Herbal plants traded at the Kaili medicinal market, Guizhou, China

Sizhao Liu1,2,3†, Beixi Zhang1,2,3†, Jiangju Zhou4, Qiyi Lei4, Qiong Fang1,2,3, Edward J. Kennelly5 and Chunlin Long1,2,3,6*

Abstract

Background: Marketplaces reflect not only the commerce of an area, but also its culture. In Qiandongnan Miao and Dong Autonomous Prefecture with Kaili as its capital, Guizhou Province, China, traditional medicine is thriving in both rural and urban areas. The local people rely extensively on plants for traditional medicines, and these are commonly sold in local specialized markets. The Kaili medicinal market is the biggest in the prefecture. However, ethnobotanical study on herbal plants traded in the traditional market in Kaili has not been performed. The aims of this study are: (1) to document medicinal plants traded in the Kaili traditional market and the associated traditional knowledge; and (2) to analyze the level of agreement among vendors in the purported uses of medicinal plants by using informant consensus (FIC) and the fidelity level (FL).

Methods: Market surveys were conducted in 2014–2019 to collect information about medicinal plants and associated traditional knowledge. Information including vernacular names, preparation methods, and plant uses was obtained by interviewing 116 vendors of herbal plants. Specimens of fresh and dried herbs, collected as vouchers, were identified by the authors and other botanists at the Minzu University of China, and deposited in the herbarium at Minzu University of China. The level of agreement among information provided by different vendors was assessed using the FIC, and the percentage of vendors claiming the use of a certain medicinal plant for the same indication was assessed with the FL.

Results: The Miao people comprise 53.4% of all informants in this study of medicinal plants. In total, 237 medicinal plant species traded in the Kaili traditional market were recorded. They belong to 219 genera and 107 families. These plants have been categorized into their purported treatments for 20 medical conditions. The inflammation category showed the highest FIC value of 0.95, showing the best agreement among market vendors claiming its usefulness to treat this condition. The FL index helped to identify 15 culturally important medicinal plant species based on the reported uses by 20 or more vendors in the market. Three medicinal plant species, Eleutherococcus gracilistylus, Sargentodoxa cuneata, and Stephania cepharantha, had an FL > 90%, being used to treat sprains/traumas, rheumatism, and heat/toxins.

Conclusions: The medicinal plants sold in the Kaili market are highly diverse and have unique medicinal characteristics. The Miao people often use traditional herbal plants for disease prevention and thereby prioritize the use of medicinal plants in everyday life. The future of this medicinal marketplace, however, is uncertain since few young
Background

The use of plants for medical treatment and therapy is a practice as old as humanity, dating as far back as the oldest known written documents and found in nearly every known culture [1–3]. Approximately 80% of the world’s population currently use traditional herbal medicines [4–6], and a large number of ethnic medicinal plants are used as raw materials in the pharmaceutical industry. Therefore, millions of people rely on medicinal plants not only for primary health care but also for their livelihood. For example, according to the Guizhou provincial government, the market for Miao medicinal products has doubled in the last 5 years to over 20 billion RMB ($2.95 billion in USD), exceeding the total sum of the Tibetan, Uygur, and Mongolian medicines [7]. Therefore, traditional medicinal plants provide valuable information for the synthesis of new drugs and play an important role in modern society.

Traditional markets around the world are known for the trade of plants, minerals, and animals, and regional trade represents an important expression of culture [8–11]. And trade of these products also has been the backbone of the economy in many rural areas, most of which consist of wild harvested goods [12]. In recent years, some ethnobotanical research on traditional markets had been conducted in China, including those in Bijie [13], Jingxi [14], Yangchun [15], Gongcheng [16], Dechang [17], Jianghua [18, 19], Zhenfeng, and Xingren [20]. These studies have contributed to the understanding of plant diversity involved in the trade of medicinal plant species [21, 22].

The Qiandongnan Miao and Dong Autonomous Prefecture is an area with rich biological and cultural diversity in Guizhou Province, Southwest China. It is also well known for its unique karst topography with elevations from 137 to 2178 m above sea level and remarkable vertical climate stratification. There are more than ten ethnic groups native to Qiandongnan Prefecture, making it an ethnic minority group hot spot.

The Miao people live primarily in southern China’s mountainous areas, including Guizhou, Yunnan, Hunan, Guangxi, Chongqing, Sichuan, Hubei, Guangdong, and Hainan. The Qiandongnan Miao and Dong Autonomous Prefecture is the largest Miao community in China, with a population of about 1.86 million, accounting for about 42% of the prefecture’s population [23].

Herbal medicines are an integral part of Miao health and development. Medical clinics in Miao communities are relatively inaccessible and treatments are often costly. The Miao villages are normally surrounded by forests with many medicinal plants, and thus they often use locally sourced herbal medicines. Thus, the Miao people have developed their own traditional medicine with associated indigenous knowledge. In the past decades, some publications have documented Miao medicinal research achievements [24–26]. The Miao medicine is a highly regarded discipline in China and is becoming increasingly popularized in the country.

However, with the rapid development of the Miao medicinal industry, the traditional markets are rapidly decreasing because of the emerging e-trade systems in China and the growth of mini-supermarkets and shops throughout the countryside, but some Miao people in Kaili still keep the custom of trading medicinal plants. Every week, the Miao people who generally live more than 30 km far from urban areas bring medicinal plants to trade in the Kaili medicinal market. It is not easy to conserve the traditional medicinal knowledge maintained by a small population. Although this marketplace is large in scale, it has not been investigated ethnobotanically. It is therefore urgent to document these medicinal plants and the associated traditional knowledge of the Miao people. Research regarding traditional marketplaces can help producers, sellers, healers, and consumers develop an ongoing relationship through knowledge-based supply and demand of medicinal plants and their derivatives.

Therefore, our study focuses on this understudied medicinal marketplace, which reflects the diversity of medicinal plants in the prefecture. There are two primary aims of this study: (1) to record the current use of medicinal plants in Kaili market and associated traditional knowledge; and (2) to explore connections between medicinal plants and vendors using the method of informant consensus (FIC) and to determine the most frequently sold medicinal plant species using the method of fidelity level (FL). Through our study, we try to provide policymakers, researchers, and local people with the necessary information and data for the conservation and sustainable use of traditional Miao medicinal plants.
and associated traditional knowledge. Furthermore, this study may provide valuable information for future development and also give comprehensive and scientific guidance for local people to consume medicinal herbs more safely.

**Methods**

**Study site**

Kaili is the capital of the Qiandongnan Miao and Dong Autonomous Prefecture, located in southeast Guizhou (Fig. 1) at nearly 850 m above sea level. The population of Kaili is dominated by the Miao people who comprise about 63% of the total population. There are dozens of rivers in Kaili that flow into the Yuanjiang River, a branch of Yangtze. The sinkholes and underground caverns in the area are well developed because of its karst topography.

**Kaili medicinal market**

The Kaili medicinal market was founded about 200 years ago by local people, and the trade of medicinal plants was likely developed in conjunction with the sale of other necessities (Fig. 2). In 2016, with the assistance of the local government and urban planners, the market was moved to a new site and developed into a tourist attraction, thereby integrating traditional medicinal culture and economy.

The current market includes two subsectors: traditional medicinal plants and pharmaceutical/ready-to-use-drug markets. The former comprise raw or dried plants with little or no processing. The latter contain processed
medicinal plant products (Fig. 3). A variety of participants are involved in the sale of medicinal plants at Kaili traditional market, such as rural harvesters, small retailers, and licensed vendors (Table 1).

**Ethnobotanical surveys**
A total of 116 vendors (71 male and 45 female) selling medicinal plants in the market were interviewed, ranging in age from 20 to 87 years old, with a mean age of 65. To gather information about medicinal plants in the market, semi-structured interviews with vendors were conducted (Fig. 4). Information from vendors was recorded, including vernacular names of medicinal plants, medicinal uses, parts used, habitat of plants, and therapeutic prescriptions. Eighteen key informants were selected to interview who were either local healers or important custodians and practitioners with rich traditional knowledge of medicinal plants. All these local healers were males.

When interviewing vendors, samples of fresh herbs were purchased at the regular price from each medicinal market as voucher specimens. For the dry herbs sold in the market, we collected specimens from the field, with assistance from local people. Voucher specimens were prepared and deposited in the herbarium at the Minzu University of China in Beijing, China, for future reference. The botanical identities of voucher specimens were confirmed by the authors and other botanists at the Minzu University of China. Plant names were checked with *Flora of China* (http://flora.huh.harvard.edu/china/) and botanical Web sites including http://www.tropicos.org/ and http://www.theplantlist.org.

**Data analysis**
The data were summarized using Microsoft Office Excel and organized for statistical analysis. All of the local therapeutic uses of medicinal plants were grouped into 20 medical categories, which were based on the information gathered from the interviewees.

The FIC index was used to measure consensus among vendors regarding the therapeutic use of each medicinal plant [27–29]. The formula is listed as follows:

\[
\text{FIC} = \frac{(\text{Nur} - \text{Nt})}{(\text{Nur} - 1)}.
\]

Nur refers to the number of therapeutic use reports, grouped in a medical category, from market vendors for a particular medicinal plant, and Nt refers to the total number of medicinal plant species used in a particular medical category. The FIC values range between 0 and 1, where 1 indicates the highest level of market vendor consensus.

| Vendors           | Definition                                                                                                                                 |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Rural harvesters  | Individuals who come from the rural areas surrounding the Kaili, bringing fresh medicinal plants collected by themselves from natural habitats or home gardens. They have good knowledge of Miao medicine |
| Small retailers   | Individuals who occasionally go to Kaili to trade herbal plants to customers, bringing fresh medicinal plants collected by themselves or rural harvesters. They have common knowledge of Miao medicine |
| Licensed vendors  | Individuals who rent a stall in the market import medicinal plants from all over the country. They have poor knowledge of Miao medicine |

---

Fig. 3 New site of Kaili traditional medicinal market. Photo by S Liu, taken in July 2017

Fig. 4 Interviewing in the market. Photo by C Long
The FL index [30] indicates the percentage of vendors claiming the use of a certain medicinal plant for the same therapeutic use, which was grouped in a specific medical category [31–33]. The FL was calculated according to the following formula: FL (%) = (Ip × 100/Iu), where Ip is the number of market vendors who independently claim a therapeutic use of a medicinal plant species to treat a specific illness or disease and Iu is the total number of market vendors that sold the same medicinal plant to treat any given illness or disease.

Results

Demographic features of the vendors

A total of 116 medicinal plant vendors (71 male and 45 female) were interviewed at the market. Of these, 62 were Miao people (Table 2). The Miao ethnic people comprised 53.4% of the total interviewees, corresponding with ethnic composition of Qiandongnan Prefecture. The large number of vendors made this market an especially good place to conduct ethnobotanical surveys. We found 50 vendors, ranging in age from 31 to 90, with a median of 60 years old, and few vendors under 30 years old. Most of those younger vendors collect wild medicinal plants and sell them as a part-time activity, while the older generation do this full time. As for the gender structure of the vendors, the number of men and women older than 60 years old was almost the same, while for those under 60 years old, almost twice as many men as women in this group. Most vendors were small retailers, as Table 3 summarizes the number of all the vendors surveyed.

Miao medicinal plants traded at traditional market

We recorded 237 medicinal plant species traded at the Kaili traditional medicinal market, which were grouped into 219 genera and 107 families. The results provided the following information for each species: scientific name, Chinese name, local name, botanical family, plant part used, disease treated, route of administration, and use value (Table 4). The dominant plant family was Compositae with 23 species (9.6% of the total species), followed by 16 species of Rosaceae (6.7%), 10 species of Labiatae (4.2%), 9 species of Liliaceae (3.8%), while another 63 families were mostly represented by 1 species. Vendors in the marketplace sold different plant parts for the preparation of traditional drugs (e.g., leaves, roots, seeds, barks, and fruits). The whole plants were the most common plant material used, followed by roots. Life forms showed that herbaceous plants constituted the highest proportion with 144 species (60.8%), while there were 47 shrubs (19.8%), 25 trees (10.5%), and 21 lianas (8.9%). The majority of remedies could be prepared from either dried or fresh materials, and some were prepared only from fresh materials, while a few were prepared from dried materials.

Diseases treated by products from traditional markets

The marketplace and source locations of medicinal plants are in southwest China, with high humidity, moderate temperature, varied terrain, and abundant wild plant resources. The medicinal plants traded on the market were used to treat 83 human ailments. Traumatic injuries have been treated with 73 species of medicinal plants, followed by skin diseases (40 species), cough (36 species), rheumatism (34 species), digestion (25 species), and gynecological conditions (23 species). A large number of medicinal plants (96 species) are used for heat-clearing, a TCM disease category, and detoxifying.

