

Ethnobotanical study on Herbal tea in Qianxinan Buyi and Miao Autonomous Prefecture of southwestern Guizhou province, China

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Abstract

Background

"Herbal tea" is a kind of "tea" made from the roots, stems, leaves, flowers, fruits, and even whole plants of herbal plants. In southwestern Guizhou Province, where ethnic minorities gathering, drinking herbal tea has always been one of the methods used by the local people to prevent common diseases. Systematical records of the use of herbal tea are urgent of ethnic groups. The present study sought to investigate and analyze the traditional knowledge of the herbal tea plants used by the minority people in Qianxinan Buyi and Miao Autonomous Prefecture of southwestern Guizhou province, and reveal their utilization characteristics and its formation factors.

Methods: In 2020 and 2021, field surveys of four villages were conducted in Qianxinan, with ethnobotanical methods such as semi-structured interviews and participatory observation. The relative frequency of citation (RFC) was used to determine the commonly used herbal tea plants. Herbal tea plant specimens were identified according to the Flora of China (<http://www.iplant.cn/>).

Results: A total of 114 species of herbal tea plants belonging to 59 families 103 genera in Qianxinan, with 60% of herbal tea plants grow in wild. The families with the richest species were Asteraceae (19 species). Of the 114 species, herbaceous were common (59%); the most popular used plant parts were whole plants (35%); processing methods of most herbal tea were dried in the sun (38%); most of herbal tea preparation forms were decocted in water for oral dose (50%). 33 major medicinal functions of herbal tea were recorded, which clearing heat, detoxify, and diuresis being the most commonly. The RFC index determined the most used species was *Houttuynia cordata* (RFC=0.51).

Conclusions: After investigation, the resources of herbal tea plants in Qianxinan are rich. However, the traditional knowledge and sustainable development and utilization of herbal tea plants need more extensive basic investigations as support. This study records the types of herbal tea plants and related information used in the Buyi and Miao Autonomous Prefecture in Southwest Guizhou Province, and lays the foundation for the development, protection and sustainable use of herbal tea resources.

Background

Traditionally, tea refers to the beverage products of the use of leaves and buds of the genus *Camellia* (sect. *Thea*, including *C. sinensis* var. *sinensis*, *C. sinensis* var. *assamica*, *C. sinensis* var. *dehungensis*, *C. taliensis*, *C. crassicolumna*, etc.). The definition of herbal tea plant is currently not clearly defined, and "herbal tea" is a kind of "tea" made from the roots, stems, leaves, flowers, fruits, and even whole plants of herbal tea plants. Herbal tea plants can be processed into beverages alone, or together with other herbal tea plants. Herbal tea drinks are popular in southern China because it reduce internal heat and treat a range of health conditions [1].

We have a long history of using tea and herbal tea plants in China. According to the "Tea Classic" written by Lu Yu in the Tang Dynasty, "Tea is for drinking, originated from the Shennong family", indicating that the use of tea in China has a history of four to five thousand years. There are many herbal tea plant resources in China. Not only many Chinese herbal medicines can be made into herbal tea product, but also fruits and vegetables for daily consumption are often processed into herbal tea beverages, such as *Lonicera similis*, *Crataegus cuneata*, *Lycium chinense* etc. Herbal tea plants are widely distributed, which includes 27 provinces of China [2]. The use of herbal tea plants is also common. In communities where medical clinics are not well-equipped, people generally rely on herbal tea plants to prevent and treat diseases in their daily lives [3, 4].

People's life rhythm is accelerating, and some unhealthy behaviors and habits have caused them to be in a sub-healthy state. According to the World Health Organization survey and research report, at present, the population in sub-health status has accounted for 75%. Sub-health is a state of low physiological function between health and disease. It is characterized by reduced vitality, weakened response ability, and decreased adaptability although the body has no obvious disease diagnosis [5, 6]. People in sub-health status are prone to complications such as diabetes and coronary heart disease. Herbal tea plants have significant health-care functions and can be used as medicine and food. The herbal tea consumed by the ethnic people often have the functions of cooling and detoxification, moisturizing the lungs and relieving coughs, beauty and lipid-lowering, delaying aging, anti-cancer, antibacterial and anti-diabetic etc. Some teas can even improve people's mental health [7-10]. In addition, herbal tea plants can also be used as an important source of antioxidants, containing polyphenols, saponins, oligosaccharides, selenium, zinc and other functional ingredients [11]. Most of the herbal tea around the world are functional. For example, the raw material of Peru's traditional tea drink "Emolientes and Emolienteros" *Linum usitatissimum* has the function of repairing liver damage [12]; South Africa's legume tea plant *Aspalathus linearis* and *Cyclopia intermedia* has anti-mutagenic properties etc. [13]; the water extract of *Chrysanthemum morifolium*, a widely used Asteraceae tea plant in Japan, has a significant therapeutic effect on type II diabetes [14]; Eagle tea mainly produced in Guizhou, Sichuan and other places in China from leaves of *Litsea coreana*), and it contains total flavonoids (TFLC) can reduce rat blood and liver tissue serum triglyceride TG, inhibit the absorption of lipids [15]. This shows that some teas have good potential in preventing and treating chronic metabolic diseases.

Modern research has proved that the plants of Rosaceae, Leguminosae, Lamiaceae, Hollyaceae, Asteraceae, Lauraceae, are very common herbal tea plants. They often contain flavonoids, volatile oils and other chemical components, which have antioxidant, anti-tumor and anti-inflammatory properties [15]. In these families and genera of herbal plants, further research is needed to explore the genetic relationship and structure-activity relationship of their chemical components, which is of great significance for finding new herbal tea resources. At the same time, on the basis of the general survey of herbal tea plant resources and the preliminary evaluation of the nutritional value of herbal plants, it is necessary to conduct in-depth evaluation and analysis of the functional components of herbal plants.

With the rapid growth of the world's population and the development of modern economy, the enhancement of health care awareness and the special requirements of consumers, the beverage industry is urged to develop in the direction of diversification, naturalization, nutrition and health. Nevertheless,

people’s over-exploitation and utilization of biological resources has invisibly made the diversity of traditional biological cultures rapidly declining. Coupled with the impact of foreign cultures, some related traditional cultures are also threatened, and the loss of traditional knowledge of plant utilization is even more serious [16].

At present, there are relatively few researches on herbal tea plants in Guizhou, except for ethnic minorities such as Eagle tea and Kuding tea. The utilization characteristics and herbal tea culture are still unknown [17]. Although local people drink herbal tea extensively, there is no systematic record, and the herbal tea knowledge also disappeared with the elderly [16, 18]. In order to further strengthen the protection and development of herbal tea plant resources in Guizhou province, ethnobotanical research on herbal tea plants in Guizhou is very necessary. In this context, this research attempts to use ethnobotanical research methods to conduct a comprehensive and systematic exploration of herbal tea plants in the Buyi and Miao Autonomous Prefecture of southwestern Guizhou Province, China.

Methods

Research area

Qianxinan Buyi and Miao Autonomous Prefecture of southwestern Guizhou province (at 104°35'~ 106°32' east longitude, 24°38'~ 26°11' north latitude), located in the southwest of Guizhou Province, adjacent to Yunnan and Guangxi province. The total area of the prefecture is 16,804 km², accounting for 9.7% of the total area of the province. According to official statistics 2019, the registered population of the prefecture reached more than 3,688,100. The prefecture has 35 ethnic minorities including Buyi, Miao, Hui and Han, among which Buyi has the largest population. The region has a humid subtropical monsoon climate, with an average annual temperature of 13.8~19.4°Cand an average annual rainfall of 1352.8 mm. There are more than 3,913 species of plants in the whole prefecture, of which more than 300 are rare plants [19]. This survey selects four counties/cities (Xingyi, Zhenfeng, Wangmo, and Ceheng counties) with relatively concentrated ethnic minorities and rich traditional cultural diversity to conduct ethnobotanical survey (Fig 1).

