

An ethnobotanical study on wild plants used by Tibetan people in Gyirong valley, Tibet, China

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Abstract

Background: Gyirong valley is known as the “Back Garden of the Himalayas” and is located in the core area of the Everest National Nature Reserve. Gyirong is also one of the important ports from ancient Tibet to Kathmandu, Nepal. Over the years, the Tibetans of Gyirong had accumulated sufficient traditional knowledge about local plant resources. However, there is almost no comprehensive report available on ethnobotanical knowledge about the local people. The purposes of this study were to (1) conduct a comprehensive study of WEPs used by Tibetan people in Gyirong valley, document the traditional knowledge associated with wild useful plants, and (2) evaluate species with important cultural significance to Tibetan people of Gyirong Valley.

Methods: Ethnobotanical data were documented through free listings, key informant interviews, and semi-structured interviews during fieldwork. The culture importance index (CI), and the informant consensus factor index (FIC) were used as quantitative indices.

Results: In total, 120 informants (61 women and 59 men) and 3,333 use reports and 111 wild plant species belonging to 39 families and 81 genera were included. These use reports were then classified into 27 categories belonging to 3 major categories. The use category that contained the most plant species was edible plants (62), followed by medicinal plants (32), and other uses (71). Plants with high CI included *Allium prattii*, *Neopicrorhiza scrophulariiflora*, *Gymnadenia orchidis*, *Rhododendron anthopogon*, *Fritillaria cirrhosa*. There are 36 species of plants in the catalog of Gyirong and Yadong were the same, but only 17 species were the same in Gyirong and Burang. There were only 11 overlapping species between all the three regions.

Conclusion: Tibetans of Gyirong have rich and unique knowledge about plant use, and wild edible and medicinal plants play an important role in the nutrition and health protection of local people. There is a higher proportion of ritual plants and wooden bowl handicraft plants in Gyirong. However, traditional knowledge is slowly being lost and is being hit by modern tourism. In the future, more attention needs to be paid to the important role of traditional knowledge in biodiversity conservation.

Background

Since antiquity, humans have been using a great diversity of wild plants for food, medicines, fuel and many other purposes [1, 2]. With the development of society and economy, wild plants still play an important role in modern people's life. The collection and consumption of wild plants have become a part of contemporary people's livelihood [3–6]. In addition, wood, feed, handicrafts, etc., are inseparable from the wild plants [7–10]. Geography and culture influence the way humans choose to use plants in their behavior and knowledge [11]. However, traditional knowledge is also losing due to the loss of traditional culture and conversion of forest ecosystems to other types of land use, which may be completely lost in future development [12, 13]. Therefore, it is important to record and preserve the traditional plant knowledge associated with plants.

China has a long history of using native plants and a large quantity of recorded knowledge on useful plants [14]. Research on traditional knowledge of wild useful plants is very rich in China, especially in the southwest region [15–18]. The studies here have promoted the recording and protection of traditional plant knowledge, resulting in important guiding significance for the future response to climate change and food and medicine shortages [19].

Tibetans are one of the 56 ethnic minorities in China, mainly living in the Qinghai-Tibet Plateau, with an average altitude of over 4000 m [20, 21]. They have extensive knowledge of wild useful plants [22–26]. As one of the nations living in the Qinghai-Tibet Plateau for generations, Tibetans can adapt to the harsh climate on the plateau, which is inseparable from the use of wild plants, while it is still relatively lacking of research. Ethnobotanical research on Tibetans in China is mainly concentrated in Yadong and Purang in the Himalayas, Qinghai, Gansu and Sichuan in western China [22, 27–33]. As for

foreign countries, they are mainly concentrated in Nepal, Bhutan and other regions [32, 34–39]. Compared with the huge distribution range of Tibetans, the scope of research on Tibetans is still very narrow, thus we need more deep researches.

Rivers cut through the Himalayas, forming several river valleys in the mountains. The valley received moisture from the warm currents of the Indian Ocean, which caused the climate is warm and humid. Therefore, the river valleys have become the rice and grain warehouse, and the refuge of humanities of Tibet. For example, Yadong, Burang, Zhangmu and Chentang, are all important trade routes and grain producing areas in Tibet. Gyirong valley known as the “Back Garden of the Himalayas” and is located in the core area of the Everest National Nature Reserve to the south of Shigatse City in the Tibet Autonomous Region of China, which is the main ethnic group is Tibetans [40]. The traditional trade between China and Nepal has a long history. Since the Han and Tang Dynasties, there have been silk trade traffic routes from mainland China through Tibet, Nepal (known as Nibala in ancient times) and India. Among them, Gyirong is one of the important ports from ancient Tibet to Kathmandu, Nepal [40, 41], as well as an important land port in China, with special location and geographical advantages.

Due to their unique topographical features and history, the Tibetan of Gyirong have accumulated rich traditional knowledge of wild and available plants. The purposes of this study were to (1) conduct a comprehensive study of WEPs used by Tibetan people in Gyirong valley, record the traditional knowledge associated with wild useful plants, and (2) evaluate species with significant cultural significance to local Tibetan people.