All the local therapeutic uses of medicinal plants were grouped into 20 medical categories, and a FIC value was computed for each (Table 5). The FIC values ranged between 0.36 and 0.95 demonstrating high levels of consensus among the 116 vendors for multiple uses of 237 medicinal plant species sold. The inflammation category had the highest FIC value of 0.95, showing a high level of agreement among the 116 vendors for the 5 medicinal plant species sold to treat inflammation. This indicated that these plants were well known by the vendors, suggesting that they may have a significant effect on treating inflammatory diseases. Other diseases also had high

| Gender | Age-group | Linguistic group |
|--------|-----------|-----------------|
|        | 20–30 | 31–60 | 61–90 | Miao | Dong | Other |
| Female | 6 | 17 | 22 | 29 | 8 | 8 |
| Male   | 12 | 33 | 26 | 33 | 20 | 18 |
| Total  | 18 | 50 | 48 | 62 | 28 | 26 |

Table 2 Demographic profile of the vendors

| Vendor profile |
|----------------|
| Numbers |
| Rural harvesters | 30 |
| Small retailers | 49 |
| Licensed vendors | 37 |
| No. | Scientific name                          | Chinese name | Miao name | Family         | Using part | Preparation method | Use and value                                                                 | Voucher specimen number |
|-----|----------------------------------------|--------------|-----------|----------------|------------|-------------------|--------------------------------------------------------------------------------|------------------------|
| 1   | Abelmoschus manihot (L.) Medicus        | Huang shu kui | huangf suf | Malvaceae      | Seed, root, flower | Grinding, decoction; pound fresh part applied on the affected area | Promote diuresis; treat strangury; heat-clearing and detoxifying; the blood circulation hematischesis; set a fracture; promote tissue regeneration | KL-139                |
| 2   | Acalypha australis L                    | Tie xian cai  | det nix vud | Euphorbiaceae  | Whole plant   | Oral, boiled with meat and drunk the soup                          | Clearing heat and promoting diuresis; cooling blood remove pathogenic heat; disperse accumulations | KL-175                |
| 3   | Eleutherococcus nudi fibrus (Ruprecht & Maximo-wicz) Maximowicz | Ci wujia       | vob bal diangd | Araliaceae     | Bark         | Oral, boiled with meat and drunk the soup                          | Strong bones and muscles; expelling wind-damp                  | KL-053                |
| 4   | Achillea wilsoniana Heimerl ex Hand-Mazz | Yun nan shi   | vob hvid bil | Compositae     | Whole plant   | Oral, boiled with meat and drunk the soup                          | Dispelling wind and eliminating dampness; arnica extract; analgesia; detumescence | KL-233                |
| 5   | Achyranthes bidentata Blume             | Tu nixi       | jex sangxghut ngei niub | Amaranthaceae | Root, dried   | Oral and external, boiled with meat and drunk the soup or medicated bath | Promote diuresis; treat strangury; remove urinary calculus; clearing heat and detoxicating; promoting blood circulation to dispel blood stasis | KL-196                |
| 6   | Aconitum carmichaeli Debx              | Wu tou        | bod jab nangl hlieb | Ranunculacae | Tuber        | Grinding, decoction                                                | Dispelling wind and eliminating dampness; warming womb and channels; eliminating cold stop pain | KL-234                |
| 7   | Acorus tatarinowii Schott               | Shi chang pu  | jab box vib  | Araceae        | Rhizome      | Oral, grinding, decoction, medicinal liquor                      | Resolve phlegm; resolving dampness; decreasing swelling to relieving pain | KL-071                |
| 8   | Actinidia chinensis Planch              | Mi hou tao    | uab mongs dongf | Actinidiaceae | Fruit        | Oral                                                              | Dry mouth; dyspepsia; anticancer                               | KL-235                |
| 9   | Agrimonia pilosa Ldb                    | Long ya cao   | jab ghad jil gheib | Rosaceae     | Whole plant   | Grinding, decoction; boiled with water                            | Astringency and hemostasis; anti-diarrhea effect; insecticide   | KL-236                |
| No. | Scientific name                      | Chinese name       | Miao name               | Family       | Using part | Preparation method          | Use and value                                                                 | Voucher specimen number |
|-----|--------------------------------------|--------------------|------------------------|--------------|------------|-----------------------------|------------------------------------------------------------------------------|--------------------------|
| 10  | *Adenophora tetraphylla* (Thunb.) Fisch | Lun ye sha shen    | ngx gheib ghob         | Campanulaceae | Root       | Oral, grinding, decoction   | Nourishing yin and clearing away heat; moistening lung for removing phlegm; tonifying stomach and promoting fluid circulation          | KL-052                   |
| 11  | *Akebia trifoliata* (Thunb.) Koiz.    | San ye mu tong     | zend damgx gir         | Lardizabalaceae | Fruit      | Oral, boiled with water     | Soothing liver and harmonizing stomach; inflammatory swelling                  | KL-012                   |
| 12  | *Alangium chinense* (Lour.) Harms     | Ba jiao feng       | ghab jongx deus diek naob dub | Alangiaceae   | Root, leaf, stems | Oral and external, grinding and drink with wine | Wind-dampness eliminating; enhance the blood circulation; pain-killing effect | KL-174                   |
| 13  | *Aleuris spicata* (Thunb.) Franch     | Fen tiao er cai    | gad mangl vud           | Liliaceae     | Root, whole plant | Grinding, decoction         | Clearing heat; moistening lung for arresting cough; promoting blood circulation for regulating menstruation; insecticide     | KL-183                   |
| 14  | *Alyssum orientalis* (Sam.) Juzep     | Ze xie             | vob gend lix            | Alismataceae  | Tuber      | Taken orally soup           | Inducing diuresis and excreting dampness; purge heat; treating stranguria    | KL-137                   |
| 15  | *Amorphophallus konjac* C. Koch       | Mo yu              | jab nangb               | Araceae       | Tuber      | Oral, grinding, decoction, medicinal liquor | Toxic material and removing stasis; resolve phlegm; disperse accumulations; analgesia | KL-011                   |
| 16  | *Amphilopsis delavayana* Planch.     | San lie ye she pu tao | ghab jongx zend ghed dub | Vitaceae      | Root       | Pound fresh part applied on the affected area; medicinal liquor | Promoting blood circulation and removing obstruction in channels               | KL-138                   |
| 17  | *Anemone rivularis* Buch.-Ham.        | Hu zhang cao       | zend liul nangb dub    | Ranunculaceae | Whole plant | Pound fresh part applied on the affected area | Heat-clearing and detoxifying; promoting blood flow and tendon relaxation; decreasing swelling to relieving pain | KL-100                   |
| 18  | *Aralia chinensis* L                  | Song mu            | ghab jongx lin det vob himuk mol | Araliaceae   | Root       | Oral and external, medicinal liquor, pound fresh part applied on the affected area | Dispelling wind and eliminating dampness; inducing diuresis for removing edema; removing stasis to stop pain                  | KL-051                   |
| 19  | *Arctium lappa* L                    | Niu bang           | vob diangb dliek        | Compositae    | Fruit, root | Oral, boiled with meat and drunk the soup | Wind-heat; promoting eruption; detoxification                                  | KL-172                   |
## Table 4 (continued)

| No. | Scientific name                                      | Chinese name     | Miao name          | Family          | Using part                  | Preparation method                                                                 | Use and value                                                                 | Voucher specimen number |
|-----|-------------------------------------------------------|------------------|--------------------|-----------------|-----------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------|
| 20  | Ardisia bicolor Walker                               | Zi jin niu       | jab bib lik jib    | Myrsinaceae     | Whole plant, dried          | Taken orally soup; pound fresh part applied on the affected area                   | Eliminating phlegm and stopping cough; dampness; promoting blood circulation | KL-195                 |
| 21  | Ardisia crenata Sims                                  | Zhu sha gen      | jab bik lik jib    | Myrsinaceae     | Root                        | Grinding, decoction                                                              | Dispelling wind and eliminating dampness; heat-clearing and detoxifying; removing stasis; analgesia | KL-176                 |
| 22  | Arenaria serpyllifolia L                             | Zao zhui         | mongb ghait ned    | Caryophillaceae | Whole plant                 | Oral and external, gridding, decoction, medicinal liquor                           | Heat-clearing and detoxifying; improving eyesight; acute conjunctivitis; hordeolum sty; sore throat | KL-173                 |
| 23  | Arisaema erubescens (Wall.) Schott                   | Yi ba san nan xing | kuad bed vud       | Araceae         | Tuber                       | Oral, grinding, decoction                                                       | Drying damp and eliminating phlegm; expelling wind and relieving convulsion; detumescence | KL-171                 |
| 24  | Aristolochia debilis Sieb. et Zucc.                  | Ma dou ling      | jab mongb qub      | Aristolochiaceae | Fruit                       | Oral, grinding, decoction                                                       | Check dysentery; anti-diarrhea effect                                          | KL-111                 |
| 25  | Artemisia annua L                                    | Huang hua hao    | vob hvid vud       | Compositae      | Whole plant                 | Oral and external, pound fresh part applied on the affected area, boiled with water | Clearing summer-heat; preventing further attack of malaria                       | KL-050                 |
| 26  | Asarum wulingense C. F. Liang                        | Wu ling xi xin   | jab niux kab       | Aristolochiaceae | Whole plant                 | Oral, boiled with water, medicinal liquor                                      | Eliminating phlegm and stopping cough; decreasing swelling to relieving pain; dispel wind-cold | KL-072                 |
| 27  | Asparagus cochinchinesis (Lour.) Merr                 | Tian mendong     | zend jab ngol hvuk | Liliaceae       | Tuber                       | Grinding, decoction                                                            | Nourishing yin and falling fire; clearing lung heat and moistening dryness       | KL-177                 |
| 28  | Begonia grandis Dry. subsp. sinensis (A. DC.) Irmsch  | Zhong hua qiu hai tang | qub haix tangf    | Begoniaceae     | Tuber                       | Oral, grinding and drink with wine                                              | Promoting blood circulation for regulating menstruation; hemostasis; check dysentery; postoperative analgesia | KL-009                 |
| No. | Scientific name                        | Chinese name       | Miao name          | Family       | Using part | Preparation method | Use and value                                                                 | Voucher specimen number |
|-----|---------------------------------------|--------------------|--------------------|--------------|------------|--------------------|--------------------------------------------------------------------------------|------------------------|
| 29  | *Belamcanda chinensis* (L.) Redouté   | She gan            | Vob dak diang bad  | Iridaceae    | Tuber      | Oral               | Heat-clearing and detoxifying; removing phlegm; activating qi to resolve stagnation | KL-182                 |
| 30  | *Berberis juliana* Schneid             | Hao zhu ci         | nbox qeb zhent     | Berberidaceae| Root, stem, leaf | Oral and external, pound fresh part applied on the affected area, grinding, decoction | Pulmonary tuberculosis; mumps; adenolymphitis; laryngitis; leucorrhea; traumatic injury | KL-008                 |
| 31  | *Berchemia yunnanensis* Franch         | Yun nan gou er cha | det nis            | Rhamnaceae   | Bark       | Grinding, decoction | Heat-clearing and detoxifying; treating stranguria to remove dampness; promoting blood circulation and stopping pain; expelling wind and relieving a cough | KL-025                 |
| 32  | *Bidens pilosa* L                     | San ye gui zhen cao| nangx jub          | Compositae   | Whole plant | Oral and external, grinding, decoction, medicated bath | Clearing heat and detoxicating; invigorating spleen to remove dampness | KL-136                 |
| 33  | *Bletilla striata* (Thurb. ex Murray) Rchb. F | Bai ji            | wus jut            | Orchidaceae  | Tuber      | Grinding, decoction | Astringency and hemostasis; detumescence and promoting granulation;                | KL-135                 |
| 34  | *Blumea balsamifera* (L.) DC           | Ai na xiang        | diangx vob hvid    | Compositae   | Whole plant | Oral and external, boiled with meat and drunk the soup or medicated bath | Dispelling wind and eliminating dampness; detoxification; promoting blood circulation | KL-007                 |
| 35  | *Boehmeria nivea* (L.) Gaudich        | Zhu ma             | nos                | Urticaceae   | Whole plant | Grinding, decoction; taken orally soup; pound fresh part applied on the affected area | Blood cooling and arresting; detoxification; the diuresis detumescence; removing stasis | KL-024                 |
| 36  | *Broussonetia papyrifera* (L.) Vent    | Gou shu            | det xit hsenb      | Moraceae     | Fruit      | Grinding, decoction | Removing liver fire for improving eyesight; nourishing kidney nourishing yin; lactagogue; invigorating spleen for diuresis | KL-006                 |
**Table 4 (continued)**