Ethnobotanical surveys on the utilization of herbal tea plants in Qianxinan Prefecture was carried out in the four villages of Xingyi, Zhenfeng, Wangmo, and Ceheng from June 2020 to October 2021. Informants was selected by snowball sampling [18]. A total of 110 informants (53 women and 57 men) were interviewed, aged between 14 and 86 (Table 1). Semi-structured interview and participatory observation were used to collect information of herbal tea plants from selected informants [20]. The content of the interview included the gender, age, education level of the informants, and the local name of the herbal tea plant mentioned, the part used, the processing and drinking method, the location and time of collection. When collecting herbal tea plant specimens in field, herbal tea plants pictures was also taken with the accompany of informants. According to the Flora of China (<http://www.iplant.cn/>), herbal tea plant specimens were identified and cataloged to the herbal tea plants list of southwestern Guizhou [21].

Table 1

Demographic basic information of the informants

	category	Number	%
Gender	Male	57	0.51
	Female	53	0.48
Age group	≤30	7	0.06
	31-50	27	0.25
	51-70	62	0.56
	71≤	14	0.13
Ethnicity	Buyi	90	0.82
	Han	16	0.14
	Yi	3	0.03
	Mongolian	1	0.01

Data analysis

Relative frequency of citation (RFC) was used to show the local importance of each collected herbal tea plants [22]. The relative frequency of citation (RFC) formula is:

$$RFC_s = \frac{FC_s}{N} = \frac{\sum_{i=i_1}^{i_N} UR_i}{N} \tag{1}$$

The frequency of citation (FC) refers to the number of informants mentioning the particular species, and N is the total number of informants, without considering the use categories of species [23]. Theoretically, the value range of this indicator is $0 < RFC < 1$. The larger the index, the higher the importance of the species in the survey area.

Results

Diversity of herbal tea

There are 114 species of herbal tea plants in Qianxinan, which belong to 59 families and 103 genera (Table 2). The largest number of herbal tea plants family was Asteraceae (19 species); followed by Lamiaceae (6 species); 5 species each in Rosaceae, Apiaceae, and Fabaceae; Solanaceae (4 species) 3 species each in Araliaceae, Primulaceae, Polygonaceae, Caprifoliaceae, and Lardizabalaceae; 2 species each in Berberidaceae, Cucurbitaceae, Equisetaceae, Poaceae and Amaranthaceae; 1 species each for other families. Life forms of herbal tea plants include herbs, shrubs, trees, vines. (Fig. 2). 72 species are herb plants (59%), followed by shrubs with 25 species (21%); vines with 12 species (10%); trees have 11 species (9%); and epiphytes are 1 species (1%).

Most cited plants

The analysis reveals that there are 49 species of herbal tea plants used by three or more informants (Table 2). More than one-third of the locals use 10 species of herbal tea plants: *Houttuynia cordata*, *Centella asiatica*, *Lonicera similis*, *Solanum nigrum*, *Plantago asiatica*, *Youngia Japonica*, *Taraxacum mongolicum*, *Sonchus wightianus*, *Verbena officinalis*, *Peucedanum medicum*. The most mentioned herbal tea plants are *Houttuynia cordata* (56 times, RFC=0.51), *Centella asiatica* (45 times, RFC=0.41), and *Lonicera similis* (43 times, RFC=0.39).

Health care effect of herbal tea plants

Most of these herbal tea plants are taken by locals in their daily lives, such as seasoning spices, vegetables, food coloring. Locals also believe that herbal tea plants have a wide range of health benefits. The herbal tea plants were used to treat 33 major health conditions. The most frequently cited functions were heat-clearing, detoxification, and fire-lowering (34 species), followed by diuretic functions (16 species); 15 species of liver-protecting functions; 10 species of gastrointestinal regulating; 8 species of blood pressure lowering; 7 species of anti-inflammatory and analgesic; 5 species of rheumatism (Table 2).

Plant parts used in herbal tea

It shows that the whole plant was the highest frequency plant parts used for processing herbal tea (35%), followed by root (17%), leaf (15%); stem (9%); fruit (8%); flower (6%); aboveground part (4%); seed and velamen all account for 2% of the total; other drinking parts accounted for 1% of the total (Fig. 3).

Discussion

Medicinal value of herbal tea plants

The 114 species of herbal tea plants recorded in this survey are regarded as the traditional beverage plants of ethnic minorities, which 67 species are Chinese medicinal plants (58%). For example, pharmacological and clinical studies have shown that *Argyreia pierreana* can be used externally and internally, and has therapeutic effects on clearing heat and detoxification, traumatic injuries, anti-inflammatory and hemostasis etc. [24]. *Perilla frutescens*, *Lophatherum gracile* and *Plantago asiatica* are proved to have diuretic effects [25-27], while *Morus alba* and *Gynostemma pentaphyllum* are proved to have lowering blood pressure effects [28, 29]. Or *Ligustrum robustum* and *Blumea balsamifera* are ethnic minority medicinal resources [30], which are ethnic cultures explored in practice by the ancestors of ethnic minorities. In the survey area, herbal tea has been used locally for a long time because of its medicinal function, which can effectively prevent, treat and regulate common diseases that appear in the body. Its medicinal value has great development potential, in-depth research is conducive to the exploration of Chinese herbal medicinal resources and germplasm resources.

Here, herbal tea plants have medicinal functions of heat-clearing and detoxification, reducing diuresis and regulation of digestive system, which is an important guarantee for locals to prevent and treat diseases (Table 2). The function of clearing heat and detoxification is most common in the community. The investigation areas that Wangmo and Ceheng belong to the Low and Hot River Valley Region in Qianxinan, with basic attributes such as low altitude and high temperature [19]. The local hot weather revealed people's demand for tea-like plants with heat-clearing and detoxifying effects. In addition, the anti-rheumatic effect is an important health benefit related to local herbal tea plants, which is mainly related to the humid climate and environment in the region. "Hui nan sky" (referred to as "Hui nan") is a special weather phenomenon in southern China [19]. This phenomenon is mainly manifested in cloudy and sunny days, very humid, with light rain or heavy fog during the period. People who live in this environment for a long time are prone to relapse of rheumatism, joint pain, and muscle pain [31]. These diseases can be relieved by drinking herbal tea, which also shows that functional tea beverages should be highly valued by the local medical community.

Most of the chemical constituents of herbal tea plants are terpenoids, organic acids, alkaloids, flavonoids, phenols and volatile oils etc. [32-33]. Whole plant of *Agrimonia pilosa* contains agrimonin A-B-C, which can be extracted as hemostatic and is sold in the market. It contains agrimophol (C₂₆H₃₄O₈) in winter underground rhizome buds and can be used as a deworming special medicine [34]. It has a volatile smell in *Litsea lancilimb*. It is not easy to be eroded by insects and is crisp, and can be used as furniture wood. Its seeds are rich in fat and can be extracted oil for industrial use [35]. The chemical components of

roots, stems and leaves of herbal tea plants are often different, thereby making the best use of all parts could increase the utilization rate of herbal tea plants. At the present stage, the existing herbal tea plant resources should be reasonably, scientifically and fully utilized, and explored from the aspects of plant biochemistry to develop new herbal tea plant products.

