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# Ethnobotany study on wild edible plants used by the Tujia ethnic group in Laifeng, southwest Hubei, China

Shuwang Hou<sup>1</sup>, Peiqing Huang<sup>1</sup> and Zhen Yao<sup>1\*</sup>

## Abstract

**Background** Wild edible plants hold a significant position in the lives of local residents, serving as a primary food source or supplement. Laifeng County, located in the hinterland of the central mountainous area of China, boasts abundant wild edible plant resources. The Tujia people, residing here for generations, have accumulated a wealth of traditional knowledge in the long-term practice of utilizing wild edible plants. The aim of this study is to document and organize the traditional utilization of wild edible plants by the Tujia ethnic group in Laifeng.

**Methods** An ethnobotanical investigation, comprising semi-structured interviews, key informant interviews, and participatory observations, was conducted in 26 traditional villages in Laifeng County from May 2023 to June 2024. A total of 252 informants were interviewed, from whom information about wild edible plants, including edible parts, food categories, consumption modes, and multiple uses was collected. The relative frequency of citation (RFC) and the cultural food significance index (CFSI) were calculated to identify the cultural importance of wild edible plants.

**Results** A total of 163 species of wild edible plants consumed by the Tujia people in Laifeng, belonging to 64 families and 118 genera and related traditional knowledge were collected, including vegetables (78), fruits (52), wine-soaking plants (12), spices (11), food substitutes (9), tea substitutes (6), nuts (5), coagulants (2), and oil (1). The most frequently used families were *Rosaceae*, *Asteraceae*, and *Poaceae*, with 23, 10, and 10 species, respectively. The most commonly utilized plant parts were fruits, leaves, and stems. RFC and CFSI analyses identified 14 species of wild edible plants with high cultural importance in the local diet, such as *Allium macrostemon*, *Houttuynia cordata*, and *Hovenia acerba*.

**Conclusions** The Tujia ethnic group in Laifeng demonstrates extensive knowledge in their traditional usage of wild edible plants, offering unique and robust insights into the harvesting, processing, and consumption of these resources. Over time, this practice has become an integral part of the local food culture. These findings contribute to the preservation of the Tujia culture of wild edible plants in Laifeng and the conservation and development of wild edible plant resources.

**Keywords** Wild edible plants, Tujia ethnic group, Laifeng, Ethnobotany, Traditional knowledge

## Introduction

Wild edible plants (WEPs), which are non-artificially cultivated and domesticated, and can be harvested from their indigenous habitats, serve as food sources [1, 2]. WEPs can serve as either the primary food source or a dietary supplement for local residents, thereby ensuring

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their sustenance security and balanced diet, as well as functioning as a primary economic resource or supplement through their processing and commercialization [3–5]. Furthermore, WEPs could provide invaluable genetic reservoirs for the cultivation of novel crops and the identification of new germplasms [6, 7]. The practice of harvesting and consuming WEPs not only meets local dietary demands as a crucial element of a global sustenance strategy, but also aids in the preservation of local cultural traditions [8, 9].

In regard to WEPs, international research primarily focuses on countries and regions in Asia, Africa, and Europe [10–12]. Ethnobotanical surveys of WEPs in China have been undertaken among the Han [13], Tibetan [14, 15], Dulong [16], Yi [17], Naxi [18], Mongolian [19], and Gelao [20] ethnic groups. These studies both document the traditional knowledge of local consumption of wild plants and evaluate the importance and value of these WEPs in local culture using quantitative methods. Moreover, advanced modern food science and technology have been utilized in studying the nutritional composition of WEPs, establishing a new research direction in the ethnobotany of WEPs [21, 22].

The Tujia ethnic group, descendants of the ancient Ba people, boasts a rich history and profound cultural heritage, primarily distributed in the border areas of central southern and southwestern China [23, 24]. Through enduring production, lifestyle, and social practices, the Tujia people have accumulated extensive traditional knowledge and experience in consuming WEPs. At present, research on the Tujia ethnic group mainly focuses on anthropology, sociology, language, art, architecture, and other aspects, and has conducted detailed studies on the Tujia ethnic group from various perspectives [25]. However, scant research has been conducted that integrates the relationship between Tujia culture and local environment and plant resources. The Tujia people, having resided in the Wuling Mountains for generations, have long adapted to the mountainous environment, thereby forming a comprehensive set of traditional knowledge and agricultural practices associated with the utilization of wild edible plant resources. Therefore, it is necessary to study the Tujia ethnic group from the perspective of the mutual relationship between humans and plants [26].

Since its inception, ethnobotany has concentrated on the traditional knowledge and culture aspects of human botany, including their applications, to investigate the interrelationships between humans and plants [5, 27]. Nonetheless, contemporary research on the ethnobotany of the Tujia ethnic group largely centers on medicinal plants in western Hunan [28, 29] and southeastern Chongqing [30], with the majority of these studies honing

in on the traditional knowledge of a specific type of plant, such as *Akebia* sp. [31] and *Gesneriaceae* [32]. Few reports exist on the knowledge of WEPs traditionally utilized by the Tujia ethnic group. Only Wu provided an overview of the edible plants and cultural connotations of the Tujia ethnic group in the central China mountainous area [33]. There remains a pressing need to collate and examine extensive knowledge on the traditional utilization of Tujia plants.

Situated in the Enshi Tujia and Miao Autonomous Prefecture in southwestern Hubei Province, Laifeng County boasts a rich history. The original Sanmao Xuanfusi was founded here, making it as one of the earliest tusi (local hereditary tribal chieftains) settlements in the Tujia ethnic region. Laifeng County represents a typical settlement area for the Tujia ethnic group in the southwestern region of Hubei Province. As of the end of 2022, the Tujia ethnic group constitutes the most populous ethnic minority in Laifeng County. The extensive history of county development, distinctive geographical location, varied climate, rich natural resources, and self-sustained ethnic economy of Laifeng have fostered a unique Tujia ethnic culture, cultivating an array of exceptional traditional knowledge on WEPs utilization.

Given this context, the present study adopts ethnobotanical methods to conduct a systematic investigation of the WEPs traditionally utilized by the Tujia ethnic group in Laifeng, employing quantitative methods to identify and assess plants of high cultural significance. The significance of this study is multifold: (1) It aims to safeguard and perpetuate the traditional ecological knowledge of WEPs utilized by the Tujia ethnic group in Laifeng while striving to record and conserve as much traditional ecological knowledge and related technology as possible. (2) It seeks to examine the relationship between the traditional culture of the Tujia ethnic group in Laifeng and wild edible plant resources, explore WEPs with local Tujia characteristics, conserve and protect wild edible genetic resources, and offer firsthand data for the development of nascent edible plant resources. (3) It promotes the inheritance and further development of the high-quality traditional culture related to biodiversity of the Tujia ethnic group in Laifeng, thereby serving as a foundation for rural revitalization, biodiversity conservation, ecological civilization construction, and sustainable development.

## Methods

### Study sites

Laifeng County (29°06′–29°41′ N, 109°01′–109°27′ E) is under the jurisdiction of Enshi Tujia and Miao Autonomous Prefecture in Hubei Province. Situated in the southwest corner of Hubei, it borders Longshan in Hunan to

the southeast, Youyang in Chongqing to the southwest, and Xianfeng and Xuan'en to the north. Positioned at the junction of Hubei, Hunan, and Chongqing, and is known as "crossing three provinces with one foot" [34]. Laifeng County governs 8 townships, including Xiangfeng Town, Lushui Town, Dahe Town, Baifusi Town, Jiusi Town, Gelche Town, Manshui Township, and Sanhu Township, with 184 villages and 12 communities.

The climate of Laifeng County is characterized as a subtropical continental monsoon humid mountainous climate, with distinct four seasons, mild and humid conditions, ample rainfall, and simultaneous rain and heat. Furthermore, influenced by non-zonal factors such as topography and terrain, it exhibits a three-dimensional climate characteristic of diverse environments and significant vertical differences. The annual sunshine hours in Laifeng County are 4425.8 h, with an average annual temperature of 15.9 °C and an average annual precipitation of 1400 mm [35]. The superior climate and fertile soil conditions have created abundant and diverse biological resources in Laifeng County. Laifeng County has 706 species of high and low plants in 109 families, and 130 species of wild animal resources [36]. There are over a hundred unique resources in the county, and it is a favorable place for producing agricultural and specialty products as well as authentic Chinese medicinal herbs such as *Zingiber officinale*, *Vernicia fordii*, *Morella rubra*, and *Atractylodes macrocephala*.

Taking Laifeng County as the research area, an ethnobotanical survey was carried out in villages with rich

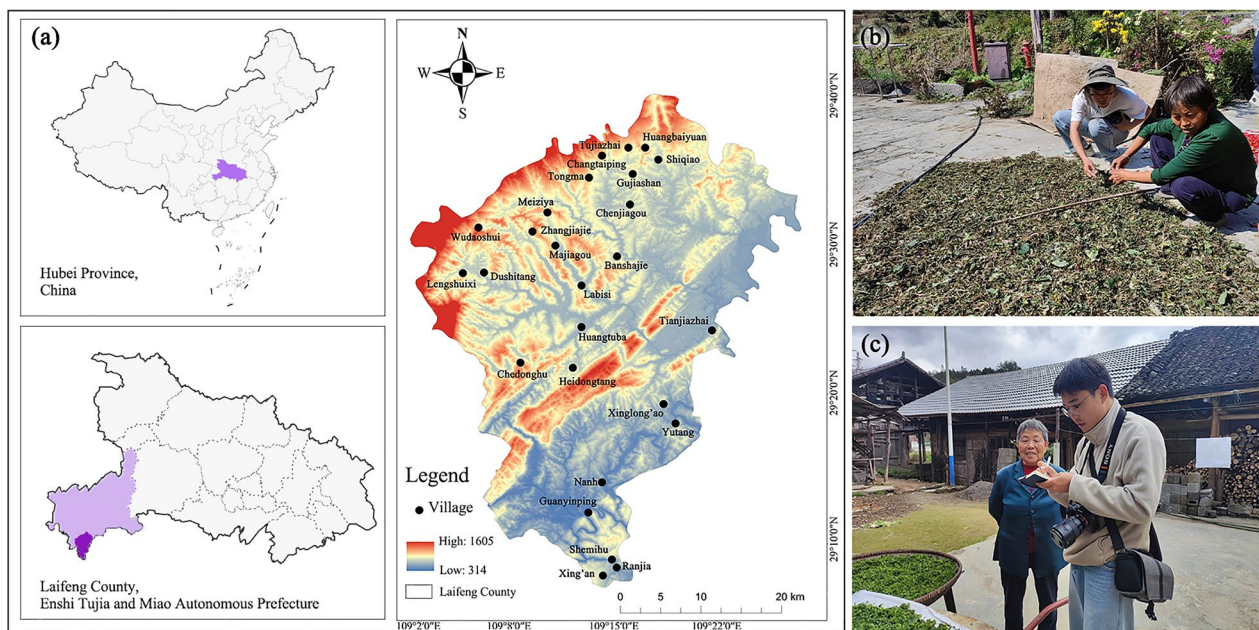
plant diversity and well-preserved traditional Tujia culture. Referring to the first to sixth batches of Chinese traditional villages, the first to third batches of Chinese ethnic minority characteristic villages, and the first to second batches of Chinese national forest villages, a total of 26 villages were identified as study sites (Fig. 1).

### Literature research

Before conducting ethnobotany surveys, consult literature materials (*Flora of China*, *Flora of Hubei*, *Flora of Enshi*, *A Brief History of the Tujia Ethnic Group*), and use websites such as China National Knowledge Infrastructure and Web of Science to search for domestic and foreign research papers using keywords such as Tujia, Tujia research progress, Tujia ethnobotany, Tujia, Tujia ethnic group, and Tujia Ethnobotany. Understand the wild plant resources and related research progress of the Tujia ethnic group in Laifeng through literature research.

### Field survey and data collection

Ethnobotanical surveys were conducted in 26 selected villages from May 2023 to June 2024. Key informant interviews, semi-structured interviews, and participatory observation methods were used for the survey, while simple random sampling, snowball random sampling, and other methods were utilized to select information reporters in villages [37]. A total of 252 interviewees reported information, including 125 males and 127 females. The age range of the interviewees spans from 8 to 98 years old, with the majority aged between 40 and 79 years



**Fig. 1** Study site. **a** Location of study sites; **b** participatory observation; **c** semi-structured interviews

old. Mostly, the interviewees were uneducated, elderly, and economically disadvantaged individuals. The identity of the information reporter includes farmers, salary workers, and retailers, with the majority being farmers (Table 1). During the interviews, primary inquiries and records included local names, availability, edible parts, frequency of use, consumption modes, taste, medicine use, collection months, and multiple uses of WEPs [38, 39].

We collected voucher specimens and took digital photos of the plants involved in the investigation, and labeled the specimens. In order to identify plants, the voucher specimens were studied and compared with reference books (*Flora of China*, *Flora of Hubei*, *Flora of Enshi*) and electronic online resources (<http://www.iplant.cn/>, <https://www.worldfloraonline.org/>, and <http://www.sp2000.org.cn/>). All vascular plants are named according to World Flora Online (<https://www.worldfloraonline.org/>), and Shuwang Hou has identified all plant species. The voucher specimens are stored at the herbarium of the College of Horticulture and Gardening, Yangtze University, in Jingzhou, Hubei Province.

#### Quantitative ethnobotanical research

Evaluate the importance of WEPs in the Tujia culture of Laifeng using the relative frequency of citation (RFC) and cultural food significance index (CFSI).

#### Relative frequency of citation (RFC)

Relative frequency of citation refers to the proportion of people mentioning a species (also known as frequency of citation, FC) to the total number of reported pieces of information, regardless of its usage type [16, 40].

$$\text{RFC} = \frac{\text{FC}_s}{N}$$

$N$  is the total number of information reporters.

The value of RFC ranges from 0 to 1. The larger the index value, the higher the frequency and importance of mention of this species in the Tujia ethnic group in Laifeng.