| No. | Scientific name                | Chinese name | Miao name      | Family            | Using part                  | Preparation method               | Use and value                                                                 | Voucher specimen number |
|-----|--------------------------------|--------------|----------------|-------------------|-----------------------------|----------------------------------|--------------------------------------------------------------------------------|-------------------------|
| 37  | Buddleja davidii F1             | Da ye zu yu cao | nangx dos nail | Buddlejaceae      | Root, stems, leaf           | External, medicated bath         | Relieving rheumatism and cold; invigorating blood circulation and stopping pains | KL-168                  |
| 38  | Caesalpinia decapetala (Roth) Alston | Yun shi     | ghaob jongx bel jab fab | Leguminosae | Seed                        | Taken orally soup                | Remove coldness; Resolve phlegm to relieve cough; dispersing wind and eliminating dampness | KL-178                  |
| 39  | Callicarpa bodinieri Levil       | Zi zhu       | det ghab diod   | Verbenaceae       | Leaf                        | Grinding, decoction;            | Hemostasis; decreasing swelling to relieving pain; removing stasis             | KL-049                  |
| 40  | Camellia oleifera Abel          | You cha      | det jenl        | Theaceae          | Fruit                       | Grinding, decoction;            | Heat-clearing and detoxifying; Have a laxative effect, insecticide              | KL-184                  |
| 41  | Campanumoea javanica Bl. subsp. japonica (Makino) Hong | Jin qian bao | jab eb wof      | Campanulaceae     | Root                        | Oral, grinding, decoction        | Moistening lung; engender liquid; hemostasis; lactagogue                      | KL-197                  |
| 42  | Canna indica L                  | Mei ren jiao | bangx sent hfud | Cannaceae         | Tuber                       | Oral and external, pound       | Heat-clearing and detoxifying; diuresis; regulate the menstrual function; regulating menstruation | KL-181                  |
| 43  | Cardiospermum hali-cocobum L    | Dao di ling  | geb lieb nionsg dab | Sapindaceae       | Whole plant                 | Pound fresh part applied on the affected area | Clearing heat and promoting diuresis; cooling blood remove pathogenic heat    | KL-179                  |
| 44  | Carpesium cernuum L             | Yan guan tou cao | vob yenb      | Compositae        | Whole plant                 | Oral, grinding, decoction       | Heat-clearing and detoxifying; resolve phlegm; insecticide; hemostasis         | KL-005                  |
| 45  | Carthamus tinctorius L          | Hong hua     | bangx sok       | Compositae        | Flower, dried               | Oral, boiled with water         | Promoting blood circulation for regulating menstruation; removing stasis and relieving pain | KL-073                  |
| 46  | Chenopodium ambrosioides L      | Tu jing jie  | jab zangd dit   | Chenopodiaceae     | Whole plant                 | Oral and external, grinding, decoction, medicated bath | Dispelling wind and eliminating dampness; insecticidal; anti-itch; promoting blood circulation and stopping pain | KL-199                  |
| No. | Scientific name                                      | Chinese name | Miao name | Family               | Using part | Preparation method         | Use and value                                                                 | Voucher specimen number |
|-----|------------------------------------------------------|--------------|-----------|----------------------|------------|-----------------------------|-------------------------------------------------------------------------------|------------------------|
| 47  | *Chimonanthus praecox* (L.) Link                    | La mei       | ghab jongx ghab link det ghab dlub | Calycanthaceae | Root       | Oral, grinding, decoction   | Relieving rheumatism and cold stopping pains; detoxification                 | KL-198                 |
| 48  | *Chirita eburnea* Hance                             | Yan bai cai  | ghab naix liod             | Gesneriaceae     | Whole plant | Oral                         | Antitusive                                                                   | KL-185                 |
| 49  | *Chloranthus henryi* Hemsl                          | Kuan ye jin su lan | jab jex liux       | Chloranthaceae    | Root       | Oral, grinding, decoction   | Relaxing tendon and activation collaterals, heat-clearing and detoxifying; decreasing swelling to relieving pain; expelling wind | KL-200                 |
| 50  | *Cibotium barometz* (L.) J. Sm                      | Jin mao gou   | vob yuk jab hlieb         | Dicksoniaceae    | Tuber      | Oral, grinding, decoction   | Strengthen the lumbus and knees; expelling wind–damp                           | KL-180                 |
| 51  | *Cirsium japonicum* DC                              | Da ji         | vob bel bat hlied          | Compositae       | Root       | Oral and external, boiled with meat and drunk the soup or medicated bath | Blood cooling and anestising, detumescence; promoting blood flow               | KL-002                 |
| 52  | *Cirsium setosum* (Willd.) MB                       | Ci er cai     | vob bel bat niab           | Compositae       | Whole plant | Oral and external, boiled with meat and drunk the soup or medicated bath | Blood cooling and anestising, clearing heat for detumescence                   | KL-074                 |
| 53  | *Clerodendrum bungei* Steud                         | Chou mu dan   | vob hangt ghad             | Verbenaceae      | Stem, leaf | Grinding, decoction; boiled with meat and drunk the soup                 | Removing toxicity for detumescence; expelling wind–damp; decreasing blood pressure | KL-169                 |
| 54  | *Clinopodium chinense* (Benth.) O. Ktze             | Feng lun cai  | jab gangb xongx hlieb      | Labiatae         | Whole plant | Oral and external, pound fresh part applied on the affected area, boiled with water | Removing toxicity for detumescence; clearing heat; hemostasis                | KL-054                 |
| 55  | *Coix lacryma-jobi* L. var. mayuen* (Roman) Starf   | Yi yi         | zend ded                   | Gramineae        | Root       | Grinding, decoction          | Clearing heat and promoting diuresis; invigorates the spleen and promotes digestion; insecticide | KL-023                 |
| 56  | *Commelina communis* L                             | Ya tuo cao    | vob ghab linx              | Commelinaceae    | Overground plant     | Oral and external, pound fresh part applied on the affected area, boiled with water | Heat-clearing and detoxifying; inducing diuresis for removing edema KL-         | KL-075                 |
| 57  | *Coriandrum sativum* L                             | Yan sui       | ghab hlab ngangs caot      | Umbelliferae     | Aerial part | Taken orally soup; pound fresh part applied on the affected area         | Promoting eruption; analgesia; appetizer digestion and detoxification;        | KL-201                 |
| No. | Scientific name                  | Chinese name | Miao name  | Family            | Using part | Preparation method | Use and value                                                                 | Voucher specimen number |
|-----|---------------------------------|--------------|------------|------------------|------------|--------------------|--------------------------------------------------------------------------------|------------------------|
| 58  | *Coriaria nepalensis* Wall.     | Ma sang      | det wik    | Coriariaceae     | Root, leaf | External, medicinal liquor or medicated bath | Heat-clearing and detoxifying; detumescence; healing sore and relieving pain; insecticide | KL-170                 |
| 59  | *Cucubalus baccifer* L.         | Gou jin man  | naf roub zhên hmangb | Caryophyllaceae | Whole plant | Oral and external, grinding, decoction, medicated bath | Expelling wind; dispersing accumulations; promoting blood circulation; setting a fracture | KL-110                 |
| 60  | *Cucurbita moschata* (Duch. ex Lam.) Duch. ex Poiret | Nan gua       | ghab hniub fab diei | Cucurbitaceae | Seed       | Oral, grinding, decoction | Insecticide; lactagogue; inducing diuresis for removing edema | KL-001                 |
| 61  | *Cunninghamia lanceolata* (Lamb.) Hook | Sha mu        | ghab ot det jib | Taxodiaceae     | Bark       | Grinding, decoction; medicated bath | Eliminating dampness; detoxification; promoting blood circulation and stopping pain | KL-133                 |
| 62  | *Curculigo orchioides* Gaertn. | Xian mào      | jab hsod yut | Amaryllidaceae   | Tuber      | Oral, boiled with meat and drunk the soup | Invigorating kidney and nourishing essence; nourishing the liver to improve visual acuity; securing the fetus; anti-diarrhea effect | KL-134                 |
| 63  | *Cuscuta japonica* Choisy       | Jin dêng teng | ghab bas hlat Jongb | Convolvulaceae | Seed       | Oral, grinding, decoction | Clearing heat and promoting diuresis; clearing lung and eliminating phlegm; resolving blood stasis and hemostasis | KL-186                 |
| 64  | *Cyanotis vaga* (Lour.) Schultes, et J. H. Schultes | Lan er cao   | laif eex caox | Commelinaceae     | Whole plant | Oral and external, grinding, decoction, medicated bath | Expelling wind–damp; relaxing tendon and activation collaterals; diuretic effect | KL-202                 |
| 65  | *Cynanchum auriculatum* Royce ex Wight | Niupi xiao   | vob bex teb   | Asclepiadaceae   | Tuber      | Oral, boiled with water, medicinal liquor | Improve digestion; replenishing yin and blood; removing toxicity for detumescence | KL-033                 |
| 66  | *Cynoglossum amabile* Stapf et Drumm | Dao ti hu    | heb dângd ghod | Boraginaceae     | Whole plant | Oral, boiled with meat and drunk the soup | Clearing heat and promoting diuresis; clearing lung and eliminating phlegm; resolve blood stasis and hemostasis | KL-022                 |
| No. | Scientific name                | Chinese name   | Miao name          | Family          | Using part | Preparation method                      | Use and value                                                                                     | Voucher specimen number |
|-----|--------------------------------|----------------|--------------------|-----------------|------------|----------------------------------------|---------------------------------------------------------------------------------------------------|-------------------------|
| 67  | *Cyperus rotundus* L           | Suo cao         | nangx songs bat    | Cyperaceae      | Tuber      | Oral and external, pound fresh part applied on the affected area, boiled with water | Regulate the flow of vital energy and remove obstruction to it; regulates menstruation, stops pain; anti-abortion; successful gestation | KL-055                  |
| 68  | *Datura metel* L              | Bai hua man tuo luo | jab hmid gangb     | Solanaceae      | Flower     | Grinding, decoction; caution with poison | Antitussive; analgesia                                                                            | KL-076                  |
| 69  | *Decaisnea insignis* (Griffith) J. D. Hooker et Thomson | Mao er shi      | bef ghob ghad      | Lardizabalaceae | Root, fruit | Oral and external, pound fresh part applied on the affected area, boiled with water | Antitussive; expelling wind                                                                 | KL-021                  |
| 70  | *Dendrobium nobile* Lindl     | Jin chai shi hu | nangx ghab zat fangx | Orchidaceae    | Stem       | Grinding, decoction                     | Nourishing the stomach to improve the production of body fluid; nourishing Yin and clearing heat; tonifying the kidney and improving eyesight | KL-004                  |
| 71  | *Dichondra repens* Forst      | Ma ti jin       | reib minl zheit    | Convolvulaceae  | Whole plant | Oral and external, grinding, decoction, medicated bath | Heat-clearing and detoxifying; clearing heat and promoting diuresis                              | KL-109                  |
| 72  | *Dioscorea bulbifera* L       | Huang du        | zend git hsob      | Dioscoreaceae   | Tuber      | Oral, grinding, decoction               | Heat-clearing and detoxifying; blood cooling and arresting                                     | KL-003                  |
| 73  | *Diospyros kaki* Thunb        | Shi             | zend mil           | Ebenaceae       | Leaf       | Oral, boiled with water                 | Heat-clearing and detoxifying; moistening lung; deficiency of body fluids                       | KL-056                  |
| 74  | *Dipsacus asperoides* C.Y. Cheng et T.M. Ai | Chuan xu duan  | vob qangd niel     | Dipsacaceae    | Root       | Oral and external, pound fresh part applied on the affected area, boiled with water | Strong bones and muscles; nourishing liver and kidney; stanch flooding                           | KL-112                  |
| 75  | *Drynaria roosii* Nakaike     | Hu jue          | diangb liox zat    | Drynariaceae    | Tuber      | Oral, boiled with water                 | Strong bones and muscles promoting blood circulation and stopping pain;                         | KL-187                  |
| 76  | *Duchesnea indica* (Andr.) Focke | She mei         | bul yuk dax        | Rosaceae        | Whole plant | Boiled with water; pound fresh part applied on the affected area | Heat-clearing and detoxifying; blood cooling and arresting; antitussive;                        | KL-032                  |
| No. | Scientific name                      | Chinese name | Miao name       | Family           | Using part       | Preparation method                                      | Use and value                                                                                             | Voucher specimen number |
|-----|--------------------------------------|--------------|----------------|------------------|------------------|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-------------------------|
| 77  | *Dysosma versipellis* (Hance) M. Cheng ex Ying | Ba jiao lian | reib bax gax    | Berberidaceae    | Rhizome          | Oral and external, boiled with water, medicated bath    | Removing toxicity for detumescence; insecticide; expelling wind and reducing phlegm;                      | KL-203                  |
| 78  | *Elaeagnus henryi* Warb. Apud Diels      | Yi chang hu tu zi | dhab nex zend jek nangs | Elaeagnaceae | leaf              | Oral, boiled with water                                 | Clear the blood and the swelling away; set a fracture to stop pain; calm panting and suppress cough        | KL-108                  |
| 79  | *Emilia sonchifolia* (L.) DC       | Yi dian hong | vob nab yongd   | Compositae       | Whole plant      | External, medicinal liquor or medicated bath            | Diarrhea                                                                                                  | KL-013                  |
| 80  | *Epilobium hirsutum* L.            | Liu ye cai   | vob liax lios   | Onagraceae       | Whole plant      | Taken orally soup, pound fresh part applied on the affected area | Heat-clearing and detoxifying; Relieving exterior and promoting dampness; set a fracture; improve digestion; promoting blood circulation | KL-232                  |
| 81  | *Epimedium acuminatum* Franch      | Cu mao yin yang huo | jab ngol xid | Berberidaceae    | Whole plant      | Oral, boiled with meat and drunk the soup               | Reinforcing kidney to strengthen yang; expelling wind–damp                                              | KL-231                  |
| 82  | *Equisetum diffusum* D. Don        | Pi san wen jing | nangx diong x nieb | Equisetaceae     | Whole plant      | Oral, boiled with meat and drunk the soup               | Hemostasis; diuretic; improving eyesight                                                                  | KL-014                  |
| 83  | *Eriobotrya japonica* (Thunb) Lindl | Pi pa        | ghab jongx det zend jeb nirx | Rosaceae   | Fruit          | Boiled with water; taken orally soup                   | Remove heat from the lung and arrest cough; lactagogue; expelling wind–damp                              | KL-204                  |
| 84  | *Eucommia ulmoides* Oliver        | Du zhong     | det dens        | Eucommiaceae     | Bark             | Oral, grinding, decoction                               | Nourishing liver and kidney; strong bones and muscles; anti-abortion mean successful gestation             | KL-107                  |
| 85  | *Eupatorium chinense* L.           | Hua ze lan   | det vit gheib   | Compositae       | Whole plant      | Oral and external, boiled with meat and drunk the soup or medicated bath | Clearing heat and relieving sore throat; cooling blood remove pathogenic heat; eliminating stasis subdue swelling | KL-130                  |
| No. | Scientific name | Chinese name | Miao name | Family              | Using part | Preparation method | Use and value                                                                 | Voucher specimen number |
|-----|----------------|--------------|-----------|---------------------|------------|--------------------|------------------------------------------------------------------------------|-------------------------|
| 86  | Euphorbia lathyris L | Xu sui zi | reib liou ros | Euphorbiaceae | Whole plant | Oral, boiled with water | Detoxicating and destroy intestinal worms; relieving water retention with hydragogue; relieving water retention with hydragogue | KL-156                  |
| 87  | Euphorbia sikkimensis Boiss | Shui huang hua | jab eb wok | Euphorbiaceae | Root, leaf | External, grinding and drink with wine | Diuretic; heat-clearing and detoxifying | KL-057                  |
| 88  | Evodia rutaecarpa (Juss.) Benth | Wu zhuyu | det gaf ved | Rutaceae | Fruit | Taken orally soup | Diuretic; heat-clearing and detoxifying | KL-015                  |
| 89  | Fallopia multiflora (Thunb.) Harald | He shou wu | vob hmuk vongx | Polygonaceae | Tuber | Taken orally soup; grinding and drink with wine; pound fresh part applied on the affected area | Ziyin Yangxue; loosening the bowel to relieve constipation; preventing further attack of malaria; expelling wind; detoxification | KL-113                  |
| 90  | Ficus carica L | Wu hua guo | ak niangb zend yex | Moraceae | leaf | Taken orally soup; medicated bath | Ziyin Yangxue; loosening the bowel to relieve constipation; preventing further attack of malaria; expelling wind; detoxification | KL-016                  |
| 91  | Ficus tikoua Bur | Di guo | bongt nial tid | Moraceae | Whole plant | Grinding, decoction | Clear away heat and remove dampness; promoting blood circulation to remove meridian obstruction; removing toxicity for detumescence | KL-017                  |
| 92  | Firmiana platanifolia (L. f.) Marsili | Wu tong | ghab jongx det hsob nox | Salicaceae | Seed | Grinding, decoction; medicated bath | Strengthen the spleen; regulate qi; aid digestion; hemostasis | KL-018                  |
| 93  | Foeniculum vulgare Mill | Hui xiang | xongx hxongb | Umbelliferae | Fruit | Taken orally soup; pound fresh part applied on the affected area | Eliminating cold stop pain | KL-019                  |
| 94  | Gastrodia elata Bl | Tian ma | yangf wid vud | Orchidaceae | Tuber | Grinding, decoction | Dizziness; numbness of the limbs; infantile convulsion | KL-020                  |
| No. | Scientific name       | Chinese name       | Miao name     | Family         | Using part | Preparation method                                      | Use and value                                                                 | Voucher specimen number |
|-----|-----------------------|--------------------|--------------|----------------|------------|---------------------------------------------------------|-------------------------------------------------------------------------------|-------------------------|
| 95  | Gentiana rhodantha Franch. ex Hemsl. | Hong hua long dan | jab juf saix | Gentianaceae   | Whole plant | Oral, boiled with water                                 | Heat-clearing and damp-drying drug; detoxification; discharging fire          | KL-106                 |
| 96  | Geranium nepalense Sweet | Ni bo er lao guan cao | jab ghab ngenx | Geraniaceae   | Whole plant | Oral, boiled with meat and drunk the soup               | Dispelling wind and eliminating dampness; dredge the meridians and relieve pain; check dysentery; clearing heat | KL-155                 |
| 97  | Gerbera piloselloides (L.) Cass | Mao da ding cao | jab bat nex jong x jub | Compositae    | Whole plant | Oral, boiled with meat and drunk the soup               | Heat-clearing and detoxifying; moistening lung for arresting cough; promoting blood circulation | KL-078                 |
| 98  | Geum japonicum Thunb. var. chinense F.Bolle | Rou mao lu bian qing | jab heib khob | Rosaceae      | Whole plant, dried | Grinding, decoction                                    | Supplementing qi and activating blood circulation; move blood stasis and clear toxins; expelling wind | KL-105                 |
| 99  | Glechoma longituba (Nakai) Kupr | Huo xue dan | vob bix seis hlieb | Labiatae      | Whole plant | Oral, boiled with meat and drunk the soup               | Damp elimination and smoothing showering; heat-clearing and detoxifying; clear the blood and the swelling away; regulate the menstrual function to stop pain | KL-077                 |
| 100 | Gleditsia sinensis Lam | Zao jia | bel def def sad bil | Leguminosae   | Fruit       | Boiled with meat and drunk the soup                    | Detumescence; insecticide                                                     | KL-114                 |
| 101 | Glochidion puberum (L.) Hutch | Suan pan zi | zend mil leib | Euphorbiaceae | Root, fruit  | Oral, boiled with water                                 | Clearing heat and promoting diuresis; detoxification; promoting blood circulation | KL-058                 |
| 102 | Gonostegia hirta (Bl.) Miq | Nuo mi tuan | bas gad nef | Urticaceae    | Whole plant | Grinding, decoction, taken orally soup; pound flesh part applied on the affected area; boiled with meat and drunk the soup; medicated bath | Invigorates the spleen and promotes digestion; block blood and break stasis inducing diuresis for removing edema; heat-clearing and detoxifying | KL-079                 |
| No. | Scientific name                        | Chinese name | Miao name           | Family             | Using part                  | Preparation method                                                                 | Use and value                                                                 | Voucher specimen number |
|-----|----------------------------------------|--------------|---------------------|--------------------|-----------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------|
| 103 | Grangea maderaspatana (L.) Poir         | Tian ji huang| reib hiol ndenb     | Compositae         | Whole plant                 | Oral and external, pound fresh part applied on the affected area; boiled with water | Clearing heat and promoting diuresis; blood-cooling and blood-flow promoting drugs; removing toxicity for detumescence | KL-129                |
| 104 | Gynura japonica (Thunb.) Juel          | Ju san qi    | jab hsaik laix dliob| Compositae         | Root, whole plant           | Oral and external, pound fresh part applied on the affected area; boiled with water | Hemostasis; decreasing swelling to relieving pain; heat-clearing and detoxifying | KL-031                |
| 105 | Gynostemma pentaphyllum (Thunb) Makino | Jiao gu lan  | vob ghab did         | Cucurbitaceae      | Whole plant                 | Oral and external, pound fresh part applied on the affected area; boiled with water | Heat-clearing and detoxifying; resolve phlegm to relieve cough; supplementing qi and nourishing yin; engender liquid; tranquilization | KL-104                |
| 106 | Hedera nepalensis K. Koch              | Zhong hua chang chun teng | jab hxend yut  | Araliaceae         | Whole plant                 | External, pound fresh part applied on the affected area                             | Expelling wind and removing toxin; the blood circulation hematishes; decreasing swelling to relieving pain | KL-154                |
| 107 | Hibiscus mutabilis L                   | Mu fu rong   | det bangx nangl      | Malvaceae          | Leaf, flower                | Pound fresh part applied on the affected area                                     | Heat-clearing and detoxifying; blood cooling and arresting; detumescence; apocenosis | KL-034                |
| 108 | Houttuynia cordata Thunb               | Ji cao       | vob diuk             | Saururaceae        | Whole plant                 | Grinding, decoction                                                                | Heat-clearing and detoxifying; drainage of pus and dissolving carbuncle; diuretic and detumescence; | KL-059                |
| 109 | Hovenia dulcis Thunb                   | Zhi ju       | zend ghol bil        | Rhamnaceae         | Seed, root                  | Grinding, decoction                                                                | Prevent alcoholism; antitussive; check retching; relaxing tendon and activation collaterals | KL-188                |
| 110 | Humulus scandens (Lour.) Merr           | Lv cao       | bangx nangx lif      | Moraceae           | Whole plant                 | Taken orally soup; grinding and drink with wine; pound fresh part applied on the affected area; medicated bath | Heat-clearing and detoxifying; promote diuresis; treat strangury                  | KL-153                |
| 111 | Hydrangea macrophylla (Thunb) Ser       | Yuan zhi xiu qu | ghab lenl hab         | Saxifragaceae      | Leaf, root                  | Grinding, decoction                                                                | Detoxification; hemostasis                                                  | KL-103                |
Table 4 (continued)