Table 2

Plant species gathered in Qianxinan were used for making herbal tea

Family	Scientific name	Life form	Part of plant used	Collecting locations	Collecting time	Processing and drinking methods	Therapeutic effect
Acanthaceae	<i>Dicliptera chinensis</i>	Herb	Whole plant	Creek side, roadside	All year	Simmer	To clear heat and promote fluid and diuresis; greasy during confinement; make decoction for red heat
Altingiaceae	<i>Liquidambar formosana</i>	Tree	Leaf, Root, Fruit	Village side	June-September	Dry in the sun→Water boiled	To expectorate, activate collaterals, benefit and regulate menstruation
Amaranthaceae	<i>Amaranthus tricolor</i>	Herb	Root, Fruit, Whole plant	Field	June-July	Simmer	Facilitate movement, get rid of heat and help improve eyesight
	<i>Chenopodium album</i>	Herb	Whole plant	Roadside, wasteland	All year	Dry in the sun→Take decocted with water	Anti-diarrhea, anti-itch
Apiaceae	<i>Centella asiatica</i>	Herb	Whole plant	Next to the village, riverside	All year	Simmer, Blanching, Boil soup	Clear air and remove dampness, remove toxicity, detoxify, detumescence
	<i>Cryptotaenia japonica</i>	Herb	Whole plant	Hillside	May-June	Boil soup	Cure wind-closed, swellings, toxins
Table 2 Plant species gathered in Qianxinan were used for making herbal tea (Continued)							
Apiaceae	<i>Hydrocotyle sibthorpioides</i>	Herb	Whole plant	Meadow, river ditch	All year	Simmer	Clearing heat, decreasing swelling, detoxify and cure jaundice
	<i>Oenanthe javanica</i>	Herb	Whole plant	Swamp, riverside, roadside	All year	Simmer, Boil soup	Delay absorption, anti-aggregating, lower blood pressure, blood circulation, treat febrile colds, and diarrhea
	<i>Peucedanum medicum</i>	Herb	Root	Tussock, rock	Spring	Boil soup, Take decocted with water	Nourish kidney, liver, and the lungs, improve eyesight, aging, and fight infection
Araceae	<i>Sauromatum horsfieldii</i>	Herb	Stem	Bamboo forest	All year	Using fresh herb, dry in the sun→Take decocted with water	Clear air and remove toxicity, swelling, stasis
Araliaceae	<i>Eleutherococcus trifolius</i>	Shrub	Root, Leaf	Village side, hillside, roadside	All year	Take decocted with water	Clear air and remove toxicity, dispel and detoxify, treating
	<i>Eleutherococcus nodiflorus</i>	Shrub	velamen	Roadside, thickets	April-July	Take decocted with water, Bubble medicated wine	To expectorate and deplete and kidney

strengt
muscle
bones,
hydrat
reduce

Table 2 Plant species gathered in Qianxinan were used for making herbal tea (Continued)

Araliaceae	<i>Eleutherococcus senticosus</i>	Shrub	velamen	Roadside, thickets	August- October	Water boiled, Bubble medicated wine	To invig spleen invigor kidney soothe nerves
Asphodelaceae	<i>Hemerocallis citrina</i>	Herb	Fruit, Flower	Hillside	May- October	Dry in the sun→Simmer	Clearin and rei toxicity eyesig moistu Hemos diuretic relieve
Asteraceae	<i>Acmella paniculata</i>	Herb	Whole plant	Field's ditch, roadside	April- November	Dry in the sun→Simmer	Relieve and inflam trauma
	<i>Adenostemma lavenia</i>	Herb	Whole plant	Waterside, roadside	All year	Dry in the sun→Water boiled, Take decocted with water	Clearin and pr diuresis removi toxicity detum
	<i>Artemisia argyi</i>	Herb, Shrub	Leaf	Wasteland, riverside	Summer	Dry in the sun→Take decocted with water	Warm menstr Hemos dispel relieve
	<i>Aster indicus</i>	Herb	Aboveground part	tussock, creek side	All year	Take decocted with water	Cough clearin and rei toxicity elimin food accum and ur

Table 2 Plant species gathered in Qianxinan were used for making herbal tea (Continued)

Asteraceae	<i>Bidens pilosa</i>	Herb	Whole plant	Next to the village, roadside, wasteland	All year	Boil soup, Take decocted with water, Simmer	Treat s throat, swellin blood enteriti appene
	<i>Bidens bipinnata</i>	Herb	Whole plant	Hillside, farm	All year	Dry in the sun→Take decocted with water	Clearin and rei toxicity disper blood and pr blood circula
	<i>Blumea balsamifera</i>	Herb	Whole plant	Under the woods, meadow	All year	Take decocted with water	Clearin and rei toxicity disper blood and pr blood circula
	<i>Chrysanthemum indicum</i>	Herb	Leaf, Flower, Whole plant	Hillside, meadow	June- November	Dry in the sun→Brewing, Simmer	Clearin and rei toxicity lowerin pressu purging smoot

	<i>Crassocephalum crepidioides</i>	Herb	Whole plant	Hillside, roadside, waterside	All year	Simmer	Remove toxicity, detumescence, trauma, treat indigestion
	<i>Eclipta prostrata</i>	Herb	Whole plant	Field, riverside	All year	Dry in the sun→Take decocted with water	Cooling and heat reducing, reduce swelling

Table 2 Plant species gathered in Qianxinan were used for making herbal tea (Continued)

Asteraceae	<i>Emilia prenanthis</i>	Herb	Whole plant	Roadside	All year	Dry in the sun→Take decocted with water	Clearing and removing toxicity, activating and removing blood stasis
	<i>Erigeron annuus</i>	Herb	Whole plant	Tussock	Summer, Autumn	Using fresh herb, Dry in the sun→Take decocted with water	Used for indigestion, gastroenteritis
	<i>Erigeron breviscapus</i>	Herb	Whole plant	Meadow	Summer, Autumn	Take decocted with water	Invigorate circulation, relieve cold
	<i>Ixeris polycephala</i>	Herb	Whole plant	Thickets, meadow	All year	Take decocted with water	Clearing and removing toxicity, the muscle and still the blood circulation
	<i>Pseudognaphalium affine</i>	Herb	Stem, Leaf	Field	January-April, August-October	Simmer	Antitumor, expectoration, treat asthma and bronchitis, trauma
	<i>Senecio scandens</i>	Herb	Whole plant	Thickets	All year	Take decocted with water	Clearing and removing toxicity, improving eyesight, diuresis

Table 2 Plant species gathered in Qianxinan were used for making herbal tea (Continued)

Asteraceae	<i>Sonchus oleraceus</i>	Herb	Leaf	Hillside, under the woods, farm	All year	Water boiled, Blanching, Simmer	Quenching thirst, clearing heat and removing toxicity, removing dampness, reducing blood pressure
	<i>Sonchus wightianus</i>	Herb	Whole plant	Wasteland, under the woods, field	All year	Water boiled, Blanching, Simmer	Clearing and removing toxicity, blood, hemostasis, lowering blood pressure
	<i>Taraxacum mongolicum</i>	Herb	Whole plant	Hill side meadow, roadside, field, river beach	All year	Using fresh herb, Dry in the sun→Take decocted with water	Clearing and removing toxicity, reducing and diuresis, nodule, diuresis, relieve
	<i>Youngia japonica</i>	Herb	Whole plant	Under the woods,	All year	Stir-frying→Water boiled	Relieve toothache

				hillside, farm, field			sore th inflam
Berberidaceae	<i>Berberis sargentiana</i>	Shrub	Root	Hillside, roadside, rock crevice	All year	Take decocted with water	Clearir heat ai damp purgin detoxif
	<i>Mahonia fortunei</i>	Shrub	Whole plant	Thickets	All year	Take decocted with water	Clearir heat ai damp purgin detoxif