Method

Study area

Gyirong Town is located in the southwest of Shigatse City, Tibet Autonomous Region of China, in the core area of Mount Everest Reserve, and adjacent to Nepal in the south. The average temperature is 10 °C - 13 °C, and the vegetation types are mainly mountain coniferous forest and mixed coniferous and broad-leaved forest. It is known as the “back garden of the Himalayas” [42–44].

Tibetans in Gyirong

Tibetans are one of the fifty-six ethnic groups in China. The distribution in China is divided into three regions according to dialects, namely as Ü-Tsang, Kham and Amdo areas. The Tibetans in Gyirong Town belong to the Ü-Tsang dialect area. Local Tibetans have rich traditional knowledge, such as handicrafts, medicinal plant knowledge, etc [9, 43, 44].

Field survey and data collection

The field research took place between 2019 and 2021, from August to September—the months of abundance of traditionally collected wild useful plant in Gyirong valley. First, field study permission was obtained from the local community committee and government authority. We explained our purpose to local governments and requested assistance from them. All our fieldwork was conducted with informed consent.

The snowball sampling method was used to select the key informants, such as veterinarians and herdsman. Other informants were selected by the randomized household interview method. Data were collected through individual semi-structured interviews conducted among local 126 informants, which constitutes the classic method in ethnobiology. Because many Tibetans in the study area cannot speak Mandarin fluently, the field work was performed with the assistance of local guides who were employed with the help of local community leaders. All interviews were conducted in the Tibetan language, which was translated into Mandarin by local guides. All field studies were conducted with the consent of informants. The use reports of each informant for the plants were recorded. The information was acquired through informants’ answers to our questions: ‘Would you mind listing some wild plants you have used?’, ‘How to use this plant?’, ‘Which plant parts were used, roots, stems, leaves or other parts?’, ‘Why do you use this species?’, ‘What time do you

collect this plant?'. The questions were designed to collect data on the (1) vernacular name of the plants, (2) category of use, (3) parts used, (4) methods for preparation and administration, (5) characteristics of the plant material (dried or fresh), and (6) collection time.

The specimens were collected from the field of the survey with the help of the key informants and all materials are labelled with numbers and names. Photographs of each plant were taken. All specimens were kept in the herbarium of Kunming Institute of Botany (KUN). The Flora of China was used to help identify the plants [45] and The Plants of the World Online was used to ensure the Latin name of the plants [46].

Data analysis

We adopted the Use report (UR) and cultural important index (CI) as ethnobotanical indices. All information about the use of local plants was organized into a "use report" list consisting of three parts: informant, used plant and used category [47, 48]. The criteria for the use categories of plants mainly refer to The Economic Botany Data Collection Standard (EBDCS) and have been partially modified in practice [48].

The cultural important index (CI) was the sum of the proportion of informants that mentioned each of the use categories for a given species [49]. In other words, CI represents the diversity of plant uses and the degree of recognition of information sources for each use category. The calculation formula is as follows:

$$CI = \sum_{u=1}^{uNC} \sum_{i=1}^{iN} \frac{UR_{ui}}{N}$$

NC was the total number of use categories and N was the total number of informants. CI ranges between 0 and the number of all use categories. A higher CI value indicated the multiple uses of a species and a higher degree of recognition. This index is used to quantitatively evaluate the importance of a certain plant to Tibetan of Gyirong from the perspective of comprehensive value.

The informant consensus factor index (FIC) was developed by Robert T. Trotter [50]. FIC was used to evaluate the degree of consensus among the population about how to treat a particular disease. The calculation formula is as follows:

$$FIC = \frac{Nur - Nt}{Nur - 1}$$

Where Nur is the number of use reports from the informants for a particular disease and Nt is the total number of plant species used to treat the disease. The FIC values range between 0 and 1. A higher FIC means that different herbalists have a higher consensus on the plant species used to certain use categories.

Results

Characteristics of informants

The study documented 3333 use reports (UR) from 120 informants. Among the informants, 59 were men and 61 were women. The informants were aged from 17 to 87 years, the average age was 48 years, while that of men was 49 years, and 46 years for women (Table 1).

The diversity of wild plants used by locals

Local Tibetan people use a variety of wild plants. We recorded and sorted out the folk usage of 111 plant species, including scientific names, vernacular names, usage, used part, the number of UR and CI (Table 2).

The taxonomic types of wild plants used by Tibetan people included angiosperms (104 species), gymnosperms (5), and ferns (2). These plants belong to 39 families and 81 genera. The most represented family was Rosaceae (14), followed by Compositae (7) and Polygonaceae (6) (Fig. 2a). The life forms of these plants are mostly herbaceous (64), followed by trees (19), shrubs (19) and vines (8).