| No. | Scientific name                  | Chinese name                        | Miao name          | Family     | Using part | Preparation method | Use and value                                                                 | Voucher specimen number |
|-----|----------------------------------|-------------------------------------|--------------------|------------|------------|--------------------|--------------------------------------------------------------------------------|-------------------------|
| 112 | Hypericum patulum Thumb. ex Murray | Jin si mei                          | vob nix ngol       | Guttiferae | Whole plant | Oral               | Heat-clearing and detoxifying; activating blood circulation to dissipate; eliminating phlegm and stopping cough; blood cooling and arresting      | KL-230                  |
| 113 | Hypericum perforatum L           | Guan ye lian qiao                   | det bangx fangx     | Guttiferae | Whole plant | Oral, grinding, decoction | Stop bleeding; heat-clearing and detoxifying; regulate the menstrual function; regulating menstruation; lactagogue                      | KL-157                  |
| 114 | Impatiens crassiloba Hook. f      | Feng xian hua                       | bangx qangb         | Balsaminaceae | Stems, root, flower | Oral, boiled with water, medicinal liquor | Dispelling wind and eliminating dampness; activating blood circulation and stimulating meridians; set a fracture                   | KL-060                  |
| 115 | Impatiens crassiloba Hook. f      | Hou lie feng xian hua               | bangx gent bil dab  | Balsaminaceae | Flower     | Oral, medicinal liquor | Clear the blood and the swelling away; analgesia                             | KL-152                  |
| 116 | Imperata cylindrica (L.) Beauv.    | Bai mao                             | nangx ghab lix      | Gramineae  | Tuber      | Oral               | Blood cooling and arresting; engender liquid and heat-clearing; promote diuresis; treat strangury                               | KL-102                  |
| 117 | Inula helianthus-aquatica C. Y. Wu ex Ling | Shui zhao yang | bangx mais hnaib   | Compositae  | Flower     | Oral, boiled with meat and drunk the soup | Resolve phlegm; dispelling wind and eliminating dampness                     | KL-189                  |
| 118 | Ixeris polycephala Cass           | Ku mai cai                          | vob ib              | Compositae  | Whole plant | Oral and external, grinding, decoction, medicated bath | Heat-clearing and detoxifying; decreasing swelling to relieving pain          | KL-080                  |
| 119 | Juncus effusus L                 | Deng xin cao                        | nangx songb mil     | Juncaceae  | Stem, dried | Oral               | Dituies; treating strangury                                                 | KL-229                  |
| 120 | Kadsura longipedunculata Finet et Gagnep | Nan wu wei zi | ghab jongx zeng ghongd yut | Schisandraceae | Fruit      | Boiled with vinegar | Promoting blood circulation to remove meridian obstruction; decreasing swelling to relieving pain,                                | KL-158                  |
| No. | Scientific name                  | Chinese name     | Miao name      | Family       | Using part     | Preparation method                                      | Use and value                                                                 | Voucher specimen number |
|-----|----------------------------------|------------------|---------------|--------------|---------------|---------------------------------------------------------|------------------------------------------------------------------------------|-------------------------|
| 121 | *Kyllinga brevifolia* Rottb     | Shui wu gong      | nangx hsob nail | Cyperaceae   | Whole plant   | Oral and external, pound fresh part applied on the affected area, boiled with water | Preventing further attack of malaria, capable of preventing phlegm from forming and stopping coughing; expelling wind | KL-035                  |
| 122 | *Lagenaria sceraria* (Molina) Standl. var. depressa (Ser.) Hara | Hu lu            | fab xef       | Cucurbitaceae | Fruit          | Oral, grinding, decoction                              | Treating stranguria and resolving mass; inducing diuresis for removing edema | KL-128                  |
| 123 | *Lasiosphaera fenxi* Reich      | Tuo pi ma bo      | jib penb       | Lycoperdaceae | Sporophore    | Pound fresh part applied on the affected area          | Clearing lung; detoxification; hemostatic                                   | KL-219                  |
| 124 | *Lemma minor* L                 | Fu ping           | box niel       | Lemnaceae     | Whole plant   | Taken orally soup                                      | Relieving exterior syndrome by diaphoresis; promoting eruption and anti-pruritus; inducing diuresis for removing edema | KL-101                  |
| 125 | *Leonurus japonicus* Thunb      | Yi mu cao         | jab lob ghel hlieb | Labiatae    | Whole plant   | Oral, soup                                             | Promoting blood circulation for regulating menstruation; diuresis detumescence | KL-151                  |
| 126 | *Ligustrum robustum* (Roub.) Blume | Cuzhuang nv zhen | jen lb         | Oleaceae      | Leaf          | Taken orally soup, pound fresh part applied on the affected area | Clear liver fire; antipyretic drugs                                        | KL-190                  |
| 127 | *Lilium brownii* F. E. Brown ex Miellez var. windulum Baker | Bai he           | bod gab tid    | Liliaceae     | Bulb          | Grinding, decoction                                    | Nourishing Yin and moistening lung; tranquillization                         | KL-036                  |
| 128 | *Litsea cubeba* (Lour.) Pers    | Shan ji jiao      | zend jangl     | Lauraceae     | Fruit, leaf, root, stem | Taken orally soup                                      | Promoting flow of qi and blood circulation, anti-asthmatic diuretic          | KL-037                  |
| 129 | *Lobelia chinensis* Tour        | Ban bian lan      | uab benx nex nas | Campanulaceae | Whole plant   | Oral, grinding and drink with wine                      | Heat-clearing and detoxifying; inducing diuresis for removing edema          | KL-131                  |
| 130 | *Lonicerajaponica* Thunb        | Ren dong          | bangx jab hxangd | Caprifoliaceae | Flower, rattan | Oral and external, medicated bath                      | Heat-clearing and detoxifying                                               | KL-061                  |
| 131 | *Lophatherum gracile* Bronn     | Dan zhu ye        | niangx ghab nex gix | Gramineae   | Whole plant   | Oral, boiled with meat and drunk the soup               | Heat-clearing and detoxifying, diuretic                                      | KL-127                  |
| No. | Scientific name                                      | Chinese name | Miao name | Family       | Using part            | Preparation method                                                                 | Use and value                                                                 | Voucher specimen number |
|-----|-----------------------------------------------------|--------------|-----------|--------------|-----------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|------------------------|
| 132 | Luffa cylindrica (L.) Roem                          | Si gua       | fab hsab  | Cucurbitaceae| Fruit                 | Oral and external, pound fresh part applied on the affected area, boiled with water  | Removing heat-phlegm; cooling blood; remove pathogenic heat                   | KL-082                |
| 133 | Lycium chinense Miller                              | Gou qi       | det uab bol | Solanaceae   | Fruit                 | Grinding, decoction                                                                 | Nourishing liver and kidney; relieving dryness and moisturizing              | KL-132                |
| 134 | Lycopodium japonicum Thunb. ex Murray              | Shi song     | hso b git nail nib | Lycopodiaceae | Whole plant | Medicinal liquor; pound fresh part applied on the affected area                     | Expelling wind; relax the muscles and stimulate the blood circulation         | KL-081                |
| 135 | Lycoris radiate (L'Her.) Herb                      | Shi suan     | ghax vib  | Amaryllidaceae| Bulb                  | Oral, grinding, decoction, boiled with meat and drunk the soup                      | Antitusive; detoxification and detumescence                                  | KL-100                |
| 136 | Lygodium japonicum (Thunb) Sw                       | Hai jin sha  | jab hrangd | Lygodiaceae  | Spore                 | Grinding, decoction                                                                 | Dituiesis; anti-febrile                                                      | KL-039                |
| 137 | Lysimachia christinae Hance                         | Guo lu huang | vob nix ngol | Primulaceae  | Whole plant | Grinding, decoction; pound fresh part applied on the affected area                 | Dituiesis; treating stranguria; heat-cleaning and detoxifying, removing stasis and detumescence | KL-040                |
| 138 | Lysimachia clethroides Duby                        | Zhan zhu cai | jub maix vud | Primulaceae  | Whole plant | Grinding and drink with wine; pound fresh part applied on the affected area        | Clearing heat and promoting diuresis; active blood and disperse stagnation; inducing diuresis for removing edema; regulate the menstrual function; regulating menstruation | KL-099                |
| 139 | Lysimachia paridiformis Franch. var. stenophylla Franch | Xiao ye luo di mei | kod tud vud | Primulaceae  | Whole plant | Grinding, decoction                                                                 | Promoting blood circulation to remove meridian obstruction; expelling wind to relieve pain | KL-159                |
| 140 | Macleaya cordata (Willd.) R. Br                     | Bo luo hui   | vob liangl bab | Papaveraceae | Whole plant | Grinding, decoction                                                                 | Promoting blood circulation to remove blood stasis; heat-clearing and detoxifying; insecticidal; anti-itch | KL-083                |
| 141 | Mahonia bealei (Fort.) Carr                         | Kuo ye shi da gong luo | det hmib nangl | Berberidaceae | Leaf, root | Oral, boiled with water                                                             | Heat-clearing and detoxifying; dryness-heat                                   | KL-115                |
| No. | Scientific name                                      | Chinese name | Miao name | Family       | Using part | Preparation method                      | Use and value                                                                 | Voucher specimen number |
|-----|------------------------------------------------------|--------------|-----------|--------------|------------|-----------------------------------------|------------------------------------------------------------------------------|-------------------------|
| 142 | *Melia toosendan* Sieb. et Zucc.                    | Chuan lian   | det zend ib | Meliaceae    | Fruit      | Taken orally; soup; pound fresh part applied on the affected area | Insecticide                                                               | KL-116                  |
| 143 | *Mirabilis jalapa* L                                | Zi mo li     | nuf suix fex | Nyctaginaceae | Root       | Grinding, decoction                    | Heat-clearing and detoxifying; promoting blood circulation                  | KL-191                  |
| 144 | *Nandina domestica* Thunb                           | Nan tian zhu  | ghaob hold ghunb | Berberidaceae | Root, stem, Fruit | Oral, grinding, decoction               | Clear away heat and remove dampness; clearing and activating the channels and collaterals; Cough and asthma | KL-084                  |
| 145 | *Dendranthus javanicus* (Bl.) DC                     | Shui qin     | vob juex    | Umbelliferae | Whole plant | Taken orally; soup; pound fresh part applied on the affected area | Heat-clearing and detoxifying; diuretic and hemostasis                      | KL-041                  |
| 146 | *Ophioglossum pedunculatum* Desv                     | Yizhi jian   | wab kaob naob | Ophioglossaceae | Whole plant | Grinding, decoction                    | Hemorrhoids; venomous snake bite; traumatic injury; infantile malnutrition   | KL-126                  |
| 147 | *Ophiopogon japonicus* (L. f) Ker-Gawl               | Mai dong     | zend jab ngol yut | Liliaceae | Tuber      | Grinding, decoction                    | Tonifying stomach and promoting fluid; nourishing Yin and moisturizing lung | KL-062                  |
| 148 | *Opuntia stricta* (Haw.) Haw. var. dillenii (Ker-Gawl) Benson | Xian ren zhang | ghab jongx vob nix | Cactaceae | Stem       | Oral, grinding and drink with wine     | Promoting flow of qi and blood circulation; heat-clearing and detoxifying    | KL-044                  |
| 149 | *Onganum vulgare* L                                 | Niuzhi       | reib nzeal youl | Labiatae | Whole plant | Oral, soup                            | Clearing summer-heat; inducing diuresis for removing edema                  | KL-085                  |
| 150 | *Osbeckia opipara* C. Y. Wu et C. Chen              | Chao tian guan | jab tok     | Melastomataceae | Root     | Taken orally                            | The blood circulation hemostasis                                             | KL-098                  |