#### Cultural food significance index (CFSI)

The cultural food significance index (CFSI) is used to evaluate the importance of WEPs in Laifeng Tujia culture [41, 42].

$$\text{CFSI} = \text{QI} \times \text{AI} \times \text{FUI} \times \text{PUI} \\ \times \text{MFFI} \times \text{TSAI} \times \text{FMRI} \times 10^{-2}$$

QI is the quotation frequency index, AI is the availability index, FUI is the frequency of utilization index, PUI

is the parts used index, MFFI is the multifunctional food use index, TSAI is the taste score appreciation index, and FMRI is the food-medicinal role index.

The larger the CFSI value, the more important the role this plant plays in the diet culture of the Tujia ethnic group in Laifeng.

#### Jaccard index (JI)

The Jaccard index (JI) is used to evaluate the similarity between the WEPs of the Tujia ethnic group in Laifeng and other different ethnic groups and areas [43, 44].

$$\text{JI} = \frac{c}{a + b - c}$$

$a$  is the species number of WEPs of Tujia ethnic group in Laifeng,  $b$  is species number of WEPs of other area, and  $c$  is the number of species common to both areas  $a$  and  $b$ .

## Results

### Diversity of wild edible plants

The variety of WEPs traditionally used by the Tujia ethnic group in Laifeng is abundant and diverse. Through extensive investigation and categorization, 163 different wild edible plants belonging to 64 families and 118 genera have been identified. Botanical and ethnobotanical information including family names, scientific names, Chinese names, habits, food categories, edible parts, consumption mode, collection months, multiple uses, FC, RFC, and CFSI is listed in Table 2. These WEPs comprise three groups: ferns (4 families and 4 species), gymnosperms (1 family and 1 species), and angiosperms (59 families and 158 species), with the angiosperms being the most plentiful. The families containing the most WEPs are *Rosaceae* (23), *Poaceae* (10), *Asteraceae* (10), *Amaranthaceae* (7), and *Lamiaceae* (7), accounting for 35.0% of the total number of species (Fig. 2a).

Categorized by their habits, the WEPs traditionally utilized by the Tujia ethnic group in Laifeng predominantly consist of herbs (69), comprising for 42.3% of the total. This is followed by shrubs (40, 24.5%), trees (24, 14.7%), and lianas (21, 12.9%). Bamboo plants are less common, with a total of 9 species (Fig. 2b). Due to their ease of harvesting, diverse variety, and broad distribution, herb plants are more frequently consumed than other habits.

The WEPs have also been categorized by their edible parts, yielding 16 categories including fruits, leaves, stems, aboveground parts, flowers, roots, seeds, rhizomes, the whole plant, etc. Fruits (68, 41.7%) are the most commonly consumed edible parts, followed by leaves (40, 24.5%) and stems (34, 20.9%) (Fig. 2c).

**Table 1** Study site locations and demographic characteristics of respondents

| Township | Village      | Population | Gender |        | Age |       |       | Education level |     |            |                |               | Occupation            |        |          | Location      |                  | Altitude (m)  |                  |
|----------|--------------|------------|--------|--------|-----|-------|-------|-----------------|-----|------------|----------------|---------------|-----------------------|--------|----------|---------------|------------------|---------------|------------------|
|          |              |            | Male   | Female | ≤19 | 20-39 | 40-59 | 60-79           | ≥80 | Illiterate | Primary school | Middle school | High school and above | Farmer | Retailer | Salary worker | Latitude (North) |               | Longitude (East) |
| Baifusi  | Ganyinping   | —          | 1      | 7      | 0   | 0     | 4     | 4               | 0   | 3          | 3              | 1             | 1                     | 5      | 2        | 1             | 29°12′1.50″      | 109°13′32.81″ | 373              |
|          | Nanhe        | 1041       | 6      | 4      | 0   | 0     | 4     | 5               | 1   | 4          | 4              | 1             | 1                     | 7      | 2        | 1             | 29°13′53.75″     | 109°14′49.21″ | 387              |
|          | Ranjia       | 692        | 5      | 3      | 0   | 1     | 1     | 6               | 0   | 5          | 2              | 0             | 1                     | 7      | 0        | 1             | 29°9′17.54″      | 109°15′28.86″ | 671              |
|          | Shemihu      | 636        | 5      | 5      | 0   | 0     | 3     | 5               | 2   | 5          | 3              | 0             | 2                     | 8      | 0        | 2             | 29°9′37.35″      | 109°15′10.66″ | 630              |
|          | Xing'an      | 1125       | 5      | 5      | 0   | 0     | 2     | 6               | 2   | 5          | 3              | 1             | 1                     | 9      | 0        | 1             | 29°7′44.68″      | 109°14′33.99″ | 584              |
| Dahe     | Chedonghu    | 1004       | 6      | 4      | 0   | 2     | 3     | 4               | 1   | 5          | 1              | 2             | 2                     | 8      | 1        | 1             | 29°21′54.84″     | 109°9′2.81″   | 818              |
|          | Dushitang    | 1486       | 3      | 8      | 0   | 0     | 3     | 6               | 2   | 6          | 2              | 3             | 0                     | 9      | 1        | 1             | 29°27′27.36″     | 109°7′1.29″   | 561              |
|          | Lengshuixi   | 919        | 5      | 7      | 0   | 2     | 3     | 4               | 3   | 7          | 3              | 0             | 2                     | 10     | 1        | 1             | 29°27′23.39″     | 109°5′49.45″  | 606              |
|          | Wudaoshui    | 715        | 6      | 4      | 0   | 0     | 4     | 6               | 0   | 5          | 2              | 2             | 1                     | 8      | 1        | 1             | 29°31′18.77″     | 109°6′40.65″  | 726              |
|          | Zhangjiajie  | 947        | 2      | 7      | 0   | 1     | 1     | 4               | 3   | 6          | 1              | 0             | 2                     | 6      | 2        | 1             | 29°30′47.46″     | 109°9′47.90″  | 782              |
| Geleche  | Chenjiagou   | 650        | 5      | 6      | 0   | 0     | 2     | 9               | 0   | 3          | 5              | 1             | 2                     | 8      | 2        | 1             | 29°32′29.19″     | 109°16′25.45″ | 568              |
|          | Gujiaoshan   | 1623       | 6      | 3      | 0   | 0     | 3     | 5               | 1   | 4          | 4              | 0             | 1                     | 8      | 0        | 1             | 29°34′37.90″     | 109°16′32.50″ | 645              |
|          | Tongma       | 1905       | 4      | 6      | 0   | 1     | 3     | 5               | 1   | 4          | 3              | 1             | 2                     | 7      | 2        | 1             | 29°34′9.38″      | 109°13′31.05″ | 815              |
|          | Tujiashai    | 1590       | 4      | 5      | 0   | 1     | 2     | 5               | 1   | 3          | 3              | 2             | 1                     | 8      | 0        | 1             | 29°36′22.35″     | 109°16′24.55″ | 753              |
|          | Changtaiping | 1241       | 8      | 1      | 0   | 0     | 2     | 6               | 1   | 4          | 3              | 1             | 1                     | 7      | 1        | 1             | 29°35′35.92″     | 109°14′23.77″ | 818              |
| Jiushi   | Banshajie    | —          | 6      | 4      | 0   | 0     | 2     | 5               | 3   | 6          | 2              | 0             | 2                     | 9      | 0        | 1             | 29°29′6.27″      | 109°15′22.96″ | 620              |
|          | Heidongtang  | 2225       | 6      | 4      | 0   | 0     | 4     | 5               | 1   | 5          | 3              | 1             | 1                     | 6      | 2        | 2             | 29°21′51.21″     | 109°13′32.01″ | 652              |
| Lvshui   | Huangtuba    | 1940       | 4      | 7      | 0   | 0     | 1     | 10              | 0   | 5          | 4              | 1             | 1                     | 10     | 0        | 1             | 29°24′12.49″     | 109°13′10.31″ | 513              |
|          | Labisi       | 1854       | 4      | 4      | 0   | 1     | 1     | 6               | 0   | 5          | 2              | 1             | 0                     | 7      | 0        | 1             | 29°27′7.74″      | 109°13′24.79″ | 531              |
|          | Majiaogou    | 1128       | 4      | 4      | 0   | 0     | 0     | 8               | 0   | 4          | 1              | 2             | 1                     | 6      | 1        | 1             | 29°29′37.66″     | 109°11′46.72″ | 563              |
|          | Meiziya      | 714        | 7      | 2      | 0   | 0     | 4     | 5               | 0   | 5          | 1              | 1             | 2                     | 8      | 0        | 1             | 29°32′8.74″      | 109°10′53.08″ | 776              |
|          | Tianjiazhai  | 1671       | 5      | 6      | 0   | 0     | 1     | 8               | 1   | 6          | 1              | 3             | 1                     | 6      | 4        | 1             | 29°23′52.27″     | 109°21′43.04″ | 521              |
| Manshui  | Xinglong'ao  | 2594       | 5      | 4      | 0   | 0     | 4     | 2               | 1   | 3          | 2              | 3             | 1                     | 6      | 1        | 2             | 29°19′41.67″     | 109°18′32.80″ | 587              |
|          | Yutang       | 2447       | 5      | 7      | 1   | 0     | 4     | 6               | 1   | 6          | 5              | 0             | 1                     | 10     | 1        | 1             | 29°17′55.43″     | 109°19′32.95″ | 510              |
| Sanhu    | Huangbaiyuan | 1671       | 5      | 3      | 0   | 0     | 2     | 6               | 0   | 2          | 2              | 2             | 2                     | 6      | 1        | 1             | 29°36′16.16″     | 109°17′25.96″ | 708              |
|          | Shiqiao      | 1318       | 3      | 7      | 0   | 0     | 3     | 6               | 1   | 6          | 3              | 0             | 1                     | 8      | 1        | 1             | 29°35′29.00″     | 109°18′18.37″ | 569              |

**Table 2** Inventory of wild edible plants used by the Tujia ethnic group in Laifeng

| Scientific name                                                                    | Chinese name | Family name      | Local name  | Habit | Food categorieies | Edible part and consumption mode    | Collection months | Multiple uses                                                        | Medicinal food | Habitat          | FC  | RFC   | CFSI   | Voucher number |
|------------------------------------------------------------------------------------|--------------|------------------|-------------|-------|-------------------|-------------------------------------|-------------------|----------------------------------------------------------------------|----------------|------------------|-----|-------|--------|----------------|
| <i>Diplazium esculentum</i> (Retz.) Sw                                             | 蕨菜           | Athyriaceae      | Sui jue     | Herb  | V                 | Tender leaf; stir-fried or boiled   | 3–6               |                                                                      |                | Wild             | 16  | 0.063 | 2.25   | LFE40122       |
| <i>Peridium revolutum</i> (Blume) Nakai                                            | 毛轴蕨          | Dennstaedtiaceae | Tian jue    | Herb  | V, Fs             | Tender leaf; stir-fried or boiled   | 2–6               |                                                                      |                | Wild             | 200 | 0.794 | 519.75 | LFE40008       |
| <i>Sceptridium ternatum</i> (Thunb.) Lyon                                          | 阴地蕨          | Ophioglossaceae  | Du jio ji   | Herb  | V                 | Whole plant; stew with meat         | 1–12              | Medicine, tonic                                                      | Yes            | Wild             | 21  | 0.083 | 37.8   | LFE40156       |
| <i>Osmunda japonica</i> Thunb                                                      | 紫萁           | Osmundaceae      | Mao mao jue | Herb  | V                 | Tender leaf; stir-fried or boiled   | 3–4               | Medicine                                                             |                | Wild             | 67  | 0.266 | 56.53  | LFE40124       |
| <i>Taxus wallichiana</i> var. <i>mairei</i> (Lemée and H. Lévl.) L.K.Fu and Nan Li | 南方红豆杉        | Taxaceae         | Hong fei    | Tree  | F, Ws             | Fruit; eaten raw or soaking in wine | 10–11             | Ornamental, medicine, firewood                                       |                | Wild, cultivated | 39  | 0.155 | 157.95 | LFE30067       |
| <i>Acorus gramineus</i> Aiton                                                      | 茴香菖蒲         | Acoraceae        | San nai     | Herb  | S                 | Leaf; spices                        | 1–12              |                                                                      |                | Wild, cultivated | 16  | 0.063 | 17.28  | LFE40167       |
| <i>Actinidia callosa</i> var. <i>henryi</i> Maxim                                  | 京梨猕猴桃        | Actinidiaceae    | Ma nai nai  | Liana | F, Ws             | Fruit; eaten raw or soaking in wine | 8–10              |                                                                      |                | Wild             | 39  | 0.155 | 14.26  | LFE30021       |
| <i>Actinidia chinensis</i> Planch                                                  | 中华猕猴桃        | Actinidiaceae    | Yang tao    | Liana | F, Ws             | Fruit; eaten raw or soaking in wine | 8–10              |                                                                      |                | Wild, cultivated | 139 | 0.552 | 78.19  | LFE40089       |
| <i>Achyranthes aspera</i> L.                                                       | 土牛膝          | Amaranthaceae    | Niu ke xi   | Herb  | V                 | Root; stew with meat                | 1–12              | Roots and stems used as medicine to strengthen the muscles and bones | Yes            | Wild             | 3   | 0.012 | 7.43   | LFE40313       |
| <i>Achyranthes bidentata</i> Blume                                                 | 牛膝           | Amaranthaceae    | Niu ke xi   | Herb  | V                 | Root; stew with meat                | 1–12              | Roots and stems used as medicine to strengthen the muscles and bones | Yes            | Wild             | 5   | 0.020 | 12.38  | LFE40159       |