The use of plants by local people involves many parts, such as fruits, roots, leaves, stems, whole plants, aerial parts, bulbs, barks, seeds, pericarps, and tubers. The most used parts are fruits (29 species), followed by stems (25) and roots (17) (Fig. 2b).

Among all wild useful plants, there are 13 species of endangered plants, of which there are 1 species of EN level, which is *Neopicrorhiza scrophulariiflora*. There are 7 species of VU levels. There are 5 species of NT levels. Among these 13 species, there are 3 species of economic plants, and the others were edible and medicinal plants. In addition, there are 16 species endemic to China among all useful plants [51] (Fig. 2c).

Edible plants

Wild edible plants (WEPs) were the most extensively used in all categories with 62 edible species belonging to 33 families, and the main edible parts of WEPs are fruits and stems. The WEPs used by Tibetan people include wild fruits, vegetables, seasonings, food substitutes, and tea substitutes. Among these, wild fruit is the most frequently used (30 species), followed by the consumption of wild vegetables (27). The most frequently reported species were *Allium prattii* (135), followed by *Zanthoxylum bungeanum* (97), *Rosa sericea* (91), *Pteridium aquilinum* var. *latiusculum* (86) and *Fragaria nubicola* (83) (Fig. 3).

Medicinal plants

Wild medicinal plants are the second largest category of wild plants used by Tibetan people of Gyirong town. These plants belong to 22 families and have been documented to treat 15 different types of human diseases. The most frequently mentioned were muscular-skeletal system disorders, followed by respiratory system disorders. The family with the most species was Compositae (5 species). The main medicinal parts were roots. The most frequently reported species were *Neopicrorhiza scrophulariiflora* (107 Use reports), followed by *Gymnadenia orchidis* (75), *Artemisia calophylla* (72), *Fritillaria cirrhosa* (61), *Rhodiola himalensis* (48), *Gastrodia elata* (46) (Fig. 4).

Other use categories

In total, 71 plants from other use categories, including fulewoods, ritual plants, economic plants, tools, dye, fodder, and crafts. A total of 22 wild plants were used as economic plants, and the most frequently reported species were *Fritillaria cirrhosa*. Wild economic plants are an important source of local income (Fig. 5a). A variety of economic plants are sold in local shops. In addition to plants, there are *Cordyceps* sp. and wild *Ganoderma* sp. (Table 3).

Tibetans burn some plants in their daily life to pray for happiness. A total of 22 wild plants were used for ritual use (Fig. 5b), and the most frequently reported species were *Rhododendron anthopogon*.

A total of 21 plant species were used as fodders (Fig. 5c), and the most frequently reported species were *Polygonum tortuosum*, followed by *Fargesia* sp. and *Poaceae* sp. Animal husbandry is one of the local important industries. In addition to grazing in pastures, local Tibetans also collect some plants and store them before the withered period arrives to supplement nutrition for livestock.

In addition, a total of 30 wild plants were used as fuelwood (Fig. 5d), tools, dyes and crafts. Among them, the most frequently reported is *Rheum australe*, which is used to dye clothes and wooden bowls. The locals collect its roots, dry them in the sun, boil them in water, and put them in wooden bowls to dye them red. The making of wooden bowls is a symbolic handicraft culture of the Gyirong. They collect the stems of dead birch or cypress trees and process them into wooden bowl handicrafts is more well documented in our previous study [9].

Evaluation and selection of wild edibles based on FIC

The wild plants used by Tibetan people include edible plants (62 species), medicinal plants (32), cultural plants (24), economic plants (24), fodders (20), fuelwoods (19), craft plants (10), tools (5), dyes (4) (Table 4).

The FIC results for the 27 use categories ranged from 0.5714 to 0.9774, and the values of the FIC were the highest for respiratory system disorders (0.9774), followed by muscular-skeletal system disorders (0.98) and the lowest for fodder (0.6935), followed by veterinary medicine (0.5714). Some categories contain only one species, including beverage, starches, inflammation, poisonings, and eyes disorders. The most frequently reported category was starches (60 use reports) (Table 4).

Discussion

Comparison of wild useful plants between Tibetan ethnic groups in different areas

To better discuss the plant use characteristics of Tibetans of Gyirong. We compared our study with other comprehensive ethnobotanical studies of the Tibetan people that have been performed in the Himalayan region. We mainly compared the differences in wild useful plant species among Gyirong (with a total of 110 species), Burang (with a total of 75 species) [27], and Yadong (with a total of 121 species) [22]. The results showed that 36 species of plants in the catalog of Gyirong and Yadong were the same, but only 17 species were the same in Gyirong and Burang. In addition, there were only 11 overlapping species between all the three regions. In general, the wild useful plant resources in Gyirong and Yadong are more abundant and similar than in Burang.

Firstly, these differences might be caused by the distribution of the plants. The research areas are not the same size, and the geographical, climatic environments and vegetation types are different [52]. Gyirong and Yadong include tropical to sub-tropical climate and the main vegetation type is coniferous broad leaved mixed forest. However, Burang Town belongs to the temperate arid climate, and the main vegetation types are desert grassland [53].