| 151 | *Osmunda japonica* Thumb                            | Zi qi        | vob haid ghab diangb | Osmundaceae | Root, stems, leaf | Grinding, decoction                    | Heat-clearing and detoxifying; blood cooling and arresting; insecticide     | KL-205                  |
| 152 | *Paris polyphylla* Smith                            | Qi ye yi zhi hua | jab gib liod | Liliaceae | Tuber      | Boiled with water; pound fresh part applied on the affected area | Clearing heat and detoxifying; dispelling wind and relieving convulsion    | KL-192                  |
| 153 | *Patrinia scabiosaefolia* Fisch. ex Trev            | Bai jiang    | jab zangd naib | Valerianaceae | Whole plant | Grinding and decoction the young leaves | Heat-clearing and detoxifying; apocenosis; promoting blood circulation      | KL-228                  |
| No.  | Scientific name                | Chinese name | Miao name   | Family         | Using part       | Preparation method                        | Use and value                                                                 | Voucher specimen number |
|------|--------------------------------|--------------|-------------|----------------|------------------|--------------------------------------------|------------------------------------------------------------------------------|-------------------------|
| 154  | *Perilla frutescens* (L.) Britt | Zi su        | ghab vud    | Labiatae       | Whole            | Oral                                       | Relieving exterior syndrome; remove coldness; regulating the flow of qi to alleviate pain | KL-227                  |
| 155  | *Periploca forrestii* Schltr   | Xi nan gang liu | ghab bas hlat daib | Gramineae      | Whole plant      | Oral and external, pound fresh part applied on the affected area, boiled with water | Relax the muscles and stimulate the blood circulation; dispelling wind and eliminating dampness | KL-02                   |
| 156  | *Peristrophe japonica* (Thunb.) Bremek | Jiu tou shi ciau | nangxzend raf | Acanthaceae    | Whole plant      | External, medicinal liquor or medicated bath | Wind-dampness dispelling and detoxification                              | KL-206                  |
| 157  | *Pharbitis purpurea* (L.) Voigt | Yuan ye qian niu | vob hmuk vongx | Convolvulaceae | Seed             | Oral, grinding, decoction                   | Dituesis and purgation; make expectation easy; disperse accumulations; insecticide | KL-097                  |
| 158  | *Phytolacca americana* L       | Chui xu shang lu | vob bix gheib | Phytolaccaceae | Root             | Grinding, decoction                        | Restoring vital energy; dituesis                                       | KL-148                  |
| 159  | *Pinellia ternata* (Thunb.) Breit | Ban xia      | kod las     | Araceae        | Tuber            | Oral and external, pound fresh part applied on the affected area, boiled with water | Eliminating dampness and reducing phlegm; calm the adverse-rising energy; check retching; relieving and eliminating mass | KL-043                  |
| 160  | *Plantago asiatica* L          | Che qian     | vob naix bat diangt | Plantaginaceae | Seed             | Taken orally soup; pound fresh part applied on the affected area | Diuretic; relieving exterior and promoting dampness; removing liver fire for improving eyesight; cooling blood remove pathogenic heat | KL-193                  |
| 161  | *Platycarya strobilacea* Sieb. et Zucc. | Hua xiang shu | det jab jib | Juglandaceae    | Leaf             | External, grinding and drink with wine      | Detoxification; insecticidal; anti-itch                                     | KL-149                  |
| 162  | *Platycladus orientalis* (L.) Franco | Ge bai       | det hangb   | Cupressaceae    | Leaf, fruit      | Oral, grinding, decoction                   | Blood cooling and arresting; resolve phlegm to relieve cough; expelling wind-damp | KL-150                  |
| 163  | *Polygala japonica* Houtt      | Gua zi jin   | vob nil lios bad | Polygalaceae   | Whole plant      | Taken orally soup; pound fresh part applied on the affected area | Resolve phlegm to relieve cough; promoting blood circulation; detumescence; tranquilization; detoxification | KL-147                  |
| No. | Scientific name                   | Chinese name | Miao name       | Family      | Using part | Preparation method       | Use and value                                                                 | Voucher specimen number |
|-----|----------------------------------|--------------|-----------------|-------------|------------|--------------------------|------------------------------------------------------------------------------|-------------------------|
| 164 | *Polygonatum cyrtonema Hua*      | Duo hua huang jing | kid vud        | Liliaceae   | Tuber      | Grinding, decoction       | Nourishing Yin and moistening lung; invigorating spleen and replenishing qi   | KL-045                  |
| 165 | *Polygonum aviculare L*          | Bian xu      | vob jab ghab qangf | Polygonaceae | Whole plant | Grinding, decoction       | Dituesis; treating strangury                                                  | KL-207                  |
| 166 | *Polygonum capitatum Buch.-Ham. ex D. Don* | Tou hua liao | dlab dongd xok | Polygonaceae | Whole plant | Medicated bath            | Promote blood circulation, promote diuresis, treat strangury; promoting blood circulation and stopping pain | KL-208                  |
| 167 | *Polygonum cuspidatum Sieb et Zucc* | Hu zhang | vob gongx xionggl | Polygonaceae | Tuber, root | Grinding, decoction       | Promoting blood circulation to remove blood stasis; heat-clearing and detoxifying; dissolving wind and eliminating dampness; | KL-146                  |
| 168 | *Polygonum hydropiper L*          | Shui liao     | vob liof        | Polygonaceae | Whole plant | Taken orally soup; medicated bath | Detoxification; clearing damp; hemostasis                                   | KL-194                  |
| 169 | *Polygonum perfoliatum L*         | Kang ban gui  | jab eb wall nangl | Polygonaceae | Aerial part, dried | Taken orally soup         | Heat-clearing and detoxifying; dissolving stasis and hemostasis              | KL-160                  |
| 170 | *Portulaca oleracea L*            | Ma chi xian   | vob hmi xangx   | Portulacaceae | Aerial parts | Pound fresh part applied on the affected area | Heat-clearing and detoxifying; cool the blood; check dysentery; xeransis     | KL-226                  |
| 171 | *Potentilla chinensis Ser*        | Wei ling cai  | vob hof dlub    | Rosaceae    | Whole plant | Grinding, decoction; pound fresh part applied on the affected area | Cool the blood and check dysentery; heat-clearing and detoxifying             | KL-117                  |
| 172 | *Potentilla kleiniana Wight et Arn* | She hao xian cai | jab eb wall nangb | Rosaceae   | Whole plant | Taken orally soup; medicated bath | Heat-clearing and detoxifying; relieves cough and reduced phlegm herb; decreasing swelling to relieving pain; preventing further attack of malaria | KL-225                  |
| 173 | *Pratia nummularia (Lam.) Br. et Aschers* | Tong chui yu dai cao | zid hmiang glab | Campanulaceae | Whole plant | Oral and external, grinding and drink with wine; medicated bath | Dispelling wind and eliminating dampness; detoxification                      | KL-161                  |
| No. | Scientific name          | Chinese name       | Miao name       | Family       | Using part     | Preparation method     | Use and value                                                                 | Voucher specimen number |
|-----|--------------------------|--------------------|----------------|--------------|----------------|------------------------|----------------------------------------------------------------------------|------------------------|
| 174 | *Prunella vulgaris* L.   | Xia ku cao         | nied dend longx | Labiatae     | Ear, dried     | Oral                   | To produce an effect toward clear vision; removing swelling and lump          | KL-046                 |
| 175 | *Pteris cretica* L. var. | Feng wei jue       | vob haib ghab mox | Pteridaceae  | Whole plant    | Grinding, decoction    | Clearing heat and promoting diuresis; blood cooling and arresting; removing toxicity for detumescence | KL-209                 |
| 176 | *Pueraria lobata* (Willd.) | Ye ge              | ghab jongx hfb  | Leguminosae  | Tuber          | Grinding, decoction    | Anti-febrile; relieving exterior syndrome; promoting eruption and promoting spleen yang blood circulation | KL-145                 |
| 177 | *Pyracantha fortuneana* (Maxim.) | Huo ji            | zend gangb kongb | Rosaceae     | Fruit, root, leaf | Grinding, decoction    | Strengthening spleen; improving digestion; analgesia; check dysentery        | KL-162                 |
| 178 | *Pyrrosia sheareri* (Baker) | Lu shan shi wei   | vob nix lod     | Polypodiaceae | Whole plant    | Taken orally soup      | Blood cooling and arresting; clearing lung and eliminating phlegm; diuresis; treating stranguria | KL-053                 |
| 179 | *Rabdosia lophanthoides* (Buch.-Ham. ex D. Don) | Xian wen xiang cha cai | gad hniangd vud | Labiatae     | Whole plant    | Oral, soup             | Clearing heat and promoting diuresis; cooling blood and removing stasis insecticide | KL-210                 |
| 180 | *Rabdosia rubescens* (Hemsl) Hara | Sui mi ya          | nange bait pet  | Labiatae     | Whole plant    | Oral and external, pound fresh part applied on the affected area, boiled with water | Heat-clearing and detoxifying; promoting blood circulation and stopping pain | KL-096                 |
| 181 | *Ranunculus japonicus* Thunb | Mao gen            | jab mongb hfuol | Ranunculaceae | Whole plant    | Boiled with water; pound fresh part applied on the affected area | Jaundice; postoperative analgesia                                            | KL-163                 |
| 182 | *Rhus chinensis* Mill    | Yan fu mu          | zend ghob pad   | Anacardiaceae | Tuber          | Oral and external medicated bath, grinding, decoction | Dispelling wind and eliminating dampness; inducing diuresis for removing edema; the blood circulation hematothecis; detoxification; antitussive | KL-143                 |
| No. | Scientific name                  | Chinese name | Miao name                 | Family            | Using part | Preparation method | Use and value                                                                 | Voucher specimen number |
|-----|----------------------------------|--------------|---------------------------|-------------------|------------|--------------------|-------------------------------------------------------------------------------|------------------------|
| 183 | *Ricinus communis* L             | Bi ma        | zend gangb hsei k lood    | Euphorbiaceae     | Seed       | Oral, boiled with water | Detumescence; activating collateral                                            | KL-237                 |
| 184 | *Rohdea japonica* (Thunb.) Roth  | Wan nian qing | uab fangf                 | Liliaceae         | Root       | Taken orally soup; grinding and drink with wine; pound fresh part applied on the affected area | Heat-clearing and detoxifying; relieve pain; stasis                           | KL-144                 |
| 185 | *Rosa chinensis* Jacq           | Yue ji       | bangx bei liangx          | Rosaceae          | Flower     | Taken orally soup    | Promoting blood circulation for regulating menstruation; removing toxicity for detumescence; enhancing splenic function; hemostasis | KL-224                 |
| 186 | *Rosa cymosa* Tratt             | Xiao guo qiang wei | qangf weif zend yut   | Rosaceae          | Root, fruit, leaf | Grinding, decoction | Arnica Extract; drainage and detoxification                                    | KL-223                 |
| 187 | *Rosa laevigata* Michx          | Jin ying zi  | bel liangx                | Rosaceae          | Root, fruit | Grinding, decoction; medicated bath | Secure essence; astringe the intestines; check vaginal discharge                | KL-095                 |
| 188 | *Rosa roxburghii* Tratt         | Sao si hua   | ghab jongx det bel tok    | Rosaceae          | Root       | Grinding, decoction  | Strengthening spleen; good for aiding digestion; anti-tussive; anti-diarrhea effect | KL-164                 |
| 189 | *Rostellularia procumbens* (L.) Nees | Jue chuang  | det nix nied              | Acanthaceae       | Whole plant | Boiled with hot water | Heat-clearing and detoxifying; promoting blood circulation and urination with diuretics; disperse accumulations; analgesia | KL-119                 |
| 190 | *Rubia lanceolata* Hayata       | Pi zhen ye qian cao | vob niangx hxb           | Rubiaceae         | Root       | Grinding, decoction  | Blood cooling and arresting; active blood and disperse stagnation              | KL-211                 |
| 191 | *Rubus corchorifolius* L. f    | Shan mei     | zend liul vob             | Rosaceae          | Root, leaf | Boiled with hot water | Hemostasis; check vaginal discharge; check vaginal discharge; anti-prunus      | KL-118                 |
| 192 | *Rubus setchuenensis* Bureau et Franch | Chuan mei | zend lil                  | Rosaceae          | Root       | Medicinal liquor; boiled with water; boiled with meat and drunk the soup | Dispelling wind and eliminating dampness; cool the blood; the blood circulation hematanisis; produce the muscle and heal ulcer | KL-094                 |
| No. | Scientific name                     | Chinese name | Miao name       | Family         | Using part | Preparation method | Use and value                                                                 | Voucher specimen number |