Table 2 (continued)

| Scientific name                                                | Chinese name | Family name    | Local name     | Habit | Food categories | Edible part and consumption mode                                | Collection months | Multiple uses                                                        | Medicinal food | Habitat          | FC  | RFC   | CFSI   | Voucher number |
|----------------------------------------------------------------|--------------|----------------|----------------|-------|-----------------|-----------------------------------------------------------------|-------------------|----------------------------------------------------------------------|----------------|------------------|-----|-------|--------|----------------|
| <i>Achyranthes longifolia</i> Makino                           | 柳叶牛膝         | Amaranthaceae  | Hong niu ke xi | Herb  | V               | Root; stew with meat                                            | 1–12              | Roots and stems used as medicine to strengthen the muscles and bones | Yes            | Wild, cultivated | 10  | 0.040 | 16.5   | LFE40359       |
| <i>Alternanthera philoxeroides</i> (Mart.) Griseb              | 喜旱莲子草        | Amaranthaceae  | Kong tong cao  | Herb  | V               | Tender stem and leaf; stir-fried or boiled                      | 3–4               | Fodder                                                               |                | Wild             | 1   | 0.004 | 0.48   | LFE30102       |
| <i>Amaranthus retroflexus</i> L.                               | 反枝苋          | Amaranthaceae  | Tu han cai     | Herb  | V               | Aboveground; stir-fried                                         | 5–7               | Fodder                                                               |                | Wild             | 37  | 0.147 | 24.42  | LFE40330       |
| <i>Celosia argentea</i> L.                                     | 青葙           | Amaranthaceae  | Ji gong han    | Herb  | V               | Tender stem and leaf; stir-fried or boiled                      | 3–5               | Fodder                                                               |                | Wild             | 9   | 0.036 | 1.8    | LFE30103       |
| <i>Chenopodium album</i> L.                                    | 藜            | Amaranthaceae  | Hui hui cai    | Herb  | V               | Tender stem and leaf; stir-fried                                | 4–5               | Fodder                                                               |                | Wild             | 1   | 0.004 | 0.22   | LFE40041       |
| <i>Allium macrostemon</i> Bunge                                | 薤白           | Amaryllidaceae | Ye cong        | Herb  | V, S            | Whole plant; spices or pickle                                   | 1–4, 9–12         | Medicine                                                             |                | Wild             | 204 | 0.810 | 6120   | LFE30014       |
| <i>Choerospondias axillaris</i> (Roxb.) B.L.Burtt and A.W.Hill | 南酸枣          | Anacardiaceae  | Suan zao       | Tree  | F               | Fruit; eaten raw                                                | 8–10              |                                                                      |                | Wild             | 20  | 0.079 | 2.44   | LFE30028       |
| <i>Cryptotaenia japonica</i> Hassk                             | 鸭儿芹          | Apiaceae       | Ya jio ban     | Herb  | V               | Tender stem and leaf; stir-fried or boiled                      | 3–5               | Fodder                                                               |                | Wild, cultivated | 104 | 0.413 | 589.68 | LFE30088       |
| <i>Oenanthe javanica</i> DC                                    | 水芹           | Apiaceae       | Ye qin cai     | Herb  | V               | Tender stem and leaf; stir-fried                                | 3–4               | Fodder                                                               |                | Wild, cultivated | 110 | 0.437 | 308    | LFE40032       |
| <i>Amorphophallus konjac</i> K. Koch                           | 魔芋           | Araceae        | Mo yu          | Herb  | Fs              | Tuber; make flour                                               | 10–11             |                                                                      |                | Wild, cultivated | 41  | 0.163 | 55.35  | LFE30002       |
| <i>Aralia echinocalyx</i> Hand.-Mazz                           | 棘茎楸木         | Araliaceae     | Hong ci luo bu | Tree  | V               | Tender stem and leaf; stir-fried or cold and dressed with sauce | 3–4               | Roots used as medicine for rheumatism and traumatic injury           |                | Wild             | 59  | 0.234 | 115.05 | LFE40042       |

Table 2 (continued)

| Scientific name                                 | Chinese name | Family name  | Local name  | Habit | Food categories | Edible part and consumption mode                                 | Collection months | Multiple uses                                         | Medicinal food | Habitat          | FC | RFC   | CFSI   | Voucher number |
|-------------------------------------------------|--------------|--------------|-------------|-------|-----------------|------------------------------------------------------------------|-------------------|-------------------------------------------------------|----------------|------------------|----|-------|--------|----------------|
| <i>Aralia elata</i> (Miq.) Seem                 | 楸木           | Araliaceae   | Ci luo bu   | Tree  | V               | Tender stem and leaf; stir-fried or cold and dressed with sauce  | 3–4               |                                                       |                | Wild             | 99 | 0.393 | 111.38 | LFE40212       |
| <i>Eleutherococcus nodiflorus</i> (Dunn) S.Y.Hu | 细柱五加         | Araliaceae   | Wu jia pi   | Shrub | V               | Tender stem and leaf; stir-fried or make soup                    | 3–4               | Root barks used as medicine for traumatic injury      | Yes            | Wild, cultivated | 13 | 0.052 | 29.25  | LFE40091       |
| <i>Heptapleurum delavayi</i> Franch             | 穗序鹤掌柴        | Araliaceae   | Dou chi ye  | Tree  | S               | Leaf; placed under the black bean sauce to enhance the fragrance | 1–12              |                                                       |                | Wild             | 7  | 0.028 | 6.3    | LFE30056       |
| <i>Hydrocotyle nepalensis</i> Hook              | 红马蹄草         | Araliaceae   | Yu dian cao | Herb  | V               | Aboveground; stir-fried                                          | 3–5               | Whole plants used as medicine to improve eyesight     | Yes            | Wild             | 1  | 0.004 | 1.76   | LFE40076       |
| <i>Hydrocotyle sibthorpioides</i> Lam           | 天胡荽          | Araliaceae   | Yu dian cao | Herb  | V               | Aboveground; stir-fried                                          | 3–5               | Whole plants used as medicine to improve eyesight     | Yes            | Wild             | 13 | 0.052 | 22.88  | LFE40084       |
| <i>Trachycarpus fortunei</i> (Hook.) H.Wendl    | 棕榈           | Areaceae     | Zong su     | Tree  | V               | Flower; stir-fried or boiled                                     | 3–4               | Barks and leaves used as rope                         |                | Wild             | 1  | 0.004 | 0.09   | LFE30033       |
| <i>Diurathera major</i> Hemsl                   | 鹭鸶草          | Asparagaceae | Xu sen      | Herb  | V               | Root; stew with meat                                             | 1–12              | Ornamental; medicine                                  | Yes            | Wild, cultivated | 10 | 0.040 | 19.5   | LFE40017       |
| <i>Ophiopogon japonicus</i> (Thunb.) Ker Gawl   | 麦冬           | Asparagaceae | Luo zi zi   | Herb  | V               | Root tuber; stew with meat                                       | 4–10              | Root tubers used as medicine to moistening lung cough | Yes            | Wild             | 3  | 0.012 | 2.97   | LFE40013       |
| <i>Polygonatum sibiricum</i> Red-outé           | 黄精           | Asparagaceae | Huang jing  | Herb  | V               | Rhizome; grilled or soaking in wine or stew with meat            | 1–12              | Medicine                                              | Yes            | Wild, cultivated | 27 | 0.107 | 105.3  | LFE30066       |

Table 2 (continued)

| Scientific name                                                 | Chinese name | Family name   | Local name       | Habit | Food categories | Edible part and consumption mode                                                      | Collection months | Multiple uses                                                             | Medicinal food | Habitat          | FC  | RFC   | CFSI   | Voucher number |
|-----------------------------------------------------------------|--------------|---------------|------------------|-------|-----------------|---------------------------------------------------------------------------------------|-------------------|---------------------------------------------------------------------------|----------------|------------------|-----|-------|--------|----------------|
| <i>Hemerocallis fulva</i> (L.) L.                               | 萱草           | Asphodelaceae | Ye huang hua cai | Herb  | V               | Tender stem and leaf; flower; stir-fried                                              | 3–7               | Ornamental                                                                |                | Wild             | 21  | 0.083 | 13.65  | LFE40336       |
| <i>Artemisia lancea</i> Vaniot                                  | 矮蒿           | Asteraceae    | Ku hao           | Herb  | V               | Tender stem and leaf; mix with glutinous rice to steam                                | 2–4               | Stems and leaves used as medicine for knife wound                         |                | Wild             | 192 | 0.762 | 414.72 | LFE40006       |
| <i>Artemisia indica</i> Willd                                   | 五月艾          | Asteraceae    | Bai hao          | Herb  | V               | Tender stem and leaf; pound and mix glutinous rice flour to make glutinous rice cakes | 3–5               | Hanging on the doors on the Dragon Boat Festival to ward off evil spirits |                | Wild             | 180 | 0.714 | 777.6  | LFE30042       |
| <i>Aster indicus</i> L.                                         | 马兰           | Asteraceae    | Ni qiu quan      | Herb  | V               | Tender stem and leaf; stir-fried or cold and dressed with sauce or make soup          | 3–4               | Whole plants used as medicine for cold and upset stomach                  |                | Wild             | 4   | 0.016 | 3.12   | LFE30043       |
| <i>Chrysanthemum indicum</i> L.                                 | 野菊           | Asteraceae    | Mao hao          | Herb  | Ts              | Flower; soak in water                                                                 | 7–11              | Ornamental, flowers used as medicine to improve eyesight                  |                | Wild             | 4   | 0.016 | 5.4    | LFE40043       |
| <i>Cirsium arvense</i> var. <i>integrifolium</i> Wimm. and Grab | 刺儿菜          | Asteraceae    | Ci ga cai        | Herb  | V               | Leaf; stir-fried or boiled                                                            | 3–5               | Fodder                                                                    |                | Wild             | 5   | 0.020 | 0.8    | LFE30053       |
| <i>Cirsium japonicum</i> DC                                     | 蓟            | Asteraceae    | Da ci ga cai     | Herb  | V               | Leaf; stir-fried or boiled                                                            | 3–4               | Medicine                                                                  |                | Wild, cultivated | 4   | 0.016 | 0.64   | LFE40343       |
| <i>Crassocephalum crepidioides</i> S.Moore                      | 野苘蒿          | Asteraceae    | Liang gen cai    | Herb  | V               | Tender stem and leaf; stir-fried or boiled                                            | 3–5               | Fodder                                                                    |                | Wild             | 10  | 0.040 | 2.4    | LFE30012       |
| <i>Lactuca indica</i> L.                                        | 翅果菊          | Asteraceae    | Tu er cao        | Herb  | V               | Tender stem and leaf; stir-fried                                                      | 3–4               | Fodder                                                                    |                | Wild             | 2   | 0.008 | 0.44   | LFE40206       |

Table 2 (continued)

| Scientific name                                                                | Chinese name | Family name     | Local name   | Habit | Food categories | Edible part and consumption mode                                                      | Collection months | Multiple uses                                                     | Medicinal food | Habitat          | FC  | RFC   | CFSI   | Voucher number |
|--------------------------------------------------------------------------------|--------------|-----------------|--------------|-------|-----------------|---------------------------------------------------------------------------------------|-------------------|-------------------------------------------------------------------|----------------|------------------|-----|-------|--------|----------------|
| <i>Pseudognaphalium affine</i> (D. Don) Anderb                                 | 鼠曲草          | Asteraceae      | Sui qu       | Herb  | V               | Tender stem and leaf; pound and mix glutinous rice flour to make glutinous rice cakes | 3–5               | Fodder                                                            |                | Wild             | 129 | 0.512 | 928.8  | LFE30013       |
| <i>Taraxacum mongolicum</i> Hand.-Mazz                                         | 蒲公英          | Asteraceae      | Pu gong ying | Herb  | V               | Aboveground; stir-fried or cold and dressed with sauce                                | 2–4               | Whole plants used as medicine for cold                            |                | Wild, cultivated | 5   | 0.020 | 5.2    | LFE40197       |
| <i>Capsella bursa-pastoris</i> Medik                                           | 芥            | Brassicaceae    | Di mi cai    | Herb  | V               | Aboveground; stir-fried or boiled                                                     | 2–4               | Whole plants used as medicine for cold and dyspepsia              |                | Wild             | 59  | 0.234 | 169.92 | LFE30041       |
| <i>Codonopsis javanica</i> subsp. <i>japonica</i> (Maxim. ex Makino) Lam.-mers | 小花金钱豹        | Campanulaceae   | Ye dang sen  | Liana | V               | Root; stew with meat                                                                  | 10–11             | Whole plants used as medicine to strengthen the muscles and bones | Yes            | Wild             | 16  | 0.063 | 39     | LFE30044       |
| <i>Cyclocodon lancifolius</i> (Roxb.) Kurz                                     | 轮钟草          | Campanulaceae   | Suan pan zi  | Herb  | F, V            | Fruit, eaten raw<br>Tender stem and leaf; stir-fried                                  | 9–10              | Roots used as medicine for gynecopathy                            |                | Wild             | 8   | 0.032 | 0.78   | LFE40276       |
| <i>Lonicera japonica</i> Thunb                                                 | 忍冬           | Caprifoliaceae  | Jin yin hua  | Liana | Ts              | Flower; soak in water                                                                 | 4–7               | Ornamental, whole plants used as medicine for cold and bronchitis |                | Wild, cultivated | 17  | 0.067 | 34.43  | LFE40140       |
| <i>Stellaria aquatica</i> Scop                                                 | 鹅肋菜          | Caryophyllaceae | Da e cang    | Herb  | V               | Aboveground; stir-fried                                                               | 3–4               | Fodder                                                            |                | Wild             | 1   | 0.004 | 0.77   | LFE40009       |
| <i>Stellaria media</i> (L.) Vill                                               | 繁缕           | Caryophyllaceae | E e cang     | Herb  | V               | Aboveground; stir-fried                                                               | 2–3               | Fodder                                                            |                | Wild             | 3   | 0.012 | 2.31   | LFE40021       |
| <i>Disporum longistylum</i> (H. Lévl. and Vaniot) H. Hara                      | 长蕊万寿竹        | Colchicaceae    | Bai long xu  | Herb  | V               | Rhizome; stew with meat                                                               | 1–12              | Roots used as medicine to strengthen the muscles and bones        | Yes            | Wild             | 7   | 0.028 | 20.48  | LFE40001       |