Table 2 Plant species gathered in Qianxinan were used for making herbal tea (Continued)

Cabombaceae	<i>Brasenia schreberi</i>	Herb	Whole plant	Ponds, swamp	Late April-late October	Swallow, Water boiled	To clea heat ai fire, rel vomiti hydrat reduce and de
Campanulaceae	<i>Lobelia nummularia</i>	Herb	Whole plant	Field, roadside	All year	Using fresh herb, Dry in the sun-Take decocted with water	To clea heat ai fire, dis rheum bruise
Caprifoliaceae	<i>Lonicera similis</i>	Vine	Flower	Hillside, terraced fields	April-June, Autumn	Stewing→Dry in the sun→Brewing	Clearir and rei toxicity wind a dissip
	<i>Platycodon grandiflorus</i>	Herb	Root	Courtyard	June-September	Take decocted with water	Promo relieve pharyr expect drains
	<i>Viburnum foetidum</i>	Shrub	Fruit	Hillside	April-October	Using fresh herb, Simmer	Clearir and rei toxicity relievir inflam
Caryophyllaceae	<i>Myosoton aquaticum</i>	Herb	Whole plant	Roadside, riverside, hillside	All year	Simmer	To exp and to boils

Table 2 Plant species gathered in Qianxinan were used for making herbal tea (Continued)

Celastraceae	<i>Gymnotheca chinensis</i>	Herb	Whole plant	Watersides, field	August-December	Simmer, Boil soup	Treat t relieve and re: phlegn removi toxicity detum clearin heat ai cooling
Clusiaceae	<i>Hypericum beanii</i>	Shrub	Root, Leaf, Bud	Creek side, stone slope	June-October	Using fresh herb, Dry in the sun→Take decocted with water	To clea liver ar damp detoxif disper: stasis
Commelinaceae	<i>Commelina communis</i>	Herb	Whole plant	Field	May-November	Take decocted with water	To clea heat, re detoxif swellir
Convolvulaceae	<i>Argyreia pierreana</i>	Vine	Stem, Leaf	Stone crevice, hillside	All year	Boil soup, Take decocted with water	Clearir and rei toxicity relievir treatin traum: acute

Crassulaceae	<i>Phedimus aizoon</i>	Herb	Whole plant	Hillside, wasteland	All year	Take decocted with water	chronic bronchitis Activate blood hemostasis, remove dampness, detoxify
Cucurbitaceae	<i>Gynostemma pentaphyllum</i>	Vine	Whole plant	Jungle	April-December	Take decocted with water, Brewing	Clearing and relieving toxicity, relieving clearness and expectoration, nourishing heart and calming lower pressure, lowering fat, protecting liver

Table 2 Plant species gathered in Qianxinan were used for making herbal tea (Continued)

Cucurbitaceae	<i>Solena heterophylla</i>	Herb	Root	Hillside, roadside, under the woods	All year, Summer, Winter	Using fresh herb, Dry in the sun→Take decocted with water	Clearing and relieving toxicity, carbuncles, cough, swelling, pain
Cyperaceae	<i>Cyperus rotundus</i>	Herb	Stem	Hillside, wasteland	All year	Simmer	To invigorate the stomach, treat gynecology
Equisetaceae	<i>Equisetum ramosissimum</i>	Herb	Aboveground part	Creek side, riverside, field	All year	Take decocted with water	Dispel, remove, anti-malaria, antipyretic, urinary infection
Fabaceae	<i>Crotalaria ferruginea</i>	Herb	Whole plant	Meadow	All year	Take decocted with water	Invigorate spleen, kidney, urinate, reduce and to relieve
	<i>Glycyrrhiza uralensis</i>	Herb	Stem, Root	Riverside, field	All year	Take decocted with water	To replenish spleen, clearing and relieving toxicity, expectoration, relieve
	<i>Pueraria montana</i>	Vine	Root	Hillside	July-October	Dry in the sun→Simmer	Relieve and remove fever, promote body fluid, quench clearness and accollate

Table 2 Plant species gathered in Qianxinan were used for making herbal tea (Continued)

Fabaceae	<i>Senna occidentalis</i>	Shrub	Seed, Root, Leaf	Riverside	All year	Stir-frying→Take decocted with water	Laxative, remove toxicity, detoxify, liver clearance, diuretic
	<i>Sophora davidii</i>	Shrub, Tree	Root, Leaf, Flower, Seed	Hillside, roadside	March-August	Stir-frying→Water boiled, Take decocted with water	Used for laryngitis, lowering pressure, indigestion

	<i>Lithocarpus polystachyus</i>	Tree	Leaf	Village side	September-October	Mash→Filter→Decoct→Dry in the sun→Brewing	Treats promofluids 1 thirst, 1 summer and clear away f
Hypericaceae	<i>Hypericum japonicum</i>	Herb	Whole plant	Field, river ditch, meadow	All year	Dry in the sun→Simmer	Clearir and re toxicity bleedir swellir hepati
Lamiaceae	<i>Ajuga decumbens</i>	Herb	Whole plant	Meadow, valley	All year	Simmer	Treatr gastro acute conjun
	<i>Callicarpa macrophylla</i>	Tree, Shrub	Leaf, Root	Thickets, parse forest	Summer, Autumn	Dry in the sun→Take decocted with water	To dis blood : and Hemos reduce and rel

Table 2 Plant species gathered in Qianxinan were used for making herbal tea (Continued)

Lamiaceae	<i>Leonurus japonicus</i>	Herb	Whole plant	Hillside, tussock	Spring, Summer	Using fresh herb, Dry in the sun→Simmer	Activat blood 1 regulat mensti diuresi swellir Clearir and re toxicity
	<i>Mentha canadensis</i>	Herb	Aboveground part	Hillside, riverside	Summer, Autumn	Dry in the sun, Air drying	Course and di heat, s improv eyesig relieve throat
	<i>Perilla frutescens</i>	Herb	Stem, Leaf, Fruit	Courtyard	All year	Using fresh herb, Take decocted with water	Relieve appear dispel reduce relieve
	<i>Prunella vulgaris</i>	Herb	Whole plant	Wasteland	Summer	Using fresh herb, Dry in the sun→Taked decocted with water	Clearir and pu improv eyesig dispell masse reducir swellir
	<i>Salvia prionitis</i>	Herb	Whole plant	Hillside, tussock	All year	Dry in the sun→Take decocted with water	Clearir and re toxicity hepati pharyr tonsilli
Lardizabalaceae	<i>Akebia trifoliata</i>	Vine	Root, Stem, Fruit	Hillside	All year	Take decocted with water	Inducin diuresi treatin strang in hear vexed
	<i>Holboellia latifolia</i>	Vine	Root, Seedcase	Sparse forest, thickets	May-September	Take decocted with water	Treat t injury, rheum pain

Table 2 Plant species gathered in Qianxinan were used for making herbal tea (Continued)