|-----|------------------------------------|--------------|----------------|----------------|------------|--------------------|--------------------------------------------------------------------------------|------------------------|
| 193 | *Rumex nepalensis* Spreng          | Ni bo er suan mo | vob haib hxub | Polygonaceae  | Root, leaf  | Medicated bath     | Heat-clearing and detoxifying; cool the blood; insecticide; purgation              | KL-140                 |
| 194 | *Sabia parviflora* Wall. ex Roxb   | Xiao hua qing feng teng | hlat det lod ninx | Sabiaceae     | Stem, leaf  | Taken orally soup, pound fresh part applied on the affected area | Anti-inflammatory and analgesia; clearing heat and promoting diuresis; clearing liver to add yin; expelling wind–damp; cholagogue | KL-047                 |
| 195 | *Sagina japonica* (Sw.) Ohwi        | Qi gu cao    | jangx lu'l vongx | Caryophyllaceae | Whole plant | Oral, boiled with water | Cooling blood remove pathogenic heat; reducing swelling and resolving mass; insecticidal  | KL-120                 |
| 196 | *Sallvia splendens* Ker-Gawl       | Yi chuan hong | ib zongs xok   | Labiatae      | Whole plant | Oral, soup        | Removing toxicity for detumescence; cool blood and nourish yin                   | KL-093                 |
| 197 | *Sallvia yunnanensis* C. H. Wright | Yun nan shu wei cao | hxangt gheib  | Labiatae      | Root        | Oral, boiled with meat and drunk the soup | Removing stasis and promoting tissue regeneration; blood cooling and arresting; promoting blood circulation for regulating menstruation; detumescence | KL-092                 |
| 198 | *Sanguisorba officinalis* L         | Di yu        | vob ot wel     | Rosaceae      | Root        | Grinding and drink with wine | Blood cooling and arresting; heat clearing and detoxifying; heal ulcer; detumescence | KL-165                 |
| 199 | *Sarcandra glabra* (Thunb) Nakai    | Cao shan hu  | det nix vub hlieb | Chloranthaceae | Whole plant | Oral and external, pound fresh part applied on the affected area, boiled with water | Promoting blood circulation to remove blood stasis; anti-febrile; set a fracture | KL-121                 |
| 200 | *Sargentodoxa cuneata* (Oliv.) Rehd. et Wils | Da xue teng   | hsoob hxangt  | Sargentodoxaceae | Root        | Grinding, decoction; boiled with water | Dispelling wind and eliminating dampness; promoting blood circulation and stopping pain; insecticide; detoxification | KL-166                 |
| 201 | *Saxifraga stolonifera* Curt       | Hu er cao    | vob bix seix   | Saxifragaceae | Whole plant | Pound fresh part applied on the affected area | Can be wind-dispersing heat; cooling blood remove pathogenic heat                 | KL-212                 |
| No. | Scientific name                          | Chinese name       | Miao name      | Family       | Using part           | Preparation method            | Use and value                                                                                     | Voucher specimen number |
|-----|----------------------------------------|--------------------|---------------|--------------|----------------------|-------------------------------|---------------------------------------------------------------------------------|------------------------|
| 202 | Selaginella uncinata (Desv.) Spring    | Cui yun cao        | jab cangt jent | Selaginellaceae | Whole plant          | Boiled with water; medicated bath | Clearing heat and promoting diuresis; detoxification; hemostasis                  | KL-091                 |
| 203 | Semiaquilegia adoxoides (DC.) Makino    | Tian kui           | jab ghad nangl | Ranunculaceae  | Tuber                | Grinding, decoction           | Heat-clearing and detoxifying; promoting blood circulation to remove blood stasis; phlegm- and mass-eliminating; diuresis | KL-215                 |
| 204 | Senecio scandens Buch.-Ham. ex D. Don  | Qian li guang      | vob wik nax    | Compositae    | Whole plant          | Oral and external, grinding, decoction, medicated bath | Clearing heat and detoxifying; expelling blood stasis for improving eyesight; expelling blood stasis for improving eyesight | KL-167                 |
| 205 | Senissa serissoides (DC.) Druce        | Bai ma gu          | det vil gheib  | Rubiaceae     | Whole plant          | Grinding, decoction           | Dispelling wind and eliminating dampness; heat-clearing and detoxifying           | KL-048                 |
| 206 | Siegesbeckia pubescens Makino          | Xian geng xi xian  | vob bix hnaib  | Compositae    | Whole plant          | Oral and external, grinding and drink with wine | Expelling wind–damp; relaxing tendon and activation collaterals; heat-clearing and detoxifying | KL-064                 |
| 207 | Sinosenece oldhamianus (Maxim.) B. Nord | Puer gen           | ghab jongx puf eef | Compositae | Whole plant          | Oral and external, grinding and drink with wine | Detoxification; promoting blood circulation to remove blood stasis; detoxification | KL-065                 |
| 208 | Smilax china L                         | Ba qia             | vob dlod dlod  | Liliaceae     | Leaf                 | Grinding, decoction           | Dispelling wind and eliminating dampness; diuretic; promoting blood circulation to remove blood stasis; detoxification | KL-090                 |
| 209 | Smilax glabra Roxb                      | Tu fu ling         | bod zangd dak  | Liliaceae     | Tuber, root          | Grinding, decoction           | Dispel dampness and resolve toxin                                                  | KL-222                 |
| 210 | Solanum lyratum Thunb                  | Bai ying           | jab diel vud niab | Solanaceae | Whole plant          | Boiled with meat and drunk the soup | Expelling wind; detoxification                                                   | KL-214                 |
| 211 | Sophora flavescens Alt                 | Ku shen            | jab gongx saib | Leguminosae   | Root                 | Grinding, decoction           | Heat-clearing and damp-drying drug; insecticide; diuretic                       | KL-213                 |
| No. | Scientific name               | Chinese name | Miao name       | Family          | Using part | Preparation method     | Use and value                                                                 | Voucher specimen number |
|-----|-------------------------------|--------------|----------------|----------------|------------|------------------------|-------------------------------------------------------------------------------|-------------------------|
| 212 | *Spiraea japonica* L. f.  | Fen hua xiu xian ju | vob sob diel  | Rosaceae       | Root       | Grinding, decoction    | Expelling wind and clearing heat; improving eyesight and removing nebula      | KL-066                  |
| 213 | *Spiranthes sinensis* (Pers.) Ames | Shou cao | ghab jorgb linl hlob hlaob | Orchidaceae | Root, whole plant | Grinding, decoction | Nourishing yin and cooling blood; moistening lung for arresting cough; enhancing qi while nourishing fluid | KL-030                  |
| 214 | *Stemona tuberosa* Lour.  | Dui ye bai bu | vob ghab dail lix | Stemonaceae   | Tuber      | Medicinal liquor       | Moistening lung for arresting cough; insecticide                              | KL-123                  |
| 215 | *Stenoloma chusanum* Ching. | Wu jue | det mangs hsiang | Lindsaeaceae | Whole plant | Grinding, decoction    | Heat-clearing and detoxifying; removing dampness and arresting bleeding       | KL-122                  |
| 216 | *Stephania cepharantha* Hayata | Jin xian diao wu guí | jab fangx liangx | Menispermacae | Tuber      | Taken orally, soup, grinding and drink with wine; pound fresh part applied on the affected area | Heat-clearing and detoxifying; expelling wind and stopping pain; blood cooling and arresting bleeding | KL-029                  |
| 217 | *Talinum paniculatum* (Jacq.) Gaertn. | Tu ren shen | vob eb bens | Portulacaceae | Root       | Taken orally, soup     | Invigorate the spleen and promoting blood; menstrual extraction; moistening lung for arresting cough | KL-067                  |
| 218 | *Taraxacum mongolicum* Hand.-Mazz. | Pu gong ying | uab bexx ferx | Compositae | whole plant | Oral, boiled with water | Heat-clearing and detoxifying; diuresis; and Stasis                          | KL-070                  |
| 219 | *Tetrapanax papyrifera* (Hook. )K. Koch | Tong tuo mu | det bel tingd | Araliaceae | Stem, root | Oral, boiled with water | Clearing heat; diuresis; lactagogue                                         | KL-216                  |
| 220 | *Tinospora sagittata* (Oliv.) Gagnep | Qing nü dan | bad jex sangx | Menispermacae | Tuber | Grinding, decoction; grinding and drink with wine; pound fresh part applied on the affected area | Heat-clearing and detoxifying; decreasing swelling to relieving pain           | KL-089                  |
| 221 | *Toddalia asiatica* (L.) Lam. | Fei long zhang xue | ghab jorgx bel sob xok gax bas | Rutaceae | Root | Grinding and drink with wine; taken orally, soup; pound fresh part applied on the affected area | Arnica extract; dispelling wind and eliminating dampness; set a fracture; analgesia | KL-028                  |
| No. | Scientific name (A. Juss.) Roem | Chinese name | Miao name | Family | Using part | Preparation method | Use and value | Voucher specimen number |
|-----|---------------------------------|--------------|-----------|--------|------------|-------------------|---------------|------------------------|
| 222 | *Toona sinensis* | Xiang chun | vob yangl | Meliaceae | Bark | Grinding, decoction | Heat-clearing and damp-drying drug; astringe the intestines; hemostasis; check vaginal discharge; insecticide | KL-088 |
| 223 | *Toricellia angulata* Oliv. var. *intermedia* (Harms.) Hu | You chi qiao bing mu | ghab jongx linl det diol | Cornaceae | Root, bark, leaf | Oral, grinding, decoction | Promoting blood flow and tendon relaxation; dispelling wind and eliminating dampness | KL-218 |
| 224 | *Trachycarpus fortunei* (Hook.) H. Wendl | Zong liu | det hsob | Palmae | Fruit, leaf | Grinding, decoction | Antitussive; hemostasis | KL-124 |
| 225 | *Trichosanthes kirilowii* Maxim | Gua lou | zend fab hvub | Cucurbitaceae | Root, fruit | Oral, grinding, decoction | Removing heat-phlegm; relieving dryness with moistening drugs; loosen the chest and dissipate binds | KL-217 |
| 226 | *Trigeterospermum cordatum* (Marq.) H. Smith | Xin ye shuang hu die | jab juf saix | Gentianaceae | Whole plant | External, grinding, drink with wine | Invigorating spleen and clearing away heat to relieving wet; insecticide; wind-heat | KL-125 |
| 227 | *Typha angustifolia* L | Shui zhu | nangx laf zuf | Typhaceae | Pollen | Grinding, decoction; pound fresh part applied on the affected area | Diuretic and hemostasis; removing stasis | KL-068 |
| 228 | *Valeriana jatamansi* Jones | Zhi zhu xiang | vob gangb vas | Valerianaceae | Stem, root, dried | Grinding, decoction | Manage qi and activating blood; detumescence; dehumidification | KL-221 |
| 229 | *Verbena officinalis* L | Ma bian cao | jab lob gheib | Verbenaceae | Whole plant | Grinding, decoction; taken orally soup; medicated bath | Heat-clearing and detoxifying; promoting blood circulation and stopping pain; inducing diuresis for removing edema | KL-065 |
| 230 | *Vernicia fordii* (Hemsl.) Airy-Shaw | You tong | bangx zend yux | Euphorbiaceae | Root, leaf, flower | Oral and external, pound fresh part applied on the affected area, boiled with water | Detumescence; removing stasis; insecticide | KL-141 |
| 231 | *Veronica didyma* Tenore | Po po na | nangx vux derib | Scrophulariaceae | Whole plant | Taken orally soup | Tonifying kidney; strengthen waist and sinews; removing toxicity for detumescence | KL-027 |
| No. | Scientific name | Chinese name | Miao name | Family | Using part | Preparation method | Use and value | Voucher specimen number |
|-----|-----------------|--------------|-----------|--------|------------|--------------------|---------------|------------------------|
| 232 | Vicia cracca L  | Guang bu ye wan dou | def xux vud | Leguminosae | Whole plant | Boiled with water; pound fresh part applied on the affected area | Dispelling wind and eliminating dampness | KL-219 |
| 233 | Vitex negundo L | Huang jing | ndut ghunx leb | Verbenaceae | Root | Grinding, decoction | Heat-clearing and detoxifying | KL-087 |
| 234 | Xanthium sibiricum Patrin ex Widd | Cang er | jab vub | Compositae | Fruit, stem, leaf | Oral grinding, decoction, boiled with meat and drunk the soup | Dispelling wind and eliminating dampness; digestion; analgesia | KL-069 |
| 235 | Zanthoxylum armatum DC. var. ferrugineum (Rehdet Wils) Huang | Zhu ye jiao | ghab jongx zend sob vud | Rutaceae | Fruit | Grinding, decoction | Relieving rheumatism and cold; invigorating blood circulation and stopping pains; antitussive | KL-142 |
| 236 | Zanthoxylum bungeanum Maxim | Hua jiao | zend sob | Rutaceae | Peel | Taken orally soup; medicated bath | Insecticidal; anti-diarrhea effect; eliminating dampness | KL-220 |
| 237 | Zingiber officinale Roscoe | Jiang | kid | Zingiberaceae | Tuber | Grinding, decoction; taken orally soup; boiled with meat and drunk the soup | Dispelling cold; calm the adverse-rising energy; check retching; eliminating phlegm and stopping cough | KL-026 |
FIC values, including treatments for stomach, intestine, and liver diseases (0.82), heart and circulatory system diseases (0.81), and fever and malaria (0.80). The lowest FIC values recorded in this study included treatments for respiratory diseases (0.36) and cough (0.36).