Table 2 (continued)

| Scientific name                                     | Chinese name | Family name    | Local name      | Habit | Food categories | Edible part and consumption mode                       | Collection months | Multiple uses                                                   | Medicinal food | Habitat          | FC | RFC   | CFSI | Voucher number |
|-----------------------------------------------------|--------------|----------------|-----------------|-------|-----------------|--------------------------------------------------------|-------------------|-----------------------------------------------------------------|----------------|------------------|----|-------|------|----------------|
| <i>Commelina communis</i> L.                        | 鸭跖草          | Com-melinaceae | Zu ya cai       | Herb  | V               | Tender stem and leaf; stir-fried                       | 4–6               |                                                                 |                | Wild             | 6  | 0.024 | 1.65 | LFE40379       |
| <i>Streptolirion volubile</i> Edgew                 | 竹叶子          | Com-melinaceae | Zu pi kong      | Herb  | V               | Aboveground; stir-fried or boiled                      | 4–6               |                                                                 |                | Wild             | 6  | 0.024 | 0.39 | LFE40284       |
| <i>Calystegia hederacea</i> Wall                    | 打碗花          | Convolvulaceae | Po wan hua teng | Herb  | V               | Aboveground; stir-fried                                | 1–12              | Fodder                                                          |                | Wild             | 6  | 0.024 | 2.48 | LFE40337       |
| <i>Cornus capitata</i> Wall                         | 头状四照花        | Cornaceae      | Li ba zi        | Tree  | F               | Fruit; eaten raw                                       | 9–10              | Ornamental                                                      |                | Wild             | 64 | 0.254 | 4.68 | LFE40253       |
| <i>Sedum emarginatum</i> Migo                       | 凹叶景天         | Crassulaceae   | Ma ci han       | Herb  | V               | Aboveground; stir-fried or cold and dressed with sauce | 3–10              |                                                                 |                | Wild             | 1  | 0.004 | 1.04 | LFE30049       |
| <i>Sedum sarmentosum</i> Bunge                      | 垂盆草          | Crassulaceae   | Gou ya ban      | Herb  | V               | Aboveground; stir-fried or cold and dressed with sauce | 3–10              | Whole plants used as medicine for dog bite and traumatic injury |                | Wild             | 7  | 0.028 | 33.6 | LFE40231       |
| <i>Eleocharis dulcis</i> (Burm.f.) Trin. ex Hensch  | 荸荠           | Cyperaceae     | Ci gu zi        | Herb  | V               | Corm; eaten raw                                        | 12,1–2            |                                                                 |                | Wild, cultivated | 2  | 0.008 | 0.11 | LFE40262       |
| <i>Dioscorea alata</i> L.                           | 参薯           | Dioscoreaceae  | Jio ban sao     | Liana | Fs              | Tuber; steamed or grilled                              | 10–12             |                                                                 |                | Wild, cultivated | 6  | 0.024 | 0.59 | LFE40289       |
| <i>Dioscorea bulbifera</i> L.                       | 黄独           | Dioscoreaceae  | Mao quan tou    | Liana | Fs              | Tuber; steamed or grilled                              | 8–10              | Medicine                                                        |                | Wild             | 7  | 0.028 | 1.54 | LFE40412       |
| <i>Dioscorea polystachya</i> Turcz                  | 薯蕷           | Dioscoreaceae  | Ye san yo       | Liana | Fs              | Tuber; steamed or grilled                              | 10–11             |                                                                 |                | Wild             | 2  | 0.008 | 0.17 | LFE30022       |
| <i>Diospyros kaki</i> Lf                            | 柿            | Ebenaceae      | Yao dai si      | Tree  | F               | Fruit; eaten raw                                       | 10–12             | Firewood                                                        |                | Wild, cultivated | 20 | 0.079 | 2.93 | LFE40409       |
| <i>Diospyros kaki</i> var. <i>silvestris</i> Makino | 野柿           | Ebenaceae      | You si          | Tree  | F               | Fruit; eaten raw                                       | 10–12             | Firewood                                                        |                | Wild             | 49 | 0.194 | 7.17 | LFE30024       |
| <i>Eleagnus henryi</i> Warb. ex Diels               | 宜昌胡颓子        | Elaeagnaceae   | Yang nai nai    | Shrub | F               | Fruit; eaten raw                                       | 3–4               |                                                                 |                | Wild, cultivated | 49 | 0.194 | 7.17 | LFE30020       |
| <i>Eleagnus lanceolata</i> Warb                     | 披针叶胡颓子       | Elaeagnaceae   | Niu nai nai     | Shrub | F               | Fruit; eaten raw                                       | 4–5               | Ornamental                                                      |                | Wild             | 18 | 0.071 | 2.03 | LFE40387       |
| <i>Eleagnus magna</i> (Servett.) Rehder             | 银果牛奶子        | Elaeagnaceae   | Ban cuan zi     | Shrub | F               | Fruit; eaten raw                                       | 6–7               |                                                                 |                | Wild             | 19 | 0.075 | 2.14 | LFE40395       |

Table 2 (continued)

| Scientific name                                                                                    | Chinese name | Family name         | Local name   | Habit | Food categories | Edible part and consumption mode         | Collection months | Multiple uses                                     | Medicinal food | Habitat          | FC  | RFC   | CFSI   | Voucher number |
|----------------------------------------------------------------------------------------------------|--------------|---------------------|--------------|-------|-----------------|------------------------------------------|-------------------|---------------------------------------------------|----------------|------------------|-----|-------|--------|----------------|
| <i>Elaeagnus pumgens</i> Thunb                                                                     | 胡颓子          | <i>Elaeagnaceae</i> | Niu nai nai  | Shrub | F               | Fruit; eaten raw                         | 3–4               | Ornamental                                        |                | Wild, cultivated | 59  | 0.234 | 9.96   | LFE30019       |
| <i>Rhododendron simsii</i> Planch                                                                  | 杜鹃           | <i>Ericaceae</i>    | Yan san hong | Shrub | V               | Flower; eaten raw                        | 3–4               | Ornamental                                        |                | Wild, cultivated | 11  | 0.044 | 1.07   | LFE40303       |
| <i>Astragalus sinicus</i> L.                                                                       | 紫云英          | <i>Fabaceae</i>     | Yang que hua | Herb  | V               | Flower; tender stem and leaf; stir-fried | 3–4               | Fodder                                            |                | Wild             | 1   | 0.004 | 0.26   | LFE40179       |
| <i>Callerya dielsiana</i> (Harms ex Diels) L.K.Phan ex Z.Wei and Pedley                            | 香花鸡血藤        | <i>Fabaceae</i>     | Ai ba dou    | Shrub | V               | Seed; grilled or boiled                  | 6–10              | Ornamental, used as medicine for traumatic injury |                | Wild             | 11  | 0.044 | 5.45   | LFE40324       |
| <i>Caragana sinica</i> (Buc hoz) Rehder                                                            | 锦鸡儿          | <i>Fabaceae</i>     | Yang que hua | Herb  | V               | Flower; stir-fried or make soup          | 3–4               | Ornamental, medicine                              |                | Wild, cultivated | 41  | 0.163 | 16.14  | LFE40160       |
| <i>Pueraria montana</i> var. <i>lobata</i> (Willd.) Maesen and S.M.Almeida ex Sanjappa and Predeep | 葛            | <i>Fabaceae</i>     | Guo ma teng  | Liana | Fs              | Root; make flour                         | 11–12, 1–2        | Roots and stems used as medicine for cold         |                | Wild, cultivated | 42  | 0.167 | 6.14   | LFE40260       |
| <i>Pueraria montana</i> var. <i>thomsonii</i> (Benth.) Wiersma ex D.B.Ward                         | 粉葛           | <i>Fabaceae</i>     | Nan guo      | Liana | Fs              | Root; make flour                         | 11–12, 1–2        |                                                   |                | Wild             | 11  | 0.044 | 3.71   | LFE40036       |
| <i>Robinia pseudacacia</i> L.                                                                      | 刺槐           | <i>Fabaceae</i>     | Ci huai hua  | Tree  | V               | Flower; make soup                        | 4–5               | Ornamental                                        |                | Wild, cultivated | 2   | 0.008 | 0.15   | LFE30027       |
| <i>Castanea henryi</i> Rehder and E.H.Wilson                                                       | 锥栗           | <i>Fagaceae</i>     | Jian li      | Tree  | N               | Seed; eaten raw or boiled                | 9–11              | Firewood                                          |                | Wild             | 73  | 0.290 | 49.28  | LFE30047       |
| <i>Castanea mollissima</i> Blume                                                                   | 栗            | <i>Fagaceae</i>     | Ban li       | Tree  | N               | Seed; eaten raw or boiled                | 8–10              | Firewood                                          |                | Wild, cultivated | 139 | 0.552 | 131.36 | LFE30100       |
| <i>Castanopsis eyrei</i> Tutch                                                                     | 甜槠           | <i>Fagaceae</i>     | Si li        | Tree  | N               | Seed; eaten raw or boiled                | 9–11              | Firewood                                          |                | Wild, cultivated | 122 | 0.484 | 115.29 | LFE30025       |
| <i>Castanopsis tibetana</i> Hance                                                                  | 钩锥           | <i>Fagaceae</i>     | Hou li       | Tree  | N               | Seed; eaten raw or boiled                | 9–11              | Firewood                                          |                | Wild             | 73  | 0.290 | 30.11  | LFE30052       |

Table 2 (continued)

| Scientific name                                                 | Chinese name | Family name     | Local name    | Habit | Food categories | Edible part and consumption mode                   | Collection months | Multiple uses                                                     | Medicinal food | Habitat          | FC | RFC   | CFSI  | Voucher number |
|-----------------------------------------------------------------|--------------|-----------------|---------------|-------|-----------------|----------------------------------------------------|-------------------|-------------------------------------------------------------------|----------------|------------------|----|-------|-------|----------------|
| <i>Coraliodiscus cordatulus</i> (Craib) B.L.Burtt               | 珊瑚崖苔         | Gesneriaceae    | Fu xin cao    | Herb  | V               | Whole plant; stew with meat                        | 1–12              | Whole plants used as medicine for headache and traumatic injury   | Yes            | Wild             | 21 | 0.083 | 31.5  | LFE40155       |
| <i>Iris japonica</i> Thunb                                      | 蝴蝶花          | Iridaceae       | Dou jiang cao | Herb  | C               | Leaf; make tofu                                    | 4–10              | Ornamental                                                        |                | Wild             | 3  | 0.012 | 2.34  | LFE40031       |
| <i>Juglans regia</i> L.                                         | 胡桃           | Juglandaceae    | Huo tao       | Tree  | N               | Seed; eaten raw                                    | 9–10              | Firewood                                                          |                | Wild, cultivated | 6  | 0.024 | 0.25  | LFE30058       |
| <i>Agastache rugosa</i> Kuntze                                  | 藿香           | Lamiaceae       | Huo xiang cao | Herb  | S               | Leaf; spices                                       | 4–10              |                                                                   |                | Wild, cultivated | 1  | 0.004 | 1.8   | LFE40366       |
| <i>Clerodendrum bungei</i> Steud                                | 奥牡丹          | Lamiaceae       | Cou mu dan    | Shrub | V               | Root; stew with meat                               | 1–12              | Ornamental, medicine                                              | Yes            | Wild, cultivated | 2  | 0.008 | 4.68  | LFE40079       |
| <i>Lycopus lucidus</i> Turcz. ex Benth                          | 地笋           | Lamiaceae       | San luo si    | Herb  | V               | Rhizome; stir-fried or cold and dressed with sauce | 11–12             | Medicine                                                          |                | Wild, cultivated | 3  | 0.012 | 3.04  | LFE40012       |
| <i>Perilla frutescens</i> (L.) Britton                          | 紫苏           | Lamiaceae       | Zi su         | Herb  | S               | Leaf; spices                                       | 3–10              |                                                                   |                | Wild, cultivated | 15 | 0.060 | 32.4  | LFE40350       |
| <i>Perilla frutescens</i> var. <i>crispata</i> (Thunb.) H.Deane | 茵陈苏          | Lamiaceae       | Zi su         | Herb  | S               | Leaf; spices                                       | 3–10              |                                                                   |                | Cultivated       | 6  | 0.024 | 12.96 | LFE40312       |
| <i>Premna microphylla</i> Turcz                                 | 豆腐柴          | Lamiaceae       | Ban ji pao    | Shrub | C               | Leaf; make tofu                                    | 5–10              | Whole plants used as medicine for traumatic injury and hemostasis |                | Wild             | 28 | 0.111 | 18.9  | LFE40376       |
| <i>Prunella vulgaris</i> L.                                     | 夏枯草          | Lamiaceae       | Feng kuo cao  | Herb  | Ts              | Aboveground; soak in water                         | 4–6               | Roots used as medicine for rheumatism and cold                    |                | Wild             | 1  | 0.004 | 3.12  | LFE40109       |
| <i>Akebia trifoliata</i> (Thunb.) Koidz                         | 三叶木通         | Lardizabalaceae | Ba yue gua    | Liana | F               | Fruit; eaten raw                                   | 7–9               | Fruits used as medicine to promote diuresis                       |                | Wild             | 99 | 0.393 | 16.71 | LFE40394       |