Secondly, different cultural backgrounds will affect the use of plants [11, 54, 55]. Gyirong is an ancient trade route for thousands of years [42]. Yadong is a trade port opened in modern times, and it is also the way to go through the ancient tea-horse road [40]. Purang is the pilgrimage road to Mount Kailash. Although these three are important trade ports from Tibet to the South Asian subcontinent, their historical background and cultural exchanges are different. In addition, the dialect of the three areas is not consistent. The Gyirong dialect stands in very close connection with a number of Tibetan dialects spoken in the adjoining parts of Nepal [56].

All in all, Gyirong belongs to the core area of Mount Everest Reserve, and it is also an important trade port from Tibet to the South Asian subcontinent for thousands of years. It has rich plant diversity and a long history and culture. This also creates the particularity of the use of Tibetan plants in Gyirong. Local people have rich knowledge of medicinal and edible plants, and have also forming a self-contained economic plant circulation route. In addition, the Gyirong Tibetans have different plant use categories from the other two regions, including wooden bowl handicraft plants. This is also one of their intangible cultural heritage.

Important wild useful plants

Based on the results of the CI quantitative analysis, we evaluated the top five wild plants that are important in the daily life of Tibetans in Gyirong Town.

Allium prattii C.H.Wright CI=1.071 is an important edible plant in Gyirong. Its young leaves and bulbs can be eaten as wild vegetables, and its fruits and flowers can be eaten as seasonings. This plant is widely distributed in the Himalayas of China and northern India and Nepal [57]. It is also used as an edible plant in many areas, for example, in Yadong County, Tibet, it has the same usage as Gyirong [22]. In Litang, Sichuan, China, the Tibetans also use the fresh bulb of the plant as a wild vegetable and spice [32]. In addition, it is recorded in the Tibetan medical scripture "Jing Zhu Ben Cao" that the plant can increase appetite and has medicinal properties for treating digestive system diseases [58].

The roots of *Neopicrorhiza scrophulariiflora* (Pennell) D.Y.Hong CI=1.016 is an effective medicine for inflammation and fever. Locals grind the dried root and drink it with boiling water. The plant is mainly distributed in the eastern Himalayas, at the junction of China and Nepal [57]. *N. scrophulariiflora* was widely used by the locals to treat cold. According to the Chinese Pharmacopoeia, this plant can treat many diseases [44]. In the Yadong County of the Himalayas and Maithili region of eastern Nepal, the plant is used by locals to treat fever and headaches with high consensus [30]. This plant was first recorded in the "Si Bu Yi Dian" and was mainly used to treat fever [23, 59].

Gymnadenia orchidis Lindl. (CI=0.921), the root of this plant is an important tonic, the locals cook it with chicken, duck or milk, which can nourish the body, and also sell the root to increase income. According to "Jing Zhu Ben Cao", this plant also has a good nourishing effect and is one of the traditional Tibetan medicinal plants. [58] It was first recorded in the Tibetan medical work "Four Medical Canons" born in the eighth century AD. [23, 59].

Rhododendron anthopogon D. Don CI=0.873 is an important ritual plant for "Sang" (People burn some plants in the morning to pray for a peaceful day) [60], the distribution range of *R. anthopogon* is almost all over the Himalayas, so is relatively easy to obtain [57]. The local Tibetans collect the old leaves of *R. anthopogon* and sun-dry them as materials for "Sang". In addition to *R. anthopogon*, *Juniperus indica* and *Artemisia* sp. are important materials for "Sang". *R. anthopogon* is also a beverage plant for local people to drink and sell. Its flowers are collected and sun-dried and then soaked in water to drink. It has a unique flavor, but drinking too much will cause headaches, which may be related to the toxic ingredients contained in it. According to the Chinese pharmacopoeia, its flowers and leaves are used separately in Tibetan medicine, and its flowers can be taken as tea, which has a good curative effect on asthma and chronic bronchitis [61].

The bulbs of *Fritillaria cirrhosa* D.Don CI=0.857 were used by the locals to treat colds and coughs, and the main processing method is decoction. In addition, *F. cirrhosa* is also an important economic plant and a veterinary medicinal plant. It is recorded in Chinese "Materia Medica and Tibetan Medicine Volume" that *F. cirrhosa* has the effect of resolving phlegm and relieving cough [23]. *F. cirrhosa*, which has high commercial value, has been excessively and indiscriminately harvested. As a result, its resources are declining sharply, and it is on the verge of extinction [62].

The state of traditional knowledge of wild useful plants in Gyirong

Tibetans of Gyirong have a wealth of knowledge and the reason for this state of knowledge is a special historical and biodiversity context. Most of the people who have acquired knowledge among the Tibetans of Gyirong are middle-aged, and these people have more voice and power in social life. Young people are reluctant to learn traditional plant knowledge [9]. The traditional knowledge mastered by the elderly is gradually forgotten as they do not carry out production work. Therefore, with the development of social economy and time, traditional knowledge is slowly disappearing or changing into other forms. Protecting and documenting pre-existing botanical knowledge is important and urgent.