Lardizabalaceae	<i>Sargentodoxa cuneata</i>	Vine	Root, Stem	Hillside	All year	Dry in the sun→Take decocted with water	Clearir and re toxicity
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							invigor blood, dispell and pa
Lauraceae	<i>Litsea lancilimba</i>	Tree	Fruit	Village side	November, December	Dry in the sun→Swallow	Treat s ache a diarrhe
Liliaceae	<i>Lilium brownii</i>	Herb	Stem	Roadside, creek side	May-June	Using fresh herb, Water boiled	Nouris lungs, heart a soothe
Lythraceae	<i>Punica granatum</i>	Shrub, Tree	Leaf	Before and after the house	All year	Simmer	Astring intestir antidia hemos dewon
Malvaceae	<i>Firmiana simplex</i>	Tree	Seed, Stem, Flower, Leaf, Fruit	Village side, before and after the house	September- October	Brying→Take decocted with water	Elimini: rheum: cure as
Melanthiaceae	Paris polyphylla	Herb	Flower	Riverside	All year	Using fresh herb, Dry in the sun→Take decocted with water	Clearir and rei toxicity relievir swellir pain, c the live relievir

Table 2 Plant species gathered in Qianxinan were used for making herbal tea (Continued)

Melastomataceae	<i>Melastoma malabathricum</i>	Shrub	Whole plant, Root	Hillside	May-June	Using fresh herb, Simmer	Treat indige: diarrhe enteriti diuresi bronch
Moraceae	<i>Morus alba</i>	Tree, Shrub	velamen, Fruit	Before and after the house	May- September	Simmer	Course and di: heat, d and sv nourisl and no blood
Musaceae	<i>Musa basjoo</i>	Herb	Root Flower	Hillside, Courtyard	All year	Take decocted with water, Simmer	To clea heat a preven treat c stoma and at pain
Myrtaceae	<i>Psidium guajava</i>	Shrub, Tree	Leaf	Hillside, wasteland	All year	Dry in the sun→Water boiled	Clearir and rei toxicity tuberci nourisl and moistu lungs
Oleaceae	<i>Ligustrum robustum</i>	Shrub, Tree	Leaf	Behind the house	All year	Simmer	Nouris and kid improv eyesig black f
Onagraceae	<i>Oenothera rosea</i>	Herb	Root	Meadow, river ditch	All year	Take decocted with water	Anti- inflam lower t pressu
Orchidaceae	<i>Cymbidium aloifolium</i>	Epiphyte	Whole plant	Thickets	All year	Boil soup, Take decocted with water	Treatr pulmo cough, tuberci and ph
Oxalidaceae	<i>Oxalis corniculata</i>	Herb	Whole	Roadside, field,	All year	Take decocted with water	Dispel

plant wasteland

rheum.
streng
muscle
bones,
rheum.

Table 2 Plant species gathered in Qianxinan were used for making herbal tea (Continued)

Piperaceae	<i>Peperomia pellucida</i>	Herb	Whole plant	Under the woods, house wall foot	All year	Simmer	Treat onychodispel stasis relieve trauma injuries
Plantaginaceae	<i>Plantago asiatica</i>	Herb	Whole plant	River ditch, field, roadside	March-November	Take decocted with water	Clear heat and diuresis remove phlegm blood, detoxify
Poaceae	<i>Imperata cylindrica</i>	Herb	Stem	River ditch, forest edge, roadside	All year	Dry in the sun→Simmer	Clear heat and remove dampness dispel dampness relieve yellow dispel and di
	<i>Lophatherum gracile</i>	Herb	Root, Leaf	Woodland, roadside	June-July	Simmer	To clear heat and fire, relieve irritability quench diuresis relieve
Polygonaceae	<i>Fallopia multiflora</i>	Vine	Root	Hillside, rock crevices	Autumn	Using fresh herb, Dry in the sun→Water boiled	Detoxify eliminate carbure malarial moisten intestines laxative
	<i>Polygonum capitatum</i>	Herb	Whole plant	Hillside, riverside	July-November	Dry in the sun→Simmer	Treat blood tract infection
	<i>Polygonum chinense</i>	Herb	Aboveground part	Valley, waterside, wetlands	Summer, Autumn	Dry in the sun→Simmer	Clear heat and relieve toxicity dissipate stasis reduce

Table 2 Plant species gathered in Qianxinan were used for making herbal tea (Continued)

Polypodiaceae	<i>Lemmaphyllum carnosum</i>	Herb	Whole plant	Under the woods	October - December	Water boiled, Simmer	Cough diuresis
Portulacaceae	<i>Portulaca oleracea</i>	Herb	Aboveground part	Courtyard, farmland	Summer, Autumn	Blanch→Dry in the sun	Clear heat and relieve toxicity blood hemostasis stop diarrhea
Primulaceae	<i>Ardisia crispa</i>	Shrub	Root, Leaf	Hillside	May	Dry in the sun→Take decocted with water	Cure sore throat, cough, bruises rheumatism
	<i>Ardisia mamillata</i>	Shrub	Whole plant	Before and after the house	All year	Airing →Bubble medicated wine	Clear heat and remove dampness treat back pain

	<i>Myrsine africana</i>	Shrub	Stem, Leaf	Hillside	May-September	Take decocted with water	trauma; hepatiti
							Clearin and rei toxicity scatter detum
Ranunculaceae	<i>Clematis florida</i>	Vine	Root, Whole plant	Roadside	All year	Take decocted with water	Anti- inflam clearin and no lungs, meridi detoxif and cu
Rosaceae	<i>Agrimonia pilosa</i>	Herb	Whole plant	Creek side, meadow, thickets	All year	Simmer	Hemos malaria dysent detoxif

Table 2 Plant species gathered in Qianxinan were used for making herbal tea (Continued)

Rosaceae	<i>Eriobotrya japonica</i>	Tree	Leaf, Flower	Before and after the house, field	October - December	Dry in the sun→Water boiled	To clea lungs ; relieve and vo
	<i>Potentilla griffithii</i>	Herb	Root	Hillside, forest edge	May- September	Simmer	Treat stoma and dy due to accum
	<i>Pyracantha fortuneana</i>	Shrub	Fruit, Root, Leaf	Hillside	Autumn	Using fresh herb, Simmer	Anti- inflam pain-re eye dis
	<i>Rosa roxburghii</i>	Shrub	Fruit, Leaf	Hillside, roadside	August- October	Using fresh herb, Simmer	Used f accum bloati dysent diarrhe menor hemor and bli
Sabiaceae	<i>Sabia parviflora</i>	Vine	Stem, Leaf	Creek side	Summer, Autumn	Using fresh herb, Dry in the sun→Take decocted with water, Brewing	Analg clearin and rei toxicity antitus expect asthm
Sapindaceae	<i>Cardiospermum halicacabum</i>	Vine	Whole plant	Field, roadside	All year	Simmer	Clearin and rei toxicity swellir pain re vomiti
Saururaceae	<i>Houttuynia cordata</i>	Herb	Whole plant	River ditch, creek side	March-March	Using fresh herb, Simmer	Clearin and rei toxicity elimin carbur drain p diureti relieve

Table 2 Plant species gathered in Qianxinan were used for making herbal tea (Continued)

Scrophulariaceae	<i>Buddleja officinalis</i>	Shrub	Flower	Hillside, riverside	Spring	Dry in the sun→Take decocted with water	To clea heat, r nouris and irr eyesig remov catara
Selaginellaceae	<i>Selaginella</i>	Herb	Whole plant	Thickets, rock	All year	Take decocted with water	Cure si