Table 2 (continued)

| Scientific name                                                    | Chinese name | Family name             | Local name   | Habit | Food categories | Edible part and consumption mode                                | Collection months | Multiple uses                                            | Medicinal food | Habitat          | FC  | RFC   | CFSI   | Voucher number |
|--------------------------------------------------------------------|--------------|-------------------------|--------------|-------|-----------------|-----------------------------------------------------------------|-------------------|----------------------------------------------------------|----------------|------------------|-----|-------|--------|----------------|
| <i>Akebia trifoliata</i> subsp. <i>australis</i> (Diels) T.Shimizu | 白木通          | <i>Lardizaballaceae</i> | San ye lan   | Liana | F               | Fruit; eaten raw                                                | 6–9               | Fruits used as medicine to promote diuresis              |                | Wild, cultivated | 37  | 0.147 | 6.24   | LFE40393       |
| <i>Holboellia angustifolia</i> Wall                                | 五月瓜藤         | <i>Lardizaballaceae</i> | Qi ye lan    | Liana | F               | Fruit; eaten raw                                                | 7–9               |                                                          |                | Wild             | 31  | 0.123 | 5.23   | LFE40383       |
| <i>Stauntonia chinensis</i> DC                                     | 野木瓜          | <i>Lardizaballaceae</i> | Huang na gua | Liana | F               | Fruit; eaten raw                                                | 9–10              |                                                          |                | Wild             | 14  | 0.056 | 2.36   | LFE40420       |
| <i>Cinnamomum tazia</i> (Buch.-Ham.) Kosterm ex M Gangop           | 少花桂          | <i>Lauraceae</i>        | Xiang gui zi | Tree  | S               | Bark; spices                                                    | 9–10              |                                                          |                | Wild, cultivated | 12  | 0.048 | 6.48   | LFE30038       |
| <i>Litsea mollis</i> (Blume) Boerl                                 | 毛叶木姜子        | <i>Lauraceae</i>        | Mu jiang zi  | Tree  | S               | Fruit; spices or cold and dressed with sauce                    | 5–7               |                                                          |                | Wild, cultivated | 106 | 0.421 | 556.5  | LFE40020       |
| <i>Clintonia udensis</i> Trautv. and C.A.Mey                       | 七筋姑          | <i>Liliaceae</i>        | Jian dao cao | Herb  | F               | Fruit; eaten raw                                                | 7–8               |                                                          |                | Wild             | 2   | 0.008 | 0.05   | LFE40057       |
| <i>Lilium brownii</i> FE.Br. ex Mieliez                            | 野百合          | <i>Liliaceae</i>        | Ye be huo    | Herb  | Fs              | Bulb; grilled or steamed                                        | 6–7               |                                                          |                | Wild             | 23  | 0.091 | 13.46  | LFE40431       |
| <i>Taxillus sutchuenensis</i> Danser                               | 川桑寄生         | <i>Loranthaceae</i>     | Ji sen ca    | Shrub | Ts              | Whole plant; soak in water                                      | 1–12              | Roots used as medicine for rheumatism                    |                | Wild             | 2   | 0.008 | 2.6    | LFE30064       |
| <i>Toona sinensis</i> (A.Juss.) M.Roem                             | 香椿           | <i>Meliaceae</i>        | Cun dian     | Tree  | V               | Tender stem and leaf; stir-fried or cold and dressed with sauce | 3–5               | Firewood                                                 |                | Wild             | 140 | 0.556 | 183.75 | LFE40170       |
| <i>Ficus tikoua</i> Bureau                                         | 地果           | <i>Moraceae</i>         | Di pi pa     | Liana | F               | Fruit; eaten raw                                                | 7–9               | Whole plants used as medicine for cold and upset stomach |                | Wild             | 24  | 0.095 | 18.9   | LFE40038       |
| <i>Morus alba</i> L.                                               | 桑            | <i>Moraceae</i>         | Sang pao     | Tree  | F               | Fruit; eaten raw or soaking in wine                             | 4–5               | Firewood                                                 |                | Wild, cultivated | 16  | 0.063 | 1.8    | LFE40098       |

Table 2 (continued)

| Scientific name                                  | Chinese name | Family name    | Local name | Habit  | Food categories | Edible part and consumption mode                       | Collection months | Multiple uses                                    | Medicinal food | Habitat          | FC  | RFC   | CFSI   | Voucher number |
|--------------------------------------------------|--------------|----------------|------------|--------|-----------------|--------------------------------------------------------|-------------------|--------------------------------------------------|----------------|------------------|-----|-------|--------|----------------|
| <i>Musa basjoo</i> Siebold and Zucc. ex Linna    | 芭蕉           | Musaceae       | Ba jiao    | Herb   | V               | Flower; stew with meat<br>Tender stem and leaf; boiled | 3–7               | Ornamental; fodder, packaging                    |                | Wild, cultivated | 17  | 0.067 | 4.76   | LFE30104       |
| <i>Morella rubra</i> Lour                        | 杨梅           | Myricaceae     | Yang mei   | Tree   | F, Ws           | Fruit; eaten raw or soaking in wine                    | 6–7               | Ornamental                                       |                | Wild, cultivated | 51  | 0.202 | 154.91 | LFE40252       |
| <i>Phytolacca acinosa</i> Roxb                   | 商陆           | Phytolaccaceae | Liu luo bo | Herb   | V               | Root; stew with meat                                   | 8–10              | Medicine                                         | Yes            | Wild             | 16  | 0.063 | 23.4   | LFE40207       |
| <i>Plantago asiatica</i> L.                      | 车前           | Plantaginaceae | Ke ma cao  | Herb   | V               | Aboveground; stir-fried or boiled                      | 3–8               | Whole plants used as medicine for cold and cough |                | Wild             | 6   | 0.024 | 31.2   | LFE40107       |
| <i>Bambusa emeiensis</i> L.C.Chia and H.L.Fung   | 慈竹           | Poaceae        | Peng zu    | Bamboo | V               | Tender stem; stir-fried or boiled                      | 6–9               | Firewood, material for weaving tools             |                | Wild, cultivated | 26  | 0.103 | 13.52  | LFE40399       |
| <i>Chimonobambusa purpurea</i> Hsueh f. & T.P.Yi | 刺黑竹          | Poaceae        | Ci zu      | Bamboo | V               | Tender stem; stir-fried or boiled                      | 9–10              | Firewood, material for weaving tools             |                | Wild             | 22  | 0.087 | 1.65   | LFE30035       |
| <i>Imperata cylindrica</i> (L.) Raeusch          | 白茅           | Poaceae        | Mao qian   | Herb   | V               | Tender stem; eaten raw                                 | 3–4               | Roots used as medicine for cold and hemostasis   |                | Wild             | 7   | 0.028 | 1.82   | LFE30074       |
| <i>Indocalamus tessellatus</i> (Munro) Keng f    | 箬竹           | Poaceae        | Zong ba ye | Bamboo | Ws              | Leaf; soaking in wine                                  | 5–8               | Packaging                                        |                | Wild, cultivated | 26  | 0.103 | 20.28  | LFE30040       |
| <i>Phyllostachys nidularia</i> Munro             | 篌竹           | Poaceae        | Be zu      | Bamboo | V               | Tender stem; stir-fried or boiled or pickle            | 4–5               | Firewood, material for weaving tools             |                | Wild, cultivated | 99  | 0.393 | 59.4   | LFE30034       |
| <i>Phyllostachys edulis</i> (Carrière) J.Houz    | 毛竹           | Poaceae        | Lan zu     | Bamboo | V               | Tender stem; stir-fried or boiled or pickle            | 2–4               | Firewood, material for weaving tools             |                | Wild, cultivated | 186 | 0.738 | 133.92 | LFE30029       |

Table 2 (continued)

| Scientific name                                                 | Chinese name | Family name  | Local name   | Habit  | Food categories | Edible part and consumption mode               | Collection months | Multiple uses                                                 | Medicinal food | Habitat          | FC  | RFC   | CFSI   | Voucher number |
|-----------------------------------------------------------------|--------------|--------------|--------------|--------|-----------------|------------------------------------------------|-------------------|---------------------------------------------------------------|----------------|------------------|-----|-------|--------|----------------|
| <i>Phyllostachys heteroclada</i> Oliv                           | 水竹           | Poaceae      | Sui zu       | Bamboo | V               | Tender stem; stir-fried or boiled or pickle    | 4–5               | Firewood, material for weaving tools                          |                | Wild, cultivated | 175 | 0.694 | 126    | LFE30031       |
| <i>Phyllostachys nigra</i> var. <i>henonis</i> (Mitford) Rendle | 毛金竹          | Poaceae      | Jin zu       | Bamboo | V               | Tender stem; stir-fried or boiled              | 4–5               | Firewood, material for weaving tools                          |                | Wild, cultivated | 76  | 0.302 | 34.2   | LFE40097       |
| <i>Phyllostachys reticulata</i> (Rupr.) K.Koch                  | 桂竹           | Poaceae      | Ban zu       | Bamboo | V               | Tender stem; stir-fried or boiled              | 5–6               | Firewood, material for weaving tools                          |                | Wild, cultivated | 34  | 0.135 | 7.65   | LFE40400       |
| <i>Pleioloblastus maculatus</i> (McClure) C.D.Chu and C.S.Chao  | 斑苦竹          | Poaceae      | Ku zu        | Bamboo | V               | Tender stem; stir-fried or boiled              | 5–6               | Firewood, material for weaving tools                          |                | Wild, cultivated | 31  | 0.123 | 11.63  | LFE40391       |
| <i>Pleuropterus multiflorus</i> Turcz. ex Nakai                 | 何首乌          | Polygonaceae | Ye jiao teng | Herb   | V               | Root tuber; stew with meat                     | 10–12             | Roots used as medicine for nephropathy and stabilizing nerves | Yes            | Wild             | 1   | 0.004 | 1.56   | LFE40177       |
| <i>Reynoutria japonica</i> Houtt                                | 虎杖           | Polygonaceae | Suan tan gan | Herb   | V               | Stem; eaten raw or cold and dressed with sauce | 3–4               | Rhizomes used as medicine for jaundice hepatitis              | Yes            | Wild, cultivated | 5   | 0.020 | 3.25   | LFE40184       |
| <i>Lysimachia paridiformis</i> Franch                           | 落地梅          | Primulaceae  | Si kuai wa   | Herb   | V               | Whole plant; stew with meat                    | 1–12              | Whole plants used as medicine for children who are frightened | Yes            | Wild             | 5   | 0.020 | 8.8    | LFE40158       |
| <i>Berchemia sinica</i> C.K.Schneid                             | 勾儿茶          | Rhamnaceae   | Long gu zan  | Shrub  | F               | Fruit; eaten raw                               | 9–10              |                                                               |                | Wild             | 3   | 0.012 | 0.29   | LFE30095       |
| <i>Hovenia acerba</i> Lindl                                     | 枳椇           | Rhamnaceae   | Ji zao       | Tree   | F, Ws           | Fruit stalk; eaten raw or soaking in wine      | 9–11              | Fruit stalks used as medicine for cold and leg cramp          |                | Wild, cultivated | 153 | 0.607 | 1652.4 | LFE40034       |
| <i>Chaenomeles cathayensis</i> (Hemsl.) C.K.Schneid             | 木瓜海棠         | Rosaceae     | Mu gua       | Shrub  | Ws              | Fruit; soaking in wine                         | 9–10              | Roots and fruits used as medicine for rheumatism              |                | Wild, cultivated | 9   | 0.036 | 15.80  | LFE40065       |

Table 2 (continued)

| Scientific name                                                      | Chinese name | Family name | Local name     | Habit | Food categories | Edible part and consumption mode               | Collection months | Multiple uses                                                                    | Medicinal food | Habitat          | FC  | RFC   | CFSI   | Voucher number |
|----------------------------------------------------------------------|--------------|-------------|----------------|-------|-----------------|------------------------------------------------|-------------------|----------------------------------------------------------------------------------|----------------|------------------|-----|-------|--------|----------------|
| <i>Crataegus cuneata</i> Siebold and Zucc                            | 野山楂          | Rosaceae    | San za         | Shrub | F, Ts           | Fruit; eaten raw<br>Tender leaf; soak in water | 3–4, 9–10         |                                                                                  |                | Wild             | 2   | 0.008 | 0.20   | LFE30055       |
| <i>Eriobotrya japonica</i> (Thunb.) Lindl                            | 枇杷           | Rosaceae    | Pi pa          | Tree  | F               | Fruit; eaten raw                               | 5–6               | Ornamental, leaves and flowers used as medicine for cold                         |                | Wild, cultivated | 92  | 0.365 | 99.36  | LFE40249       |
| <i>Fragaria nilgerrensis</i> Schltdl. ex J.Gay                       | 黄毛草莓         | Rosaceae    | Ye cao mei     | Herb  | F               | Fruit; eaten raw                               | 6–8               |                                                                                  |                | Wild             | 10  | 0.040 | 0.68   | LFE40025       |
| <i>Prunus conradinae</i> Koehne                                      | 华中樱桃         | Rosaceae    | Ye en tao      | Tree  | F               | Fruit; eaten raw                               | 4–5               | Ornamental                                                                       |                | Wild             | 95  | 0.377 | 13.36  | LFE40068       |
| <i>Pyracantha fortuneana</i> (Maxim.) H.L.Li                         | 火棘           | Rosaceae    | Jiu bei liang  | Shrub | F, Ws           | Fruit; eaten raw or soaking in wine            | 8–11              | Ornamental, fruits and leaves used as medicine for gynecopathy and blister ulcer |                | Wild             | 77  | 0.306 | 33.78  | LFE30009       |
| <i>Pyracantha loureirae</i> (Kostel.) Merr                           | 全缘火棘         | Rosaceae    | Jiu bei liang  | Shrub | F, Ws           | Fruit; eaten raw or soaking in wine            | 9–11              | Ornamental, fruits and leaves used as medicine for gynecopathy and blister ulcer |                | Wild             | 15  | 0.060 | 6.58   | LFE40307       |
| <i>Rosa laevigata</i> Michx                                          | 金樱子          | Rosaceae    | Tang guan guan | Shrub | F, Ws           | Fruit; eaten raw or soaking in wine            | 7–11              | Ornamental                                                                       |                | Wild             | 161 | 0.639 | 684.65 | LFE40165       |
| <i>Rosa multiflora</i> var. <i>cathayensis</i> Rehder and E.H.Wilson | 粉团蔷薇         | Rosaceae    | Be ci tai      | Shrub | V               | Tender stem; eaten raw                         | 3–4               | Ornamental                                                                       |                | Wild             | 28  | 0.111 | 3.98   | LFE40191       |
| <i>Rosa roxburghii</i> f. <i>normalis</i> Rehder and E.H.Wilson      | 单瓣缙丝花        | Rosaceae    | Ci guo guo     | Shrub | F, Ws           | Fruit; eaten raw or soaking in wine            | 8–10              | Fruits used as medicine for gynecopathy                                          |                | Wild             | 154 | 0.611 | 654.89 | LFE40347       |