Traditional knowledge of local Tibetans is also heavily influenced by traditional Tibetan medicine and tourism [9, 26]. In the catalog, the plants recorded in the traditional Tibetan medicinal books occupy the vast majority. In addition, locals sell

many wild plants in the store, including various seasonings and medicines, and these products are mainly aimed at tourists. With the development of commerce, the excessive collection of plants has caused a certain degree of damage to the local ecological environment [63]. The degree of collection and dependence on wild plants is related to the economic status of the local people. According to local government statistics on the basic situation of the township, the understory economy of wild plants has become an important source of economic income for locals. Such as, *Fritillaria cirrhosa*, *Neopicrorhiza scrophula* is suffering from exhaustive collection. In addition, there are 11 other plant species under different levels of protection, but these plants are not protected because of commercialization [51].

Gyirong Tibetans have a wealth of traditional knowledge, while there is great resistance to the inheritance of this knowledge and they are being attacked by modern tourism. In the future, more attention should be paid to the protection of local traditional knowledge and useful plant species.

Conclusion

Gyirong has rich plant diversity and a long history and culture. This study is the first systematic cataloging and evaluation work using ethnobotanical survey and research methods in Gyirong. This study enriched the ethnobotanical study of the Himalayan region and 111 wild plant species used in local Tibetan daily life were recorded. Multiple uses of these plants were analyzed and the most culturally significant species of the local Tibetan people were identified by quantitative methods. Medicinal and edible plants play a significant role for the local Tibetan people in household-level food and health. Based on the comparison study, Gyirong has a higher proportion of ritual plants and wooden bowl handicraft plants [9]. The use of wild plants differed sharply among different areas, which might be attributed to the various geographical environments, vegetation types, and different influences of cultures. Botanical traditional knowledge of Tibetan is also heavily influenced by tourism, locals sell many wild plants in the store. In the future, we should pay more attention to the reasonable protection of cherished plants and promote the inheritance and development of traditional knowledge.

Declarations

Availability of data and to participate

Please contact the corresponding author for data requests.

Ethical approval and consent to participate

The authors asked for permission from the local authorities and the people interviewed to carry out the study.

Consent for publication

The people interviewed were informed about the study's objectives and the eventual publication of the information gathered, and they were assured that the informants' identities would remain undisclosed.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

WYH organized the study team and provided technical support. GCA and DXY executed the research plan. GCA identified the specimen and wrote the manuscript. HHB, ZY and WYH collected the data. YHZ participated in the drawing of the map in the article. WYH reviewed the manuscript. All authors took part in the field works. All authors were involved in the drafting and revision of the manuscript and approved the final revision.

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Tables

Table 1

Characteristics of informants

Characteristics	Number	Percentage
<i>Communities</i>		
Chongse	5	5%
Jiangcun	9	9%
Jipu	16	16%
Langjiu	9	9%
Maga	20	20%
Nai	22	22%
Rema	18	18%
Resuo Bridge	3	3%
Zhacun	18	18%
<i>Gender</i>		
Female	61	61%
Male	59	59%
<i>Age</i>		
Below 20	5	5%
20-29	12	12%
30-39	19	19%
40-49	27	27%
50-59	26	26%
60-69	21	21%
70-79	7	7%
Above 80	3	3%

Table 2

List of plants used by the Tibetan people in Gyirong

Botanical taxon	Botanical family	Local name(s)	Voucher	Parts used	Local use of Urs and Preparation	No. of Urs	UR	CI
<i>Chenopodium album</i> L.	Amaranthaceae	lei1; niu1; niu1-che1-ma1	QTB-JL-42	leaves	food: vegetable (14), used to make bun or fry.	14	14	0.111
<i>Allium chrysanthum</i> Regel	Amaryllidaceae	guo1-ba1	QTB-JL-21	roots	food: vegetable (20), used to make bun or fry; seasoning (7), cook it with pork and potatoes.	27	27	0.214
<i>Allium fasciculatum</i> Rendle	Amaryllidaceae	ou1-ga1	QTP-EBT-3050	aerial parts	food: vegetable (10), used to make bun or fry; seasoning (7), cook it with pork and potatoes.	17	17	0.135
<i>Allium prattii</i> C.H.Wright	Amaryllidaceae	ru1-ba1; ri1-guo1	QTP-EBT-3009	aerial parts	food: vegetable (126), used to make bun or fry; seasoning (9), cook it with pork and potatoes.	141	141	1.119
<i>Allium przewalskianum</i> Regel	Amaryllidaceae	ri1-guo1; zen1-bu1	QTP-EBT-3200	leaves	food: seasoning (19), as part of the dip; economic (1), be sold in stores.	20	20	0.159
<i>Allium wallichii</i> Kunth	Amaryllidaceae	ru1-guo1	QTB-JL-55	aerial parts	food: seasoning (6), cook it with pork and potatoes or as part of the dip.	6	6	0.048
<i>Angelica sinensis</i> (Oliv.) Diels	Apiaceae	dang1-gui1	QTB-JL-41	roots	medicine: tonic (3), cook it with meat.	3	3	0.024
<i>Carum carvi</i> L.	Apiaceae	guo1-nie1	QTB-JL-63	leaves; seeds	food: vegetable (25), the leaves are cooked with other ingredients; seasoning (35), use seeds to make a dip or a sausage; medicine: gastralgia (5), seed soak in water	65	65	0.516
<i>Chaerophyllum villosum</i> Wall. ex DC.	Apiaceae	da1-ga1-li1	QTB-JL-20	leaves	economic (3), be sold in stores; food:	5	5	0.040