	<i>tamariscina</i>						ache
Solanaceae	<i>Lycium chinense</i>	Shrub	Fruit	Hillside, ridge	August- November	Using fresh herb, Take decocted with water	Nouris and kid improv eyesig
	<i>Solanum nigrum</i>	Herb	Aboveground part	Field, wasteland	April-July	Simmer, Boil soup, Take decocted with water	Cure si venom scatter detum Hemo boils
	<i>Solanum pseudocapsicum</i>	Shrub	Root	Roadside, river ditch	All year	Dry in the sun→Take decocted with water	Activat blood 1 pain
	<i>Solanum violaceum</i>	Shrub	Fruit, Root	Roadside, wasteland	All year	Dry in the sun→Using fresh herb →Take decocted with water	Anti-inflam and detoxif calmin pain

Table 2 Plant species gathered in Qianxinan were used for making herbal tea (Continued)

Thelypteridaceae	<i>Cyclosorus acuminatus</i>	Herb	Stem, Whole plant	Field, meadow, roadside	Summer, Autumn	Dry in the sun→Take decocted with water	Clearir and re toxicity dispell and re damp strength spleen
Urticaceae	<i>Urtica fissa</i>	Herb	Whole plant	Hillside, roadside	All year	Using fresh herb→Simmer	Elimin and de relieve postpa convul convul childre
Verbenaceae	<i>Verbena officinalis</i>	Herb	Whole plant	Hillside, creek side	All year	Take decocted with water, Simmer	Promo blood circula removi stasis, detoxif diuresi malari
Violaceae	<i>Viola philippica</i>	Herb	Whole plant	Farm, wasteland	Spring, Autumn	Dry in the sun→Take decocted with water	Clearir and re toxicity blood ; reducir swellir
Vitaceae	<i>Cayratia japonica</i>	Vine	Whole plant	Valley, hillside	Summer, Autumn	Dry in the sun→Take decocted with water	Coolin and detoxif diuresi swellir
Zingiberaceae	<i>Zingiber officinale</i>	Herb	Stem	Farm	June- November	Simmer	Relieve appea dispel warm i stop ve resolve and rel cough

In the list, RFC relative frequency of citation; ZYC=Chinese medicinal materials; PQXNXX Number indicates the more common herbal tea plants have not collected relevant specimens, and there are photos as evidence

Protection of herbal tea plant diversity

With the acceleration of the pace of modern life, fewer people have experience in collecting herbal tea plants. In addition, most young people are looking for drinks with better taste, and the herbal tea made from natural plants often tastes poor, as a result, most young people know little about herbal tea plants. The elders are more familiar with the herbal tea plants. They can be passed on from generation to generation through oral and hand instruction, but the relevant knowledge is not systematically recorded properly, and young people also lack the awareness of protecting traditional knowledge [3, 16, 18]. Therefore, it is necessary to establish a resource bank of herbal tea plants to realize the sustainable use of herbal tea resources, and promote the inheritance and protection of ethnic traditional knowledge

According to China Species Red List, *Paris polyphylla* and *Glycyrrhiza uralensis* were endangered plants and were cultivated by local villagers in home garden. Due to the spread of invasive alien species and man-made damage, the growth conditions of wild species are restricted, and the living space of plant resources in our country is continuously reduced [36]. Via the conversation with the key informants, a large number of *Cunninghamia lanceolata* have been planted in Ceheng County in recent years and the space for herbal tea plants has been destroyed, which makes it more and more difficult for locals to collect herbal tea plants. Although *Cunninghamia lanceolata* have high economic benefits and large yields, but continuous single planting will degrade soil fertility and reduce species diversity [37]. Excessive pursuit of short-term economic benefits, unrestrained over-exploitation and unauthorized dig and wanton felling of trees, pose certain threats to herbal tea plant resources. Therefore, it is urgent to investigate the baseline data of the herbal tea plant resource and establish the herbal tea plants database.

In-depth study on herbal tea plant resources

It is found that herbal tea plants are mostly from family Asteraceae as other study[1, 4]. There are about 1000 genera and 25000-30000 species of Asteraceae, which is the largest family of dicotyledons. It has high economic value and a wide range of uses, for example *Artemisia annua* and *Artemisia mandshurica* can be used as vegetables, *Taraxacum mongolicum* and *Imperata cylindrica* can be used as medicine. In the study of multipurpose plant utilization in ethnic areas of Guizhou, southwest China, it is mentioned that most of the plants used as food and medicinal plants in ethnic areas are herbaceous plants [38]. It is distributed on the side of water ditches, roadsides, fields or mountains, which is very convenient for local residents to obtain.

In this study, the production of herbal tea plants is based on the whole plant or other parts of the plant (roots, stems, leaves). And the herbal plants are dried in the sun, which is convenient for later storage and use. Sun-dried processing also facilitates the preservation of the original medicinal ingredients of plants. It can reduce waste of herbal tea plants in the process of processing and making herbal tea plants when using whole plants. Similar to the processing methods of fermented beverages of the Shui nationalities, herbal tea plants can also be used as raw materials for fermented wines [39]. To improve the utilization rate of herbal tea plants, the roots, stems, leaves and other parts of a small number of herbal tea plants can also be processed and drunk separately. Processing and drinking the different parts can exert the different effects of the plants. Taking *Senna occidentalis* as an example, the seeds are fried to cure malaria, the root simmering water is used for diuresis and edema, and the fresh leaves are mashed and applied externally to treat poisonous snake venom bites [40].

The processing and drinking of teas can also be developed into herbal tea beverages in the form of Teabag according to the current convenient and fast lifestyles of people [41], or formulated into liquid herbal tea beverage [42]. However, the rise of a series of new types of herbal tea beverages such as Wahaha and Nongfu Spring have caused the degradation of traditional tea beverages. In order to cater to the taste of the majority of drinkers, many manufacturers have begun to add various food agents to herbal tea beverages, ignoring the nutritional value of the herbal tea plants themselves, to meet the development of commercial herbal tea beverages [1]. Whether herbal tea beverages are safe to drink, the biological activity and toxicity of herbal tea plants are still being further studied. The development of herbal tea beverages is based on the research on the pharmacological activities and ingredients of the pharmaceutical and food industries, so as to ensure the safety of their herbal tea beverages.

The whole plant or roots, stems and leaves of other parts of the herbal tea plant were used to concentrate the effective ingredients of the herbal plant by decoction. This way of processing can make the effect better [43, 44]. Taking decocted water also have certain particularities to have the best effect, such as the amount of decoction, the time of decoction or the number of times of drinking[45]. Locals decocted herbal plants in water based on their past experience, but lacked some taboo knowledge of edible plants [46, 47]. Studies have found that some medicinal and poisonous herbal tea plants are poisonous due to toxic plant components, improper drinking methods can cause adverse reactions [48, 49]. Table 2 shows that some herbal tea plants are not suitable for pregnant women and frail cold patients. When developing herbal tea plants among ethnic people, not only should the ethnic plant resources be investigated and protected, but also the medicinal, ecological and cultural value of plants should be systematically studied, and the utilization and protection of plants should be integrated [50]. Although daily herbal tea drinking can clear heat and detoxify and effectively enhance immunity, it is necessary to promote reasonable and scientific herbal tea drinking methods to local residents.

Conclusions

Herbal tea is a kind of drink used by people in daily life. It has medicinal functions of clearing heat, detoxifying, dispelling dampness, and relieving summer heat. Research shows that there are 114 species herbal tea plants of 59 families 103 genera in the Qianxinan Buyi and Miao Autonomous Prefectures in southwestern Guizhou province used by local people, which Asteraceae is the most common.