Table 2 (continued)

| Scientific name                        | Chinese name | Family name | Local name     | Habit | Food categories | Edible part and consumption mode | Collection months | Multiple uses                                                         | Medicinal food | Habitat | FC  | RFC   | CFSI  | Voucher number |
|----------------------------------------|--------------|-------------|----------------|-------|-----------------|----------------------------------|-------------------|-----------------------------------------------------------------------|----------------|---------|-----|-------|-------|----------------|
| <i>Rosa rubus</i> H.Lév. and Vaniot    | 悬钩子蔷薇        | Rosaceae    | Hong ci tai    | Shrub | V               | Tender stem; eaten raw           | 3–4               | Ornamental                                                            |                | Wild    | 47  | 0.187 | 7.71  | LFE40023       |
| <i>Rubus amphidasy</i> Focke           | 周毛悬钩子        | Rosaceae    | Lao fu pao     | Shrub | F               | Fruit; eaten raw                 | 7–8               | Tender stems and leaves used as medicine for gynecopathy and diarrhea |                | Wild    | 11  | 0.044 | 4.95  | LFE40067       |
| <i>Rubus biflorus</i> Buch.-Ham. ex Sm | 粉枝莓          | Rosaceae    | Huang long pao | Shrub | F               | Fruit; eaten raw                 | 5–7               | Tender stems and leaves used as medicine for diarrhea                 |                | Wild    | 2   | 0.008 | 0.20  | LFE40069       |
| <i>Rubus chroosepalus</i> Focke        | 毛萼莓          | Rosaceae    | Gai wan pao    | Shrub | F               | Fruit; eaten raw                 | 7–8               | Tender stems and leaves used as medicine for diarrhea                 |                | Wild    | 11  | 0.044 | 1.07  | LFE40355       |
| <i>Rubus corchorifolius</i> L.f        | 山莓           | Rosaceae    | San yue pao    | Shrub | F               | Fruit; eaten raw                 | 4–5               | Tender stems and leaves used as medicine for diarrhea                 |                | Wild    | 217 | 0.861 | 260.4 | LFE40058       |
| <i>Rubus coreanus</i> Miq              | 插田蕨          | Rosaceae    | Be ci pao      | Shrub | F               | Fruit; eaten raw                 | 6–7               | Tender stems and leaves used as medicine for diarrhea                 |                | Wild    | 69  | 0.274 | 62.1  | LFE40425       |
| <i>Rubus innominatus</i> S.Moore       | 白叶莓          | Rosaceae    | Da gu pao      | Shrub | F               | Fruit; eaten raw                 | 7–8               | Tender stems and leaves used as medicine for diarrhea                 |                | Wild    | 48  | 0.190 | 43.2  | LFE40326       |
| <i>Rubus lambertianus</i> Ser          | 高粱蕨          | Rosaceae    | Suan pao       | Shrub | F               | Fruit; eaten raw                 | 9–11              | Tender stems and leaves used as medicine for diarrhea                 |                | Wild    | 42  | 0.167 | 37.8  | LFE30048       |

Table 2 (continued)

| Scientific name                              | Chinese name | Family name     | Local name    | Habit | Food categories | Edible part and consumption mode                   | Collection months | Multiple uses                                                                  | Medicinal food | Habitat          | FC  | RFC   | CFSI   | Voucher number |
|----------------------------------------------|--------------|-----------------|---------------|-------|-----------------|----------------------------------------------------|-------------------|--------------------------------------------------------------------------------|----------------|------------------|-----|-------|--------|----------------|
| <i>Rubus parkeri</i> Hance                   | 乌藤子          | Rosaceae        | Wu pao        | Shrub | F               | Fruit; eaten raw                                   | 7–8               | Tender stems and leaves used as medicine for diarrhea                          |                | Wild             | 13  | 0.052 | 1.46   | LFE30005       |
| <i>Rubus parvifolius</i> L.                  | 茅莓           | Rosaceae        | Hao yang pao  | Shrub | F               | Fruit; eaten raw                                   | 6–7               | Tender stems and leaves used as medicine for diarrhea                          |                | Wild             | 67  | 0.266 | 45.73  | LFE40356       |
| <i>Rubus rosifolius</i> Sm                   | 空心藤          | Rosaceae        | Kong tong pao | Shrub | F               | Fruit; eaten raw                                   | 4–5               | Tender stems and leaves used as medicine for diarrhea                          |                | Wild             | 124 | 0.492 | 130.2  | LFE30018       |
| <i>Rubus setchuenensis</i> Bureau and Franch | 川莓           | Rosaceae        | Wu pao        | Shrub | F               | Fruit; eaten raw                                   | 10–12             | Tender stems and leaves used as medicine for knife wound, dye the fabric black |                | Wild             | 83  | 0.329 | 89.64  | LFE30006       |
| <i>Rubus wallichianus</i> Wight and Aitn     | 红毛悬钩子        | Rosaceae        | Hou zi pao    | Shrub | F               | Fruit; eaten raw                                   | 5–6               | Tender stems and leaves used as medicine for diarrhea                          |                | Wild, cultivated | 31  | 0.123 | 4.36   | LFE40392       |
| <i>Zanthoxylum armatum</i> DC                | 竹叶花椒         | Rutaceae        | Ye hua jiao   | Shrub | S               | Fruit; spices                                      | 9–12              |                                                                                |                | Wild, cultivated | 52  | 0.206 | 175.5  | LFE40427       |
| <i>Zanthoxylum bungeanum</i> Maxim           | 花椒           | Rutaceae        | Hua jiao      | Tree  | S               | Fruit; spices<br>Tender leaf; stir-fried or boiled | 6–9               |                                                                                |                | Wild, cultivated | 77  | 0.306 | 623.7  | LFE40428       |
| <i>Zanthoxylum dimorphophyllum</i> Hemsl     | 异叶花椒         | Rutaceae        | Hu jiao ci    | Shrub | S               | Fruit; spices                                      | 9–11              |                                                                                |                | Wild             | 5   | 0.020 | 1.13   | LFE30004       |
| <i>Houttuynia cordata</i> Thunb              | 蕺菜           | Saururaceae     | Ze er gen     | Herb  | V               | Rhizome; cold and dressed with sauce               | 2–4               | Whole plants used as medicine for cold                                         | Yes            | Wild, cultivated | 205 | 0.813 | 4612.5 | LFE40039       |
| <i>Illicium henryi</i> Diels                 | 红茴香          | Schisan-draceae | Ba guo xiang  | Shrub | S               | Fruit; spices                                      | 8–10              |                                                                                |                | Wild, cultivated | 22  | 0.087 | 11.14  | LFE40095       |

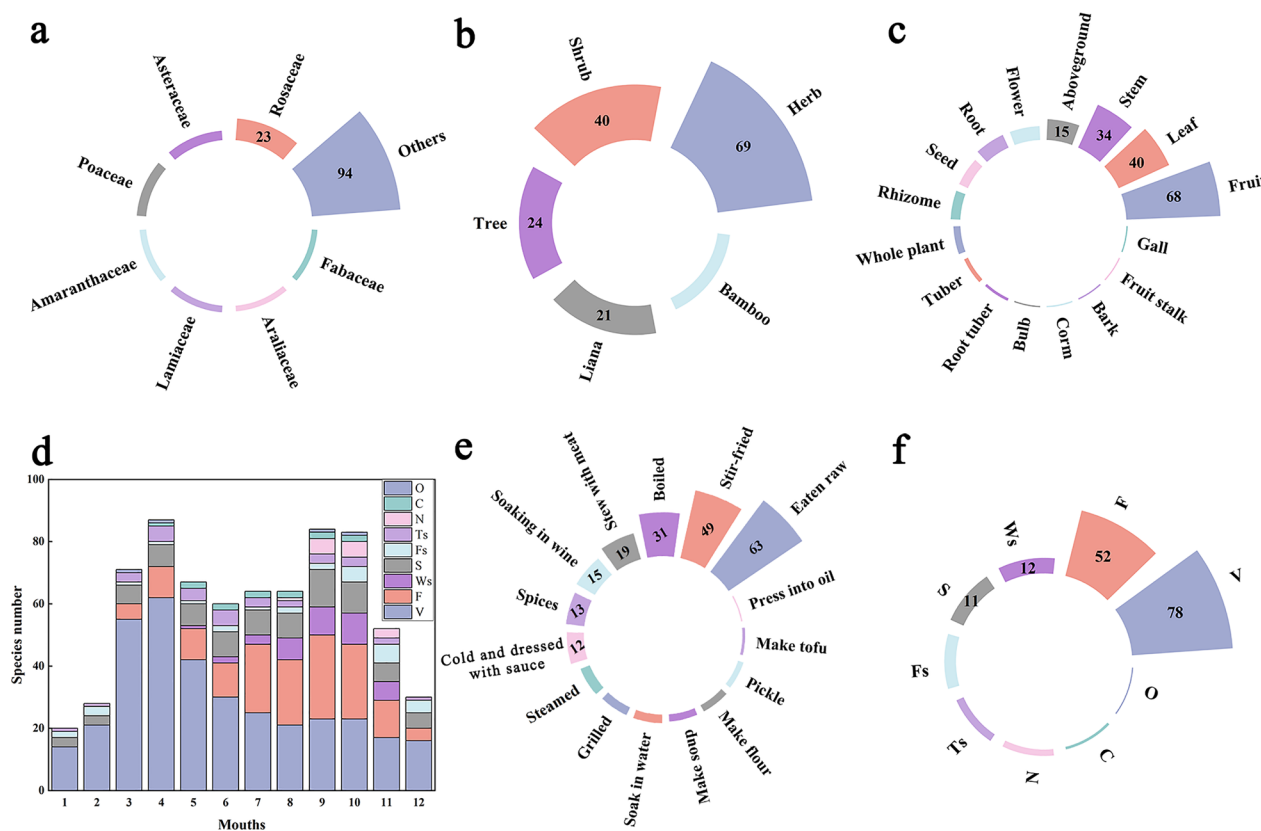
Table 2 (continued)

| Scientific name                                      | Chinese name | Family name    | Local name    | Habit | Food categories | Edible part and consumption mode                         | Collection months | Multiple uses                                                     | Medicinal food | Habitat          | FC  | RFC   | CFSI   | Voucher number |
|------------------------------------------------------|--------------|----------------|---------------|-------|-----------------|----------------------------------------------------------|-------------------|-------------------------------------------------------------------|----------------|------------------|-----|-------|--------|----------------|
| <i>Kadsura longipedunculata</i> Finet and Gagnep     | 南五味子         | Schisandraceae | Fan tuo zi    | Liana | F               | Fruit; eaten raw                                         | 9–12              |                                                                   |                | Wild             | 4   | 0.016 | 0.45   | LFE40389       |
| <i>Schisandra henryi</i> C.B.Clarke                  | 翼梗五味子        | Schisandraceae | Cen tuo       | Liana | F               | Fruit; eaten raw                                         | 7–9               | Whole plants used as medicine for rheumatism and gastrostia       |                | Wild             | 55  | 0.218 | 14.85  | LFE40369       |
| <i>Schisandra sphenanthera</i> Rehder and E.H.Wilson | 华中五味子        | Schisandraceae | Xue cen tuo   | Liana | F               | Fruit; eaten raw                                         | 7–9               | Whole plants used as medicine for rheumatism and gastrostia       |                | Wild             | 26  | 0.103 | 7.61   | LFE40373       |
| <i>Smilax china</i> L.                               | 菝葜           | Smilacaceae    | Jin gang teng | Shrub | F, V            | Fruit; eaten raw<br>Tender stem and leaf; stir-fried     | 3–5, 9–11         | Roots used as medicine for traumatic injury                       |                | Wild             | 11  | 0.044 | 23.82  | LFE40224       |
| <i>Smilax glabra</i> Roxb                            | 土茯苓          | Smilacaceae    | Jin gang teng | Shrub | Fs              | Rhizome; make flour or stew with meat or soaking in wine | 8–12              | Roots used as medicine for gastrostia                             | Yes            | Wild             | 6   | 0.024 | 4.39   | LFE40419       |
| <i>Lycium chinense</i> Mill                          | 枸杞           | Solanaceae     | Gou ji        | Shrub | Ws              | Fruit; soaking in wine                                   | 8–11              | Ornamental                                                        |                | Wild, cultivated | 4   | 0.016 | 4.68   | LFE40348       |
| <i>Talinum paniculatum</i> (Jacq.) Gaertn            | 土人参          | Talinaceae     | Yang sen      | Herb  | V               | Root; stew with meat<br>Leaf; stir-fried or boiled       | 1–12              | Ornamental, medicine                                              | Yes            | Wild, cultivated | 9   | 0.036 | 7.02   | LFE40403       |
| <i>Camellia oleifera</i> C.Abel                      | 油茶           | Theaceae       | You ca        | Shrub | O, F            | Seed; press into oil<br>Gall; eaten raw                  | 3–4, 9–10         | Ornamental, Stem barks used as medicine for knife wound, firewood |                | Wild, cultivated | 111 | 0.440 | 124.88 | LFE40110       |
| <i>Debregeasia orientalis</i> C.J.Chen               | 水麻           | Urticaceae     | Sui ma        | Shrub | F               | Fruit; eaten raw                                         | 5–7               | Leaves used as medicine for burns and scalds                      |                | Wild             | 24  | 0.095 | 13.86  | LFE30045       |