					seasoning (1), cook its leaves with meat; fodder (1): the leaves are used to feed cattle		
<i>Heracleum candicans</i> Wall. ex DC.	Apiaceae	jiong4- wa1- dong1- bu4	QTB-JL- 43	aerial parts	medicine: headache (1); soak in water.	1	0.008
<i>Aralia</i> sp.	Araliaceae	jia1-ra3- cei3- ma1	QTB- JPG-10	leaves	food: vegetable (2), cook vegetable.	2	0.016
<i>Aralia tibetana</i> G.Hoo	Araliaceae	dai1- ga1-ni1	QTB-JL- 46	whole plant	fodder (5): the leaves are used to feed cattle	5	0.040
<i>Panax pseudoginseng</i> Wall.	Araliaceae	san1- jing1	QTP- EBT- 3084	roots	medicine: tonic (30), soak in water; economic (25): be sold in stores.	55	0.437
<i>Polygonatum cirrhifolium</i> (Wall.) Royle	Asparagaceae	ra3- mu1- xia3- jia1	QTB-JL- 1	aerial parts; roots	food: vegetable (26), cook vegetable; economic (8), be sold in store; medicine: nephropathy (11), roots soak in water or make soup.	35	0.278
<i>Polygonatum sibiricum</i> Redouté	Asparagaceae	rang3- ma1- xia-jia1	QTB-JL- 26	roots; aerial parts	medicine: tonic (15), roots soak in water or make soup; food: vegetable (45), cook vegetable; economic (12), be sold in store; fodder (3): used to feed cattle.	75	0.595
<i>Artemisia calophylla</i> Pamp.	Asteraceae	bang1- ma1	QTB-JL- 50	aerial parts	ritual use (4), used to burn in incense burner; medicine: rheumatism (72): used it to sweat steaming or leaves soak in water to drink.	76	0.603
<i>Artemisia japonica</i> Thunb.	Asteraceae	kang1- ba1	QTB-JL- 59	aerial parts	ritual use (60), used to burn in incense burner; medicine: detoxification (23), soak in water;	87	0.690

					economic (4): be sold in store.		
<i>Artemisia youngusbandii</i> J. R. Drumm. ex Pamp.	Asteraceae	sang1- kang3- ba1	QTB-JL- 49	aerial parts	ritual use (4), used to burn in incense burner; medicine: rheumatism (4), used it to sweat steaming or leaves soak in water to drink.	8	0.063
<i>Galinsoga parviflora</i> Cav.	Asteraceae	cuo1- ma1	QTP- JPG-6	whole plants	fodder (1): used to feed cattle.	1	0.008
<i>Leontopodium souliei</i> Beauverd	Asteraceae	ba1- wa1	EBT-PL- 99	leaves	tool (2), used it to start a fire.	2	0.016
<i>Saussurea tridactyla</i> Sch.Bip. ex Hook.f.	Asteraceae	gang3- la1- mei3- duo3	QTB-JL- 66	whole plants	economic (36), be sold in store; medicine: arthrophlogosis (46): soaked in water.	82	0.651
<i>Taraxacum sikkimense</i> Hand.-Mazz.	Asteraceae	se4-ji4- mei3- duo3	QTB-JL- 110	whole plant	medicine: endocrine (3), soaked in water; economic (2), be sold in store.	5	0.040
<i>Impatiens bicornuta</i> Wall.	Balsaminaceae	po1-zi1	QTB-JL- 73	seeds	varnish (12), used to polish furniture	12	0.095
<i>Impatiens falcifer</i> Hook.f.	Balsaminaceae	po1-zi1	QTB-JL- 15	seeds	varnish (14), used to polish furniture	14	0.111
<i>Impatiens scabrida</i> DC.	Balsaminaceae	po1-zi1	QTB-JL- 70	seeds	varnish (13), used to polish furniture	13	0.103
<i>Impatiens sulcata</i> Wall.	Balsaminaceae	po1-zi1	QTB-JL- 62	seeds	varnish (11), used to polish furniture	11	0.087
<i>Berberis angulosa</i> Wall. ex Hook.f. & Thomson	Berberidaceae	jiu1- bo1; jiu1-le1- bu1	QTB-JL- 113	leaves; fruits; branches	medicine: diarrhea (1), soaked in water; food: fruit (7), raw; fuelwood (2): used to burn.	10	0.079
<i>Berberis aristata</i> DC.	Berberidaceae	jiu1-lu1- xin1	QTB-JL- 28	fruits; branches	fuelwood (3), used to burn; food: fruit (2), raw.	5	0.040
<i>Berberis xanthophlaea</i> Ahrendt	Berberidaceae	giu1- lu1; giu1- le1-bu1; gei1-	QTB-JL- 27	barks; fruits	dyes (10), used to dye wool yellow; food: fruit (4), raw.	14	0.111