This study recorded two species of national secondary protected plants, *Paris polyphylla* (Melanthiaceae) and *Glycyrrhiza uralensis* (Fabaceae). They were cultivated in home gardens of local villagers. In recent years, the natural succession of vegetation has been disturbed due to the impact of various human activities such as reclamation and grazing. When collecting herbal tea plants, locals need to strengthen their awareness of rational utilization and protection of plant resources to prevent destruction of herbal tea plant germplasm resources. Herbal tea plants are not only the first choice for local people's daily drinks, but also a source of economic income. It is necessary to implement systematic protection of plant germplasm resources and establish cultivation gardens, thus provide a source of production for the development of the herbal tea market and increase the income of local villagers.

Declarations

Ethics approval and consent to participate

All the villagers and healers who decided to collaborate were interviewed according to mutually agreed conditions, especially with regards to the Convention on Biological Diversity (CBD) and the ISE Code of Ethics.

Consent for publication

Not applicable.

Availability of data and materials

All data generated or analyzed during this study are included in this published article.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

YFG conceived the research, revised and finalized the manuscript, and identified most plants. XFL prepared the draft version and revised the manuscript. All authors carried out the fieldwork research for this study and all authors read and approved the final manuscript.

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References

1. Liu, Y., Ahmed, S., and Long, C., Ethnobotanical survey of cooling herbal drinks from southern China. *Journal of ethnobiology and ethnomedicine*. 2013;9(1):1-8.
2. Fu, Y., Yang, J. C., Cunningham, A. B., et al., A billion cups: The diversity, traditional uses, safety issues and potential of Chinese herbal teas. *Journal of ethnopharmacology*. 2018;222:217-228.
3. Liu, S., Zhang, B., Zhou, J., et al., Herbal plants traded at the Kaili medicinal market, Guizhou, China. *Journal of Ethnobiology and Ethnomedicine*. 2021; 17(1):1-37.
4. Rashid, N., Gbedomon, R. C., Ahmad, M., et al., Traditional knowledge on herbal drinks among indigenous communities in Azad Jammu and Kashmir, Pakistan. *Journal of ethnobiology and ethnomedicine*. 2018;14(1):1-20.
5. Guo, X., Xu J., and Li Y., Application of bioinformatics in sub-health detection and evaluation. *Journal of Shanghai University of Traditional Chinese Medicine*. 2021;35(03):7-11+32.
6. Guo D., Li Q., Wei Y., et al., Research on the effect of individualized health management on improving the risk of chronic diseases in sub-healthy population. *Journal of Shanxi Medical*. 2021;50(24):3342-3345.
7. Farzaneh V., Carvalho I.S., A review of the health benefit potentials of herbal plant infusions and their mechanism of actions. *Industrial Crops and Products*. 2015;65:247-258.
8. Marcus D.M., Traditional medicine: a global perspective. *Bulletin of the World Health Organization*. 2010;88:953-953.
9. de Santayana M.P., Blanco E., and Morales R., Plants known as té in Spain: an ethno-pharmaco-botanical review. *Journal of ethnopharmacology*. 2005;98(1-2):1-19.
10. Atoui A.K., Mansouri A., Boskou G., et al., Tea and herbal infusions: their antioxidant activity and phenolic profile. *Food chemistry*. 2005;89(1):27-36.
11. Halliwell B. Food-derived antioxidants. Evaluating their importance in food and in vivo. *Food science and agricultural chemistry*. 1999.
12. Bussmann R.W., Paniagua-Zambrana N., Sifuentes R.Y., et al., Health in a Pot—the ethnobotany of emolientes and emolienteros in Peru. *Economic Botany*. 2015;69(1):83-88.

13. Marnewick J.L., Gelderblom W.C., Joubert E., An investigation on the antimutagenic properties of South African herbal teas. *Mutation Research/Genetic Toxicology and Environmental Mutagenesis*. 2000;471(1-2):157-166.
14. Yamamoto J., Tadaishi M., Yamane T., et al., Hot water extracts of edible *Chrysanthemum morifolium* Ramat. exert antidiabetic effects in obese diabetic KK-Ay mice. *Bioscience, biotechnology, and biochemistry*. 2015;79(7):1147-1154.
15. Han B.Q., Peng Y., Xiao P.G., Systematic research on Chinese non-Camellia tea. *Mod. Chin. Med*. 2013;15(4):259-269.
16. Jin B., Liu Y., Xie J., et al., 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. *Journal of ethnobiology and ethnomedicine*. 2018;14(1):1-21.
17. Wang, J.L., Li X.S., Linghu C.D., Exploitation of Resources of Non-tea Drinkable Plants and Development of Peculiar Industry in Guizhou. *Guizhou Agricultural Sciences*. 2001;(01):56-58.
18. Grasser S., Schunko C., Vogl C.R. Gathering "tea"—from necessity to connectedness with nature. Local knowledge about wild plant gathering in the Biosphere Reserve Grosses Walsertal (Austria). *Journal of ethnobiology and ethnomedicine*. 2012;8(1):1-24
19. WWW.baidu.com
20. Goodman L.A., Snowball sampling. *The annals of mathematical statistics*. 1961;148-170.
21. Geng Y., Zhang Y., Ranjitkar S., et al., Traditional knowledge and its transmission of wild edibles used by the Naxi in Baidi Village, northwest Yunnan province. *Journal of ethnobiology and ethnomedicine*. 2016;12(1):1-21.
22. Martin G.J., *Ethnobotany: a methods manual*. Routledge. 2010.
23. Whitney C., *Quantitative ethnobotany analysis with ethnobotanyR*. 2019.
24. Tardío J., Pardo-de-Santayana M., Cultural importance indices: a comparative analysis based on the useful wild plants of Southern Cantabria (Northern Spain). *Economic Botany*. 2008;62(1):24-39.
25. Yu S.T., Xiong G.X., Cheng H., et al., Influence of different extraction methods on *Perilla frutescens* leaf volatile components. *Journal of Southern Agriculture*. 2014;45(1):108-111.
26. Yuan K., Xue Y.Q., Gui R.Y., et al., Determination of trace elements in *Lophatherum gracile* brongn from different habitat by microwave digestion-atomic absorption spectroscopy. *Spectroscopy and Spectral Analysis*. 2010;30(3):804-808.
27. Geng F., Sun Q., Yang L., et al., Effects of the seeds and herbs of *Plantago asiatica* L. on diuresis. *SH J. TCM*. 2009;21:150-156.
28. Wang F., Li J.R., Research progress on chemical constituents: physiological function and application of mulberry leaves. *Food Sci*. 2005;26:111-117.
29. Ji X., Shen Y., Guo X., Isolation, structures, and bioactivities of the polysaccharides from *Gynostemma pentaphyllum* (Thunb.) Makino: A review. *BioMed research international*. 2018;2018.
30. Cheng H.F., et al., Study on the hemostatic effect of different extracts of *Argyreia pierreana*. *Herald of medicine*. 2008;27(10):1186-1187.
31. Li Y.C., et al., Study on the resources of medicinal plants in Xingyi City, Guizhou Province. *Northwest pharmaceutical journal*. 2009;24(02):103-106.
32. Liu J., Prevent the invasion of damp evil in summer season of long. *Family Medicine: second half month*. 2014;(8):18-18.
33. Yu J.P., Analysis of the plant resources and chemical constituents of Kuding tea in Guizhou. *Journal of plant resources and environment*. 1997;(02):23-26.
34. Cheng Y.Y., et al., Advances in the study of phytochemistry and pharmacological effects of *Lonicera japonica*. *Agricultural Research And Application*. 2009;(01):14-16.
35. Wu H.P., et al., Study on the chemical composition of *Agrimonia pilosa*. *Natural product research and development*. 2012;24(1):55-56+65.
36. Xiao Y., Ishaq M., Yan S., et al., Chemical Constituents of *Litsea lancilimba*. *Chemistry of Natural Compounds*. 2021;57(1):163-165.
37. Chi X., Zhang Z., Xu X., et al., Threatened medicinal plants in China: Distributions and conservation priorities. *Biological Conservation*. 2017;210: 89-95.
38. Zhenwen L., Changqing L.C., Studies on Ecological Benefit in Mixed Stand of Chinese Fir and Macclure. *Journal of Fujian College of Forestry*. 1992;02.
39. Mao S., Shen Y., Deng H., Multipurpose plant utilization in ethnic areas of Guizhou, southwest China. *Ecological Indicators*. 2018;90:547-553.
40. Hong L., Zhuo J., Lei Q., et al., Ethnobotany of wild plants used for starting fermented beverages in Shui communities of southwest China. *Journal of ethnobiology and ethnomedicine*. 2015;11(1):1-22.
41. Yin H.Q., Wei J., et al., *Senna occidentalis* (L.) chemical composition separation and structure identification. *Journal of Beijing Institute of Technology*. 2013.
42. Fang S.T., Zeng R., et al., Development of Miao Nationality's Characteristic Herbal Tea Beverage. *Journal of agricultural products processing*. 2018;10.
43. Ding H., Fan Y., Discuss Method of Making a Decoction and Administration by Ancient and Contemporary Understanding of Ganlan Water. *Chinese Journal of Basic Medicine in Traditional Chinese Medicine*. 2010;05.
44. Halberstein R.A., Medicinal plants: historical and cross-cultural usage patterns. *Annals of epidemiology*. 2005; 15(9):686-699.
45. Kim Y.K., Kim C.S., Cui X., The decocting and taking methods of herbal medicines. *Korean Journal of Oriental Medicine*. 2004;10(2):63-72.
46. Zhao H.T., Song P.L., Li L.X., et al., A preliminary study of traditional & wild medicinal & edible plants in minority concentrated region of Guizhou. *Mod Chin Med*. 2016;18(6):743-749.
47. Söukand R., Quave C.L., Pieroni A., et al., Plants used for making recreational tea in Europe: a review based on specific research sites. *Journal of Ethnobiology and Ethnomedicine*. 2013;9(1):1-13.
48. Agra M.F., Baracho G.S., Nurit K., et al., Medicinal and poisonous diversity of the flora of "Cariri Paraibano", Brazil. *Journal of ethnopharmacology*. 2007;111(2):383-395.