Table 2 (continued)

| Scientific name                                               | Chinese name | Family name          | Local name   | Habit | Food categories | Edible part and consumption mode                          | Collection months | Multiple uses                                                             | Medicinal food | Habitat          | FC | RFC   | CFSI  | Voucher number |
|---------------------------------------------------------------|--------------|----------------------|--------------|-------|-----------------|-----------------------------------------------------------|-------------------|---------------------------------------------------------------------------|----------------|------------------|----|-------|-------|----------------|
| <i>Laportea bulbifera</i> (Siebold and Zucc.) Wedd            | 珠芽艾麻         | <i>Urticaceae</i>    | Hong huo ma  | Herb  | V               | Tender leaf; boiled or stew with meat                     | 6–7               | Roots used as medicine for rheumatism, traumatic injury and blister ulcer | Yes            | Wild, cultivated | 6  | 0.024 | 7.8   | LFE40406       |
| <i>Urtica fissa</i> E.Pritz                                   | 荨麻           | <i>Urticaceae</i>    | Be huo ma    | Herb  | V               | Tender leaf; boiled or stew with meat                     | 6–7               | Roots used as medicine for rheumatism, traumatic injury and blister ulcer | Yes            | Wild, cultivated | 7  | 0.028 | 18.2  | LFE30046       |
| <i>Viburnum</i> sp.                                           | 荚蒾属          | <i>Viburnaceae</i>   | Ruan huan zi | Shrub | F               | Fruit; eaten raw                                          | 8–9               | Ornamental                                                                |                | Wild             | 10 | 0.040 | 0.98  | LFE40210       |
| <i>Viola philippica</i> Cav                                   | 紫花地丁         | <i>Violaceae</i>     | Hua kou jian | Herb  | V               | Aboveground; stir-fried or boiled                         | 3–5               | Whole plants used as medicine for knife wound                             |                | Wild             | 1  | 0.004 | 3.12  | LFE40132       |
| <i>Nekemias grossedentata</i> (Hand.-Mazz.) J.Wen and Z.L.Nie | 大齿牛果藤        | <i>Vitaceae</i>      | Teng ca      | Liana | Ts              | Tender stem and leaf; soak in water                       | 3–6               |                                                                           |                | Wild, cultivated | 45 | 0.179 | 324   | LFE40047       |
| <i>Vitis davidii</i> (Rom. Caill.) Foëx                       | 刺葡萄          | <i>Vitaceae</i>      | Ye pu tao    | Liana | F               | Fruit; eaten raw                                          | 7–10              |                                                                           |                | Wild             | 15 | 0.060 | 1.69  | LFE40378       |
| <i>Vitis flexuosa</i> Thunb                                   | 葛藤葡萄         | <i>Vitaceae</i>      | Sui pu tao   | Liana | F               | Fruit; eaten raw                                          | 7–11              |                                                                           |                | Wild             | 45 | 0.179 | 6.33  | LFE40423       |
| <i>Vitis heyneana</i> Schult                                  | 毛葡萄          | <i>Vitaceae</i>      | Ye pu tao    | Liana | F               | Fruit; eaten raw                                          | 7–10              |                                                                           |                | Wild             | 32 | 0.127 | 3.6   | LFE40396       |
| <i>Hedychium coronarium</i> J.Koenig                          | 姜花           | <i>Zingiberaceae</i> | Cao guo      | Herb  | S               | Fruit; spices<br>Flower; make soup<br>Rhizome; stir-fried | 4–12              | Ornamental, roots used as medicine for headache                           | Yes            | Wild, cultivated | 6  | 0.024 | 38.27 | LFE40285       |
| <i>Zingiber striolatum</i> Diels                              | 阳荷           | <i>Zingiberaceae</i> | Yang huo     | Herb  | V               | Flower; stir-fried or cold and dressed with sauce         | 7–9               | Ornamental, medicine                                                      |                | Wild, cultivated | 17 | 0.067 | 30.98 | LFE30023       |

Food categories: V vegetables; F fruits; Ws wine-soaking plants; S spices; Fs food substitutes; Ts tea substitutes; N nuts; C coagulants; O oil



**Fig. 2** Diversity of wild edible plants used by the Tujia ethnic group in Laifeng. **a** Family distribution; **b** habit distribution; **c** edible parts distribution; **d** collection months; **e** consumption mode distribution; **f** food category distribution

While the collection months may vary for different categories of WEPs, they are generally concentrated from March to October (Fig. 2d). The Tujia ethnic group in Laifeng prefer to collect tender stems and leaves of wild plants as vegetables for consumption, predominantly gathering wild vegetables from March to May in spring. Wild fruits and nuts have more variety, with the greatest collection occurring in summer and autumn from July to October, during which mature fruits and seeds are more abundant.

Owing to the diversity WEPs and dietary habits, various consumption modes are employed. There are 15 consumption modes for WEPs, including being eaten raw, stir-fried, boiled, stewing with meat, soaking in wine, used as spices, and cold and dressed with sauce, etc. Eaten raw is the most common method, with a total of 63 species, accounting for 38.7%, followed by stir-fried (49) and boiled (31) (Fig. 2e).

### Classification of wild edible plants

Based on the diverse purpose of consumption, the WEPs can be categorized into 9 distinct groups: vegetables, fruits, wine-soaking plants, spices, food substitutes, tea substitutes, nuts, coagulants, and oil. Among these, wild vegetables (78) and wild fruits (52) constitute the majority, accounting for 79.8% of the total species (Fig. 2f). This is followed by wine-soaking plants (12) and spices (11), as along with food substitutes (9), tea substitutes (6), nuts (5), and coagulants (2). Oil use is the least category, with only 1 species.

### Wild vegetables

A total of 78 types of wild vegetables are traditionally utilized by the Tujia ethnic group in Laifeng, primarily consisting of leaves, stems, and aboveground parts. These are principally processed using methods such as stir-frying, boiling, and stewing with meat. The most frequently mentioned ones are *Allium macrostemon*, *Houttuynia cordata*, *Pseudognaphalium affine*, and *Artemisia indica*.

*A macrostemon* is a wild vegetable universally consumed by households of the Tujia ethnic group in Laifeng. It is typically served as a cold or pickled vegetable and can also be employed as a spice (Fig. 3a, b). *A macrostemon* is widely distributed in Laifeng County and is also cultivated in some Tujia courtyards as a supplement to *Allium fistulosum*, which is the principal spice. According to the Tujia ethnic group in Laifeng, *A macrostemon* possesses a more potent aroma and certain medicinal properties, rendering it beneficial as a vegetable and spice.

*Houttuynia cordata* is a medicinal and edible plant deeply cherished by the Tujia ethnic group in Laifeng. Every spring, as the temperature rises and new leaves sprout from the roots of *H cordata*, it is an optimal time to consume its tender roots and stems. Contrarily to the practice in Yunnan and Guizhou where the entire *H cordata* is consumed, the Tujia ethnic group in Laifeng restrict their consumption to the tender roots and stems, served cold and dressed with sauce. The above ground

parts are more commonly utilized as herbal medicine to treat colds. In the local market town of Laifeng in spring, it is common to see vendors selling washed or pickled *H cordata* roots (Fig. 3c).

*Pseudognaphalium affine* and *Artemisia indica* are frequently used by the Tujia ethnic group in Laifeng to prepare glutinous rice cakes (Fig. 3d–f). In March and April, the Tujia ethnic group in Laifeng gathers the tender stems and leaves of *P affine* and *A indica*, processes them to removes their bitterness through hammering, kneading, and washing, and then mixes them with glutinous rice flour to produce cakes. These cakes are filled with ingredients such as bacon, *Allium macrostemon*, *Allium sativum*, dried tofu, and peppers, and are covered with leaves of *Citrus sinensis*. Cakes sold in the market town are typically made by combining *P affine* and *A indica*. Using only *P affine* results in softer cakes that are less easy to shape, while using *A indica* alone gives the cakes a darker color. The perfect blend of *P affine* and *A indica* results



**Fig. 3** WEPs used as vegetables. **a** *Allium macrostemon* being dried; **b** *Allium macrostemon* and *Pteridium revolutum* being sold; **c** *Houttuynia cordata*; **d** *Artemisia indica*; **e** *Pseudognaphalium affine*; **f** Make *Artemisia indica* and *Pseudognaphalium affine* cakes; **g** *Artemisia lancea*; **h** she Fan; **i** process *Artemisia lancea*

in cakes with a harmonious balance of color, aroma, and taste. Apart from *P affine* and *A indica*, *Artemisia lancea*, also known as “bitter Artemisia” by locals, is often used to prepare Shefan, a meal made by steaming a mixture of *A lancea* and glutinous rice (Fig. 3g–i).

#### Wild fruits

A total of 52 wild fruits are utilized for consumption by the Tujia ethnic group in Laifeng, typically eaten raw or employed for fruit wine production. The most popular ones include *Hovenia acerba*, *Rosa laevigata*, and *Rosa roxburghii* f. *normalis*. *H acerba* is consumed in the form of mature fruit stalks. In addition to eat it raw, the Tujia ethnic group in Laifeng also soaks it in wine, positing that the *H acerba* wine can alleviate weakness and cramps in the hands and feet (Fig. 4a). Studies have indicated that the extract from the stem of *H acerba* possesses robust antioxidant activity [45].

*Rosa laevigata* and *Rosa roxburghii* f. *normalis* are colloquially referred to as “sugar jars” and “prickly fruit,”

respectively. They are both shrubs of the *Rosaceae* family and can also be soaked in wine for consumption apart from being eaten raw (Fig. 4b–e). These two WEPs typically flourish near rivers and ditches. However, their populations have largely diminished due to the construction of production and living infrastructure, as well as resent environmental damage.

Further, *Rubus* sp. are also cherished wild fruits of the Tujia ethnic group in Laifeng. *Rubus corchorifolius*, *R rosifolius*, *R coreanus*, and *R setchuenensis* are frequently mentioned and highly favored for their taste (Fig. 4f–h). In the case of *Camellia oleifera*, galls derived from its fruits and leaves are consumed. During periods of food scarcity, these are also stir-fried to alleviate hunger (Fig. 4i).

#### Spices

Spice plants, encompassing a total of 11 wild species, feature prominently in the diet of the Tujia ethnic group in Laifeng. The Tujia ethnic group in Laifeng favors the



**Fig. 4** WEPs used as fruits. **a** *Hovenia acerba* wine; **b** *Rosa laevigata* wine; **c** *Rosa roxburghii* f. *normalis* wine; **d** *Rosa laevigata*; **e** *Rosa roxburghii* f. *normalis*; **f** *Rubus corchorifolius*; **g** *Rubus coreanus*; **h** *Rubus setchuenensis*; **i** galls on *Camellia oleifera*

consumption of the unripe, tender fruits of *Litsea mollis*, harvested from May to July. Following harvesting, it is immersed in oil and vinegar and consumed as a spice (Fig. 5a–b). Certain varieties of spices are cultivated in homegardens for convenient harvesting and use. The leaves of *Perilla frutescens* and *Perilla frutescens* var. *crispa* are frequently used to cook fish to eliminate the fishy smell (Fig. 5c). The leaves of *Acorus gramineus* are employed for stewing meat to enhance its aroma (Fig. 5d). The fruits of *Hedychium coronarium* are used for stewing chicken, the flowers are used for crafting oil tea soup, and the rhizomes are stir-fried. *Heptapleurum delavayi*, colloquially termed “fermented soybean leaf,” is favored by housewives, but is not directly utilized as a spice (Fig. 5e). Rather, it serves as a bedding to augment the aroma of fermented soybean during its production.

#### Food substitutes and tea substitutes

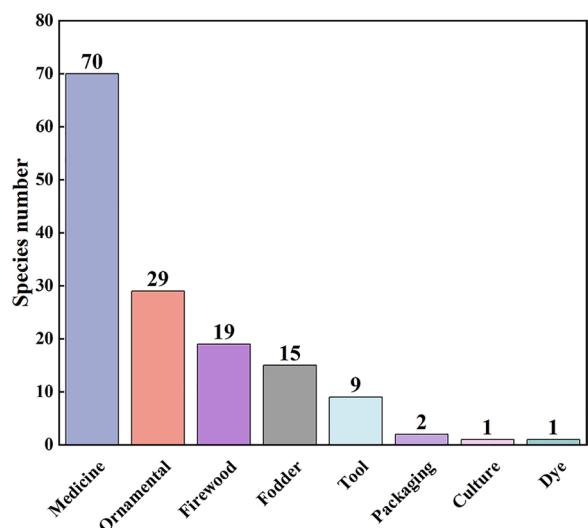
A total of 9 plant species serve as food substitutes, with *Amorphophallus konjac* and *Pteridium revolutum*

being particularly favored by the Tujia ethnic group in Laifeng. *A konjac* tofu, made from tubers, and *P revolutum* cake, derived from rhizomes, are commonly witnessed in the market town. Nevertheless, the powder production yield for both these plants is relatively low. Informants report that only approximately 3 kg of *P revolutum* cake can be produced from 50 kg of its rhizomes (Fig. 5f–g).

Six types of tea substitutes exist, among which *Nekemia grossedentata*, colloquially referred to as “vine tea,” has emerged as a major industry in Laifeng County, exhibiting robust growth (Fig. 5h–i). The Tujia ethnic group of Laifeng harvests the tender stems and leaves of wild *N grossedentata* in early spring, producing vine tea through the process of kneading, frying, and drying. Studies have indicated that tea brewed from *N grossedentata* is rich in diverse flavonoids, exhibiting antibacterial and anti-inflammatory properties [46].



**Fig. 5** WEPs used as spices, food substitutes and tea substitute. **a** *Litsea mollis*; **b** *Litsea mollis* oil; **c** *Perilla frutescens*; **d** *Acorus gramineus*; **e** *Heptapleurum delavayi*; **f** *Amorphophallus konjac* cakes; **g** *Pteridium revolutum* cake; **h** *Nekemia grossedentata*; **i** *Nekemia grossedentata* tea



**Fig. 6** Multiple uses of wild edible plants used by the Tujia ethnic group in Laifeng

**Multiple uses of wild edible plants**

The 124 species (76.5%) of WEPs traditionally used by the Tujia ethnic group in Laifeng hold not only edible value, but also serve multiple uses such as medicinal, ornamental, material, and fodder (Fig. 6). Of these, 70 species are primarily used for their medicinal purposes. For example, *Polygonum sibiricum* (Fig. 7a), *Eleutherococcus nodiflorus*, *Aralia echinocaulis*, and others are frequently mentioned as medicinal and edible plants for treating conditions like rheumatism, traumatic injury, and bone grafting. Moreover, 23 species are regarded as tonics by the Tujia people in Laifeng, including *Corallodiscus cordatus*, *Sceptridium ternatum*, and *Disporum longistylum*, often used in meat stews for their medicinal properties (Fig. 7b–d).

