicum DC in different regions of Shaanxi Province. J Ethnobiol Ethnomed. 2008;4:17.
3. Hu X, Yin Y, Liu Y, Gao H, Shi Y, Wang Y. Effects of traditional Chinese herbal medicines on the survival of wild and farmed plants in China. J Ethnobiol Ethnomed. 2010;6:20.
4. Phillips O, Gentry Ah, Reynell C, Wilkin P, Galvezudaranc B. Quantitative ethnobotany and Amazonian conservation. Conserv Biol. 1994;8:225–48.
5. Nolans JM, Robins MC. A measure of semantic category clustering in free-listing tasks. Field Methods. 2000;12:12–28.
6. Quinlan M. Considerations for collecting free lists in the field: examples from ethnobotany. Field Methods. 2005;17:219–34.
7. Zhang J. Comparative cultural salience: measures using free-list data. Field Methods. 2006;18:398–412.
8. Tabata M, Satoko E, Honda G, Yesilada E, Fukui H, Goto K, Ikebdo Y. Traditional medicine in Turkey. III. Folk medicine in East Anatolia, van and Bitlis provinces. Int J Pharmacognosy. 1994;32:33–12.
9. Tardio J, Paradesantayana M. Cultural importance indices: a comparative analysis based on the useful wild plants of southern Cantabria (northern Spain). Econ Bot. 2008;62:24–39.
10. Bano A, Ahmad M, Ben HT, Saboor A, Sultan S, Zafar M, Khan MP, Anshad M, Ashraf MA. Quantitative ethnomedical study of plants used in the skardu valley at high altitude of Karakoram-Himalayan range, Pakistan. J Ethnobiol Ethnomed. 2010:4;1034.
11. Zai-Fu XU. Preliminary comparison on traditional knowledge of medicinal plants used by Dai Xishuangbanna China and Khmer Cambodia. Acta Bot Yunnan. 2008;30:371–7. 
12. Zhang J. Comparative cultural salience: measures using free-list data. Field Methods. 2006;18:398–412.
13. Tabata M, Satoko E, Honda G, Yesilada E, Fukui H, Goto K, Ikebdo Y. Traditional medicine in Turkey. III. Folk medicine in East Anatolia, van and Bitlis provinces. Int J Pharmacognosy. 1994;32:33–12.
14. Tardio J, Paradesantayana M. Cultural importance indices: a comparative analysis based on the useful wild plants of southern Cantabria (northern Spain). Econ Bot. 2008;62:24–39.
15. Bano A, Ahmad M, Ben HT, Saboor A, Sultan S, Zafar M, Khan MP, Anshad M, Ashraf MA. Quantitative ethnomedical study of plants used in the skardu valley at high altitude of Karakoram-Himalayan range, Pakistan. J Ethnobiol Ethnomed. 2010:4;1034.
16. Zai-Fu XU. Preliminary comparison on traditional knowledge of medicinal plants used by Dai Xishuangbanna China and Khmer Cambodia. Acta Bot Yunnan. 2008;30:371–7.
42. Xuejian Tao MD, Davis LS, Lipsky PE. Effect of an extract of the Chinese herbal remedy Tripterygium wilfordii Hook f. on human immune responsiveness. Arthritis Rheum-US. 1991;34:1274–81.

43. Bao J, Dai SM. A Chinese herb Tripterygium wilfordii Hook f. in the treatment of rheumatoid arthritis: mechanism, efficacy, and safety. Rheumatol Int. 2011;31:1123–9.

44. Yuan G, Chen Y, Li F, Zhou R, Li Q, Lin W, Huang L. Isolation of an antibacterial substance from Mahonia fortunei and its biological activity against Xanthomonas oryzae pv. oryzae. J Phytopathol. 2017;165(5):289–96.

45. Yang B, Yue Q, Wang LP, Zhang XL. Studies on the anti-inflammatory molecular mechanism of chlorogenic acid extracted from Lonicera confusa DC in vitro. Chin Pharmacol Bull. 2009;25:542–4.

46. Song JL, Shin EJ, Son KH, Chang HW, Kang SS, Kim HP. Anti-inflammatory activity of the major constituents of Lonicera japonica. Arch Pharm Res. 1995;18:133–5.

47. Kwak WJ, Han CK, Chang HW, Kim HP, Kang SS, Son KH. Loniceroside C, an antiinflammatory saponin from Lonicera japonica. Chem Pharm Bull. 2003;51:333.

48. Xue YQ, Song J, Su-Ping YE, Yuan K. Separation, identification and its antibacterial activity of glycosylflavones in Lophatherum gracile Brongn. West China J Pharm Sci. 2009;24(3):218–20.

49. Liu XR. Study on antimicrobial effect of the extract from Lophatherum gracile Brongn. J Guangdong Ind Tech Coll. 2008;7(2):20–3.

50. Greca MD, Fiorentino A, Monaco P, Pinto G, Pollio A, Previtera L. Action of antialgal compounds from Juncus effusus L. on Selenastrum capricornutum. J Chem Ecol. 1996;22:587.

51. Bonghyun K, Kyoungsik P, Chang IM. Elucidation of anti-inflammatory potencies of Eucommia ulmoides bark and Plantago asiatica seeds. J Med Food. 2009;12:764–9.

52. Feng L, Chen F, Bai J. Study of antimicrobial in vitro from Fagopyrum dibotrys extracts. J Wuhan Bot Res. 2006;24:249–4.