49. Agra M.F., Freitas P.F., Barbosa-Filho J.M., Synopsis of the plants known as medicinal and poisonous in Northeast of Brazil. *Revista Brasileira de Farmacognosia*. 2007;17:114-140.

50. Pei S.J., Traditional Culture and Biodiversity Conservation. *Bulletin of the Chinese Academy of Sciences*. 2011;26(02):190-196.

Figures

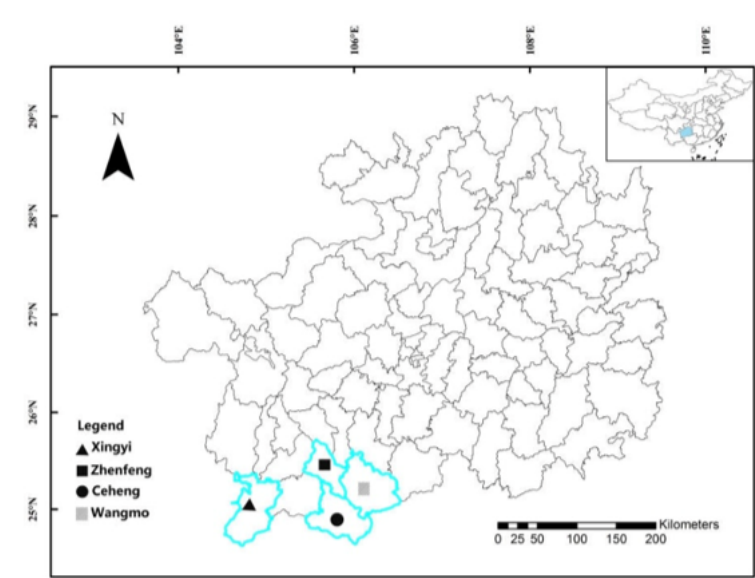


Figure 1

Map of the study area, Qianxinan Prefecture of Guizhou.

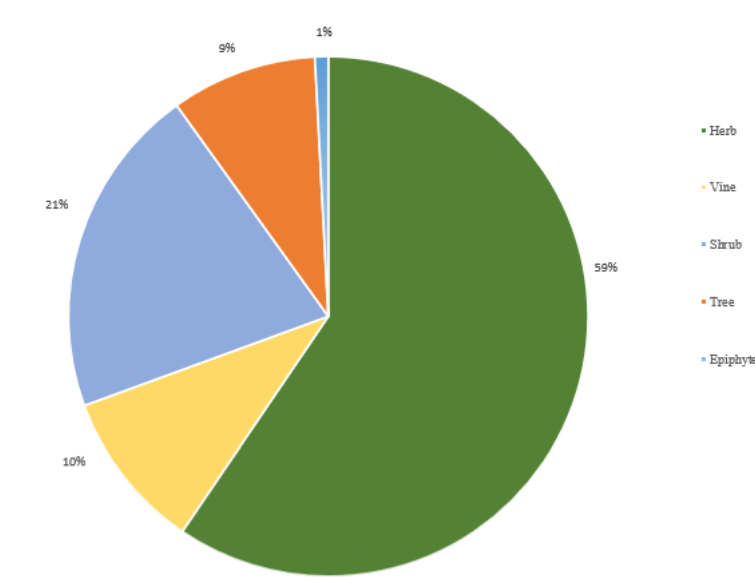


Figure 2

Life forms of plants used for herbal tea in Qianxinan.

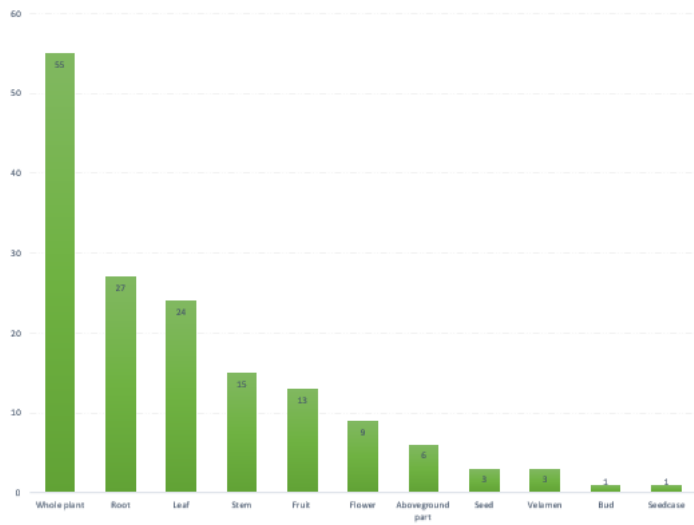


Figure 3

Plant parts use for processing herbal tea in Qianxinan.