The FL index indicates that there are 15 important medicinal plant species (Table 6) in the Kaili market, according to the information provided by 20 market suppliers for the treatment of 20 diseases. In this analysis, 237 species of medicinal plants mentioned by vendors were calculated. Three medicinal plant species with FL > 90% include Stephania cepharantha (Fig. 5), Eleutherococcus nodiflorus (Fig. 6), and Sargentodoxa cuneata (Fig. 7) are used for conditions like sprains/
traumas, rheumatism, and heat/detoxification. This high FL may be related to their success in the treatment of these diseases and/or to the local cultural practices. Nine medicinal plants, including the previous three, had an FL > 70%. The additional species were *Fallopia multiflora, Gleditsia sinensis, Grangea maderaspatana, Fallopia multiflora, Gleditsia sinensis, Grangea maderaspatana,*

**Discussion**

**Medicinal plants and associated traditional knowledge**

Based on market surveys and field investigations, we documented 237 species (belonging to 219 genera and 107 families) of medicinal plants traded at Kaili traditional medicinal market. The number of medicinal plants sold indicates the rich indigenous knowledge of medicinal plants and their applications. The 145 herbaceous species form the biggest category of plant type. This may be because herbaceous plants are easier to collect and other forest resources are dwindling in abundance rapidly. This finding is similar to other studies in other areas [34–36]. Most vendors would use the whole plant for medicinal purposes, but such collection practices likely reduce the wild population. Like other linguistic groups, the Miao people also have the custom of collecting medicinal plants for cooking and bathing on the Dragon Boat Festival (the fifth day of the fifth month in the lunar calendar), including *Acorus calamus, Dipsacus asperoides, Paederia scandens,* and *Leonurus artemisia.* Many plants are harvested in the season around the Dragon Boat Festival [37], and thus it is the most prosperous time on Kaili medicinal market.

*Acorus calamus* is widely used by the Miao not only as a medicinal herb, but also it is used symbolically to ward
off evil spirits by displaying it on doors or using it in a medicinal bath. The Miao healers often use the rhizomes of *Acorus calamus* to treat aphasia, traumas, diarrhea, snake bites, and stomach ache [38]. Some local Miao people soak their feet daily in hot water baths infused with *Acorus calamus* rhizomes to drive the cold away, balance *yin* and *yang*, and boost their immunity. When an elder dies, the Miao people boil *Acorus calamus* in water to scrub the corpse. They believe that *Acorus calamus* water will wash away unhappiness and allow the deceased to rest peacefully.

Some medicinal plant species are traditionally used as starters for preparing fermented beverages by Miao people, similar to a practice in the Shui communities [39]. In Kaili, the fifth and eighth months of the lunar calendar are considered the best times to buy wild fruits of *Ficus tikoua*, *Actinidia chinensis*, *Rubus setchuenensis*, and *Rosa roxburghii* for brewing wine or liquor.

Most of the knowledge on herbal remedies is handed down orally to the young people in the community by elders. In this market, 66.4% of vendors were male, probably because women are dedicating themselves to housework, childcare, keeping livestock, and farmyard management, while the men collect wild medicinal herbs from the high mountains [40]. Most medicinal plant vendors are small retailers who have common knowledge of Miao medicine and other ethnomedicine.