<i>Stauntonia angustifolia</i> (Wall.) R.Br. ex Wall.	Berberidaceae	pa1-ji1	QTP-JPG-2	fruits	food: fruit (2), raw.	2	0.016
<i>Betula utilis</i> D.Don	Betulaceae	da4-ge1-ba1	QTB-JL-7	burls; branches; stems	medicine: diabetes (8), soak in water; economic (2), be sold in store; fuelwood (14), used to burn; craft (7), used to make Tibetan traditional wooden bowls; ritual use (8), used to burn in incense burner; tool (6), used to make cooking utensils.	37	0.294
<i>Onosma hookeri</i> C.B. Clarke	Boraginaceae	guo1-mu1-mu1-zi1	QTP-EBT-3052	roots	medicine: hair follicle (4), soaked in canola oil and apply to the head; eczema (4); ritual use (7), used to burn in incense burner; economic (1), be sold in store.	16	0.127
<i>Capsella bursa-pastoris</i> (L.) Medik.	Brassicaceae	du1-yang1	QTB-JL-34	aerial parts	food: vegetable (8), cooked vegetable.	8	0.063
<i>Thlaspi arvense</i> L.	Brassicaceae	mang3-ru1	QTB-JL-35	leaves	food: vegetable (10), cooked vegetable	10	0.079
<i>Cannabis sativa</i> L.	Cannabaceae	si1-ma1	QTB-JL-78	barks	tool (8); fodder (4), used to feed cattle.	12	0.095
<i>Dipsacus asper</i> Wall. ex C.B. Clarke	Caprifoliaceae	lang1-zhu1-ma1	QTP-EBT-3053	aerial parts	fodder (1), used to feed cattle.	1	0.008
<i>Lonicera</i> sp.	Caprifoliaceae	se4-le4-qin1-mei3-duo3	EBT-PL-42	flowers	economic (2), be sold in store.	2	0.016
<i>Nardostachys jatamansi</i> (D.Don) DC.	Caprifoliaceae	bang1-bu4	QTB-JL-123	roots	ritual use (87), used to burn in incense burner; economic (1), be sold in store; medicine: relieving cough and asthma (4), soaked in water.	92	0.730

<i>Coriaria terminalis</i> Hemsl.	Coriariaceae	da1-lu1	QTP-EBT-3005	fruits	food: fruit (1), raw.	1	0.008
<i>Rhodiola himalensis</i> (D. Don) S.H. Fu	Crassulaceae	suo3-la1-ma3-bu4	QTB-JL-124	stems	medicine: tonic (20), hypertension (28), soaked in water; economic (19), be sold in store; ritual use (3), used to burn in incense burner.	70	0.556
<i>Cyclanthera pedata</i> (L.) Schrad.	Cucurbitaceae	ra3-ru1	QTB-JPG-12	fruits	food: vegetable (7), cooked vegetable.	7	0.056
<i>Herpetospermum pedunculatum</i> (Ser.) C.B. Clarke	Cucurbitaceae	sei1-lei1; sei1-lei1-mei3-duo3	QTB-JL-22	flowers; fruits	medicine: diarrhea (12), powder; veterinary medicine: diarrhea (3), powder.	15	0.119
<i>Solena heterophylla</i> Lour.	Cucurbitaceae	ma1-ma1-dong4-cei1	QTB-JL-80	fruits	food: fruit (6), raw.	6	0.048
<i>Trichosanthes lepiniana</i> (Naudin) Cogn.	Cucurbitaceae	ka1-ge1-di1	QTB-JL-24	seeds	medicine: fever (1), poder; economic (1), be sold in store.	2	0.016
<i>Juniperus indica</i> Bertol.	Cupressaceae	xiu1-bai1	QTB-JL-57	branches; stems	ritual use (67), used to burn in incense burner; fuelwood (7), used to burn; craft (6)	80	0.635
<i>Juniperus tibetica</i> Kom.	Cupressaceae	xiu1-bo1	QTB-JL-64	branche; stems	ritual use (38), used to burn in incense burner; fuelwood (22), used to burn; craft (20), used to make Tibetan traditional wooden bowls; food: fruit (2), raw.	82	0.651
<i>Pteridium aquilinum</i> var. <i>latiusculum</i> (Desv.) Underw. ex A. Heller	Dennstaedtiaceae	da1; da1-gu1; dai1-ga1; da1-li1	QTB-JL-10	leaves	food: vegetable (86), raw.	86	0.683
<i>Elaeagnus umbellata</i> Thunb.	Elaeagnaceae	ra1-lu1	QTB-JL-18	fruits	food: fruit (43), raw.	43	0.341