In addition, certain WEPs have also been introduced and planted as ornamental plants in the homegardens of the Tujia ethnic group in Laifeng due to their ornamental value, such as *Caragana sinica*, *Taxus wallichiana* var. *mairei*, *Rhododendron simsii*, and *Elaeagnus*



**Fig. 7** WEPs used for multiple uses. **a** *Polygonatum sibiricum*; **b** *Corallodiscus cordatus*; **c** *Sceptridium ternatum*; **d** *Disporum longistylum*; **e** *Caragana sinica*; **f** *Taxus wallichiana* var. *mairei*; **g** *Rhododendron simsii*; **h** *Phyllostachys edulis* pipe; **i** Zongzi wrapped in *Indocalamus tessellatus*



**Table 3** Jaccard similarity index for wild edible plants between Tujia ethnic group in Laifeng and other ethnic groups in different areas

| Nationality | Study area           | Indices |     |    | Jaccard | References |
|-------------|----------------------|---------|-----|----|---------|------------|
|             |                      | a       | b   | c  |         |            |
| Gelao       | Northern Guizhou     | 163     | 141 | 50 | 0.20    | [20]       |
| –           | Hunan Gaowangjie     | 163     | 48  | 33 | 0.19    | [47]       |
| Yao         | Jianghua County      | 163     | 130 | 43 | 0.17    | [48]       |
| Yi          | Liangshan Prefecture | 163     | 105 | 25 | 0.10    | [17]       |
| Zhuang      | Fangchenggang area   | 163     | 163 | 27 | 0.09    | [49]       |

**Discussion**  
**The traditional knowledge of WEPs of the Tujia ethnic group in Laifeng is an important component of their dietary culture**

The conventional utilization of WEPs is prevalent among local communities globally; however, the traditional knowledge of WEPs varies distinctly across different cultures [50]. The traditional knowledge concerning the use of WEPs by the Tujia ethnic group in Laifeng constitutes a significant component of their dietary culture, with the gathering and processing of WEPs serving as a tangible representation of their dietary practices.

The conventional utilization of WEPs by the Tujia ethnic group in Laifeng is extensive and varied. In total, 252 information reporters reported a total of 163 species of WEPs. In addition, different edible parts of 16 WEPs are processed into 9 different categories of food through 15 consumption modes. Simultaneously, the pre-consumption procedure of WEPs thoroughly epitomizes the traditional wisdom of the Tujia cuisine culture in Laifeng [51]. The locals are well aware of the plants that require processing prior to consumption to eliminate their toxicity or unsuitable parts, in an effort to avoid a bitter or astringent taste and make the food more palatable. For instance, for all bamboo types, the local people blanch and soak freshly gathered tender stems before consumption, followed by either stir-frying or pickling.

Through long-term production and lifestyle practices, the Tujia ethnic group in Laifeng has developed a multitude of unique dietary cultures and habits. Many of these dietary practices preserve traditional knowledge associated with the utilization of WEPs, including oil tea soup preparation, Hezha creation, and Shefan production. The Tujia people enjoy consuming oil tea soup. In some Tujia communities in Laifeng, oil tea soup is a traditional delicacy that is essential for every meal. Oil tea soup, a snack characterized by the qualities of both tea and soup, is initially fried in oil to emanate a fragrant aroma. Subsequently, it is boiled with water,

and spices such as *Allium sativum* and *Zingiber officinale* are added. After being removed from the pot, stir-fried rice and other ingredients are added, rendering it edible. When preparing oil tea soup, the Tujia ethnic group in Laifeng also adds flowers such as *Caragana sinica* and *Hedychium coronarium* as ingredients to enhance the aroma of the oil tea soup. Hezha, a soy product stewed with vegetables, constitutes a significant component of the Tujia ethnic group’s cuisine. When preparing Hezha, soybeans are ground into soybean milk, followed by adding water, boiling, integrating shredded vegetables, and boiling again [52]. Besides integrating cultivated vegetables, the Tujia ethnic group in Laifeng occasionally utilizes wild vegetables, such as *Aralia elata*, as shredded vegetables for Hezha preparation. The Tujia ethnic group in Laifeng observes a traditional festival, known as She Day, on the second day of the second lunar month. The preparation of Shefan symbolizes the social aspect of the Tujia population in Laifeng [53]. There are ingredients such as *Artemisia lancea*, glutinous rice, *Allium sativum*, *Allium macrostemon*, bacon, dried tofu, and others to steam Shefan. It is believed that consuming them and marking She Day stands for praying for a prosperous year.

It is worth mentioning that due to the mountainous area of Laifeng County, the Tujia ethnic group traditionally chooses high mountains to live in. Therefore, the Tujia ethnic group settlement area in Laifeng is fragmented into discrete units by the terrain, resulting in the regional characteristics of the traditional knowledge of WEPs of the Tujia ethnic group in Laifeng. For instance, exclusively the inhabitants of Lengshuixi Village in Dahe Town consider that the fruit of *Viburnum* sp. to be edible. Similarly, locales such as Green Water Town, Manshui Town, and Jiushi Town do not consume *Osmunda japonica*. Yet it is regarded as a valuable resource in areas such as Dahe Town, Geleche Town, and Baifusi Town. Overall, these variations in the usage of traditional knowledge of WEPs contribute to the diversity of culinary culture of the Tujia ethnic group in Laifeng.

Comparisons of Jaccard index with data from other areas and ethnic groups showed that areas with high *J*

values are geographically closer to our study area. Previous study has indicated that a high *JI* may reflect that the study area is located within the same geological belt, possessing similar socioeconomic and cultural characteristics [16]. Most of the areas compared are located in southwestern China, which may share similar dietary habits. Additionally, the distribution and composition of resources may also influence the lifestyle of local residents, potentially impacting the collection and consumption of WEPs [54]. Our results included 66 plant species that were not listed in other data sources, such as *Actinidia callosa* var. *henryi*, *Achyranthes longifolia*, *Codonopsis javanica* subsp. *japonica*, *Caragana sinica*, *Corallodiscus cordatulus*, and *Clerodendrum bungei*. This may be attributed to cultural differences.

#### WEPs of the Tujia ethnic group in Laifeng and their relationship with medicine and health

WEPs not only contribute to food diversity in local communities but also advocate health [55]. Even prior to the scientific substantiation of the nutritional, protective, and therapeutic effects of WEPs, their health and medicinal benefits were already recognized within local communities [56]. The interconnection between food and medicine is widespread globally, and many WEPs overlap with traditional treatment systems and cannot be separated [51, 57]. Our research indicates that 70 species of WEPs used by the Tujia ethnic group in Laifeng serve medicinal purposes. These types are commonly employed to treat injuries and ailments such as traumatic injury, rheumatism, gynecological diseases, and knife wounds, bearing similarities to the remedies used in the Tujia and Miao communities in the region of Xiangxi, adjacent to Laifeng County [28]. The Tujia ethnic group in Laifeng often utilizes these medicinally valuable WEPs to prepare medicinal wine for either external or internal use to attain medicinal effects. In addition, we have also investigated the medicinal plants utilized by the Tujia ethnic group in Laifeng, such as *Dyssma versipellis* and *Achilles millefolium*. These are widely used for treating diseases but are excluded from Table 2.

The homology of medicine and food can be traced back to the Zhou Dynasty in China, which refers to certain foods that not only fulfill basic nutritional needs but also possess medicinal properties similar to herbs, plants, or traditional medicines [49]. In Laifeng, there exists a robust tradition of using food for treatment. Of the 70 kinds of WEPs that can be used for medicine, 23 types are considered as homologous plants of medicine and food by the Tujia people in Laifeng, or as part of a tonic diet. These plants are typically used for stewing with meat, bones, and other foods, playing a role in tonifying deficiency, strengthening muscles and bones,

and enhancing eyesight. Stewing is the preferred method of consumption for its health benefits, a conclusion that aligns with research findings in other regions [49, 58].

It is worth mentioning that the potential toxicity of WEPs also needs to be taken seriously. Studies have shown that certain types of WEPs contain oxalates and other potentially toxic compounds, which often exert toxic effects on the human body [59, 60]. The fruit of *Illicium henryi* is documented in the *Flora of China* as highly toxic. However, during the investigation, it was found that the Tujia ethnic group in Laifeng use their fruits as spices, and their consumption knowledge deserves further research. In addition, further toxicology research on WEPs should be conducted to identify specific toxic components and ensure consumer safety.

#### Protection and utilization of WEPs of the Tujia ethnic group in Laifeng

The mastery of knowledge about WEPs by informants is significantly positively correlated with their age, implying that older informants possess more extensive knowledge [16]. With the development of the economy and society, the continuous trend of migrant workers has led to a high degree of hollowing out and aging within rural communities [61]. The majority of residents in the surveyed villages are elderly, with 68.7% of the respondents being over 60 years old. Similar to most local residents in the region, the traditional knowledge of using WEPs among the Tujia ethnic group in Laifeng is mainly transmitted orally [62]. However, the knowledge is fading away due to the aging of the informants, raising the possibility that no one will inherit it. Due to the improvement of living standards, an increasing number of local residents, especially the younger generation, opt to cultivate a single species or purchase food to fulfill their daily consumption needs, thereby presenting a challenge to the traditional utilization knowledge of WEPs. In addition, factors such as climate change, land use changes, and the impact of human activities on the environment pose a serious threat to the habitat of WEPs.

Concurrently, with the increasing emphasis placed on health preservation and dietary diversity by modern individuals, the opportunities for the development and utilization of WEPs have also increased. Through the application of modern food science methods to analyze the nutritional components, medicinal value, and functions of WEPs, the scientific validity of traditional knowledge of using WEPs is examined, thereby providing a foundation for their development and utilization. The nutritional, phytochemical, and pharmacological studies of some representative WEPs of the Tujia ethnic group in Laifeng have demonstrated the rationality of local people's use of WEPs and revealed their potential

development and utilization value. The fruits of *Elaeagnus* sp. are rich in nutrients such as VC, VB1, phosphorus, and calcium, making them very suitable for processing and making fruit juice, fruit wine, and other products [63]. The main nutritional components of *Castanea henryi* are starch, sugars, and being rich in protein, fat, fiber, vitamin C, and mineral elements [64]. The fruit of *Pyracantha fortuneana* is rich in various vitamins, amino acids, anthocyanins, polysaccharides, and flavonoids, which have good in vitro antioxidant, antibacterial, whitening, lipid-lowering, blood coagulation promoting, antiaging, anti-inflammatory, and other effects [65]. Indeed, some species of WEPs of the Tujia ethnic group in Laifeng have also been developed into healthy, ecological products, contributing to the local economy, such as *Nekemias grossedentata*, *Rosa roxburghii* f. *normalis*, and *Litsea mollis*. Combining the development of WEPs with local industries is a beneficial strategy to address the challenges of hollowing out local villages and aging populations [66].

Furthermore, the local homegarden management plays a protective role for WEPs, with the homegarden serving as an important gene pool for WEPs [54, 67]. In the survey, it was found that some WEPs were introduced and cultivated by the Tujia ethnic group in Laifeng from the wild in their own homegardens for ornamental, edible, and medicinal purposes, such as *Taxus wallichiana* var. *mairei*, *Caragana sinica*, and *Diurandthera major*. In addition, *Polygonatum sibiricum* is widely planted in the homegardens of the Tujia ethnic group in Laifeng due to its economic value. This practice, to some extent, protects the distribution and sustainable utilization of WEPs, while also making the homegardens of the Tujia ethnic group in Laifeng full of wildness and beautifying the living environment. Meanwhile, it is worth further studying how homegarden management affects WEPs in the future.

## Conclusion

The study conducted an ethnobotanical survey of WEPs across 26 villages in Laifeng, recording 163 species of WEPs from 64 families and 118 genera, along with corresponding traditional knowledge from the Tujia ethnic group in Laifeng. The traditional utilization of WEPs by the Tujia ethnic group in Laifeng is rich in knowledge, with local individuals displaying unique and rich insights into the collection, processing, and consumption of WEPs, which has become a part of the local food culture. WEPs play an important role in the vitality of the Tujia ethnic group in Laifeng, among which *Allium macrostemon*, *Houttuynia cordata*, *Hovenia dulcis*, *Forsythia suspensa*, and *Artemisia argyi* have high cultural importance. In the current social context characterized by changes in

production and lifestyle, as well as rural revitalization, the traditional knowledge of WEPs among the Tujia ethnic group in Laifeng can promote local biodiversity conservation, healthy ecological diets, and the development and sustainable utilization of these plant resources. Decision-makers should consider the value of WEPs and protect and develop traditional knowledge related to local and WEPs.

## Abbreviations

|      |                                  |
|------|----------------------------------|
| WEP  | Wild edible plant                |
| RFC  | Relative frequency of citation   |
| FC   | Frequency of citation            |
| CFSI | Cultural food significance index |
| QI   | Quotation frequency index        |
| AI   | Availability index               |
| FUI  | Frequency of utilization index   |
| PUI  | Parts used index                 |
| MFFI | Multifunctional food use index   |
| TSAI | Taste score appreciation index   |
| FMRI | Food-medicinal role index        |
| V    | Vegetables                       |
| F    | Fruits                           |
| Ws   | Wine-soaking plants              |
| S    | Spices                           |
| Fs   | Food substitutes                 |
| Ts   | Tea substitutes                  |
| N    | Nuts                             |
| C    | Coagulants                       |
| O    | Oil                              |

## Acknowledgements

We would like to thank all the respondents in the Laifeng Country for sharing their knowledge with us, especially those who helped us in the field survey.

## Author contributions

SWH planned and designed the study. SWH and PQH collected the data. SWH identified the plants. SWH interpreted and analyzed data and wrote the manuscript. SWH and ZY modified the manuscript. All authors read and approved the final version.

## Funding

This work has not received any funding support.

## Availability of data and materials

All data generated or analyzed during this study was included in this published article (along with the supplementary files).

## Declarations

### Ethics approval and consent to participate

Not applicable.

### Consent for publication

Not applicable.

### Competing interests

The authors declare that they have no competing interests.

Received: 25 July 2024 Accepted: 27 September 2024

Published: 7 October 2024

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