**Therapeutic effectiveness and popularity of medicinal plants**

The medicinal plants from the market were used to treat 83 human ailments. Traumas, fevers, and skin diseases, for example, were common conditions among the Miao, which likely relates to their environment and culture [20]. Many Miao people face difficult living conditions in mountainous areas. When the Miao work in rugged mountainous terrain, they can be injured easily. That is likely the reason that herbs to treat traumatic injury occupy a large proportion of the medicinal market. The weather in Kaili and surrounding areas is wet and humid throughout the year [41]. From the theory of traditional Chinese medicine, those who live in damp areas should expel wind in the body regularly to relieve constipation and improve sleep quality, and then make their bodies feel better [42]. Thus, Miao people use many herbs to treat rheumatism. The Miao's living environment is also regarded to cause so-called heat, another concept from TCM; thus, the medicinal plants for heat-clearing and detoxifying are very popular in the market.

Inflammation was cited as the highest number of medicinal plants, revealing the importance of anti-inflammatory treatment. In poor Miao villages, many people do not have the resources to purchase modern pharmaceuticals, so collection of herbs to treat inflammation is necessary. As a result, minor diseases can escalate to much more serious ones. Stomach, intestine, and liver diseases all have an FIC of = 0.82, showing a high level of agreement among the 116 vendors to treat these diseases.

The high FL values in this study highlight that the local vendors and residents have a strong dependence on these 15 species of medicinal plants. As such, all of these medicinal plants should be further studied, focusing on their chemistry, pharmacology, biological activity, and toxicity, as well as evaluation of efficacy and safety of local medicinal plants. For example, *Eleutherococcus nodiflorus*, *Sargentodoxa cuneata*, and *Stephania cepharantha* had an FL > 90%, which were used to treat traumatic injury and sprain, rheumatic problems, and heat-clearing and detoxifying. The most important nine species had an FL > 70%, have considerable agreement among market vendors on their particular use and credibility, and therefore could be further analyzed for potential development. Identifying plants with high values of FIC and FL is very important, as it will useful to support traditional medicine and establish related policies.

**Preparation and dosage of medicinal plants-based remedies**

The Miao people use fresh medicinal plants frequently [43], while dry plants are seldom used. This is because they believe the active ingredients of fresh plants are still intact, so this method can optimize effectiveness [44]. The Miao healers usually mixed several species instead of a single herb. For example, a Miao healer may treat cold with *Dichondra repens*, *Arctium lappa*, *Taraxacum mongolicum*, and *Lonicera japonica* and *Sargentodoxa cuneata*, and instead of using a specific single plant species. Rheumatism and traumatic injury were the most common problems for which the Miao people prepare remedies with more than one plant species. When administering medicinal herbs, some healers practice a form of personalized medicine by preparing dosages according to individual patients, rather than measuring consistent doses.

The Miao usually use processing methods such as decoction, medicinal liquor, external application, and medicated bath. Medicinal plants are often added to food with an egg or animal meat for the purpose of enhancing the body’s immunity and supplement protein.

Meanwhile, the Miao people use different additives like alcohol, honey, salt, and sugar to improve the flavor and taste. In particular, the practice of combining plants and alcohol has a long history in Miao medicine. Miao healers use different procedures to administer their raw material/alcohol combinations. The medicinal plants are soaked in alcohol for about one month, and the resulting
liquid then is drunk by the patient or applied externally to the affected parts. Alcohol can act as solvent instead of water, where fresh plant or dried plant powder is placed in alcohol and either drunk or applied externally [45]. It is believed that alcohol extracts contain more active components from the medicinal plants than water does, thus being more effective in curing diseases. For example, *Aralia racemosa*, when soaked in alcohol, is far more effective in treating rheumatism than the fresh plant alone.

**Threats to medicinal plants and associated traditional knowledge**

Compared with other herbal markets that only appear on the Dragon Boat Festival and Chung Yeung Festival (the 9th day in September of lunar calendar), the Kaili medicinal market sold herbal medicines every week. These plants are in great demand and supply is limited. Lacking relevant development policies and protection measures in this area pose a serious problem, as some rare or endangered species were being sold. For example, *Paris polyphylla* is a common Miao medicinal plant in Guizhou. However, due to over-exploitation, the survival of wild populations is seriously threatened, and resources are dwindling. Therefore, the collection of plant resources and ex situ conservation of rare and endangered species are important missions, and selling endangered species in the market should be also controlled.

Most Miao medicinal knowledge was handed down orally to the younger members of the community by elders [46]. However, nowadays, indigenous knowledge is less commonly passed down from the elders to the young generation. According to the age structure of the vendors (Table 2), groups 31–60 and 61–90 at roughly equal in size. There was only a small group of young people in the market. Few young Miao appear to be trained in traditional knowledge and sustainable harvesting of medicinal plants, likely because most herbal materials are collected from wild plant populations, and there is small quantity for each plant. Compared to working in the urban areas, collecting and selling wild medicinal plants were only temporary job; it is less profitable. Even Miao medicine has a lot of growth potential, but for reasons of cost and time, it is hard for untrained people to develop a successful business. In interviews, most young people also expressed disbelief that studying indigenous knowledge can earn money for their life [18, 47]. Thus, in recent years a large number of rural young people have chosen to move to big cities to work and live. This phenomenon could have a negative influence on the inheritance and development of indigenous knowledge. It exposes the vulnerability of traditional medicinal knowledge if its transmission is limited by acculturation or inter-ethnic exchange from generation to generation [48].

**The names of Miao medicinal plants**

The Miao often name medicinal plants according to their features such as color, morphology, usage, and flavor [49, 50], which is similar to the nomenclature of local people in Umnugobi Province, Mongolia [51]. There are three main types of nomenclature: (1) The word *jab*, which means medicine, is added to the medicinal plants. For example, the Miao name for *Epimedium acuminatum* is *jab ngol xid* which means “herbal medicine used to treat impotence.” Thus, this nomenclature can be formulated as “jab+ usage”; (2) the used plant part is added to the name. For example, the Miao name for *Ophiopogon japonicus* is *zend nangx ngol yut*. These words mean tuber (*zend*), herb (*nangx*), and persistent cough (*ngol yut*). Thus, in Miao nomenclature *Ophiopogon japonicus* is clearly understood to be an herbaceous plant and its tubers can be used to treat persistent cough; (3) the Miao name for a medicinal plant may be adopted from the local dialect in the study area. For example, the Miao people’s name for *Bletilla striata* is *wal jut*, which is the local dialect name for this plant.

**How to protect the Miao people’s traditional medicine culture?**

Nowadays, the Chinese government has recognized ethnomedicine and issued a series of policies to support their protection and development after the foundation of the whole country [52, 53]. However, it is still urgent to cultivate more professional talents in the field of ethnomedicine by issuing more preferential policies and funds. Researchers from different agencies and enthusiasm are encouraged to strengthen the investigation of Miao medicine plants. Books and databases of medicinal plants can be published, with supports from foundations, and providing free access to local healers and those (especially young people) who are interested in Miao ethnomedicine. For species with significant economic value, scientific institutions should accelerate scientific research on artificial breeding and cultivation. The advanced theories and methods of pharmacology, chemistry, and molecular biology should be applied to study the traditional Miao medicinal knowledge and enhance Miao people’s understanding and confidence. Because of its significance in economy and culture, the local government or administration agency may pay more attention to the medicinal market to provide a better environment for vendors and buyers. It is also necessary to encourage the Miao people to conserve medicinal plants in situ and ex situ, such as by planting endangered and preferred medicinal species in their home gardens or farmlands.
Conclusion
This study shows that sociocultural customs related to medicinal plants have brought about their own unique influences on daily life and become indispensable components in the folk culture and social custom in Kaili. In this study, we analyzed the data collected from 116 vendors who sold fresh or dried herbal medicinal material of 237 plant species to treat a wide spectrum of illnesses and diseases. Most of these plants were used in the treatment of heat and detoxification, traumas, skin diseases, and wounds. Inflammatory diseases have the highest value of used citations, followed by stomach, intestine, and liver diseases. The occurrence of these diseases is likely associated with local living habits and environmental conditions. Three medicinal plant species, *Eleutherococcus nodiflorus*, *Sargentodoxa cuneata*, and *Stephania cepharanthia*, which are used by the local people, have a particularly high public recognition and consistent patterns of use: The next step should include further studies on these plants’ chemistry, pharmacology, biological activity, and toxicity for potentially developing functional foods or pharmaceutical products.

Although high numbers of medicinal plant species have been reported to be used for human health problems, many wild species are being threatened by various anthropogenic factors, while conservation efforts are less practiced in the study area.

Furthermore, the knowledge on herbal remedies is held by elders, who are less educated, while most young people prefer to look for jobs in urban areas instead of studying traditional medicinal knowledge in the countryside. It is therefore urgent to find solutions for conserving and transmitting the traditional medicinal knowledge in the study area.

Acknowledgements
We are grateful to those who participated in the market surveys and field investigations: Dongping Li and Wenhua Zhang from Kaili University, Yue Zhou, Yuanyuan Ji, and Hang Shu from Minzu University of China, and Debra Kramer from Montana State University. We fully acknowledge the local vendors and healers for participating in the surveys and sharing their knowledge on the use of medicinal plants with us. Without their contribution, this study would have been impossible.

Authors’ contributions
CL conceived the research, revised and finalized the manuscript, and identified most plants. SL prepared the draft version and revised the manuscript. All authors carried out the fieldwork research for this study. Co-first authors reviewed the literature and analyzed the data. EJK edited the English and provided helpful comments. All authors read and approved the final manuscript.

Funding
This work was financially supported by the National Natural Science Foundation of China (31873016, 31761143001, 31161140345, 31630070, and 31660083), Minzu University of China (2020MJD(03), and Jiannsheng Fresh Herb Medicine & Foundation (JSYY-20190101-043).

Availability of data and materials
All data generated or analyzed during this study are included in this published article.

Declarations

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

Consent for publication
Not applicable.

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

Author details
1 Key Laboratory of Ecology and Environment in Minority Areas, Minzu University of China, National Ethnic Affairs Commission, Beijing 100081, China. 2 College of Life and Environmental Sciences, Minzu University of China, Beijing 100081, China. 3 Key Laboratory of Ethnomedicine, Minzu University of China, Ministry of Education, Beijing 100081, China. 4 School of Life and Health Science, Kaili University, Guizhou 556000, China. 5 Lehman College, City University of New York, Bronx, NY 10468, USA. 6 Kunming Institute of Botany, Chinese Academy of Sciences, Kunming 650201, China.

Received: 11 August 2021 Accepted: 17 November 2021
Published online: 29 November 2021

References
1. Cragg GM, Newman DJ. Natural products: a continuing source of novel drug leads. Biochim Biophys Acta. 2013;1830(6):3670–95. https://doi.org/10.1016/j.bbaagen.2013.02.008.
2. Fowler MW. Plants, medicines and man. J Sci Food Agric. 2006;86:1797–804.
3. Randimbivololona F. Research, valorization and exploitation of biological resources for medicinal purposes in the Malagasy Republic (Madagascar). J Ethnopharmacol. 1996;51:195–200.
4. Applequist WL, Brinckmann JA, Cunningham AB, Hart RE, Heinrich M, Katerere DR, van Andel T. Scientists & apos; warning on climate change and medicinal plants. Planta Med. 2020;86(1):10–8. https://doi.org/10.1055/a-1041-3406.
5. World Health Organization. WHO traditional medicine strategy 2002–2005. Geneva: World Health Organization; 2002.
6. Robinson MM, Zhang X. The world medicines situation 2011: Traditional medicines: global situation, issues and challenges. Geneva: World Health Organization; 2011.
7. Guo WW, Yuan TZ, Long DY, Zhou XX, Sun YL, Wang JX, Zhong L. Innovation and development of traditional Miao medicine. J Med Pharm Chin Minorities. 2020;26(2):74–5. https://doi.org/10.16041/j.cnki.cn15-1175.c.2020.02.031.
8. Lima PG, Coelho-Ferreira M, da Silva SR. Perspectives on medicinal plants in public markets across the Amazon: a review. Econ Bot. 2016;70(1):64–78. https://doi.org/10.1007/s12231-016-9338-y.
9. Randriamiharisoa MN, Kuhlman AR, Jeannoda V, Rabarison H, Rakotoarivelo N, Randriananivony T, Raktoarivony F, Randrianisolo A, Bussmann RW. Medicinal plants sold in the markets of Antananarivo, Madagascar. J Ethnobiol Ethnomed. 2015;11(1):60. https://doi.org/10.1186/s13002-015-0046-y.
10. Kasper-Pokoś R, Petras M, Luczaj L. Wild and native plants and mushrooms sold in the open-air markets of south-eastern Poland. J Ethnobiol Ethnomed. 2016;12(1):45. https://doi.org/10.1186/s13002-016-0117-8.
11. Kebede A, Ayailev S, Mesfin A, Mululeam G. Ethnobotanical investigation of traditional medicinal plants commercialized in the markets of Dire Dawa City, eastern Ethiopia. J Med Plants Stud. 2016;4(3):170–8.
Publisher’s Note
Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.