<i>Hippophae salicifolia</i> D. Don	Elaeagnaceae	da1-ru1	QTB-JL-16	fruits; branches	food: fruit (21), raw; seasoning (14), fruit juice is used as a substitute for vinegar; medicine: arthrophlogosis (3), the juice is used to smear the joints; fuelwood (1), used to burn.	39	0.310
<i>Rhododendron anthopogon</i> D. Don	Ericaceae	po1-lu1	QTB-JL-115	branches; flowers	ritual use (91), used to burn in incense burner; fuelwood (1), used to burn; medicine: eyesache (4), arthrophlogosis (4), flowers are used to soak water; beverage (6), soak in water; economic (4), be sold in store.	110	0.873
<i>Rhododendron arboreum</i> Sm.	Ericaceae	mei3-duo1	QTB-JL-30	branches; stems	fuelwood (7), used to burn; craft (9), used to make Tibetan traditional wooden bowls.	16	0.127
<i>Rhododendron lepidotum</i> Wall. ex G. Don	Ericaceae	su1-lu1	QTB-JL-114	branches	ritual use (15), used to burn incense burner	15	0.119
<i>Euphorbia micractina</i> Boiss.	Euphorbiaceae	ta3-lu1-ma1	QTB-JL-85	leaves	medicine: poisons (2)	2	0.016
<i>Quercus semecarpifolia</i> Sm.	Fagaceae	bai1-luo4	QTB-JL-25	stems; branches; leaves	ritual use (2), used to burn in incense burner; craft (15), used to make Tibetan traditional wooden bowls; fuelwood (48); fodder (5), used to feed cattle; food: starch (4), cooked fruit.	74	0.587
<i>Gentiana veitchiorum</i> Hemsl.	Gentianaceae	bang1-jie1-mei3-duo3	QTP-EBT-3024	whole plant	medicine: fever (18), soaked in water.	18	0.143
<i>Swertia cordata</i> (Wall. ex G. Don) C.B. Clarke	Gentianaceae	di1-ge1-da1	QTP-EBT-3111	aerial parts	medicine: fever (10), soak in water; economic (2); veterinary	13	0.103

					medicine (1), soak in water.		
<i>Isoetes hypsophila</i> Hand.-Mazz.	Isoetaceae	pa1- xia4	QTP- JPG-3	leaves	food: vegetable (25), cooked vegetable.	25	0.198
<i>Juglans regia</i> L.	Juglandaceae	da1-ba1	QTB-JL- 88	fruits; stems; branches	dyes (23), pericarp used to dye the container black; ritual use (9), used to burn in incense burner; food: fruit (9), raw; craft (30), used to make Tibetan traditional wooden bowls; fuelwood (12), used to burn.	83	0.659
<i>Elsholtzia fruticosa</i> (D.Don) Rehder	Lamiaceae	ma1- zei1	QTB-JL- 48	aerial parts	ritual use (12), used to burn in incense burner; fuelwood (5), used to burn.	17	0.135
<i>Nepeta densiflora</i> Kar. & Kir.	Lamiaceae	pi1-ba4	QTP- EBT- 3060	aerial parts	fodder (3), used to feed cattle	3	0.024
<i>Cicer microphyllum</i> Benth.	Fabaceae	pu3- gui3	EBT-PL- 13	fruits	food: fruit (2), raw.	2	0.016
<i>Fritillaria cirrhosa</i> D.Don	Liliaceae	bai1- mu4	QTP- EBT- 3012	bulbs	medicine: tonic (40), stew or soak in water; cold (20); economic (45), be sold in store; veterinary medicine (1), soak in water; food: fruit (2), raw.	108	0.857
<i>Malva verticillata</i> L.	Malvaceae	jiang4- ba1-la1- mu1	QTB-JL- 36	roots; leaves	food: vegetable (25), cooked vegetable.	25	0.198
<i>Paris polyphylla</i> Sm.	Melanthiaceae	bo1- luo3	QTP- EBT- 3085	arerial parts	ritual use (11), used to burn in incense burner; medicine: stomachache, soaked in water or wine (10); economic (2), be sold in store; vegetable (28), cooked vegetable.	51	0.405
<i>Gastrodia elata</i> Blume	Orchidaceae	tian3- ma3	QTP- JPG- 3292	roots	economic (29), be sold in store; medicine: headache (6), cardiopathy	77	0.611

					(40), slice and soak in water or stew; food: vegetable (2), used to make soup with chicken.		
<i>Gymnadenia orchidis</i> Lindl.	Orchidaceae	wang1-bu1-la1-ba1	QTB-JL-56	roots	medicine: pulmonary disease (5), soak in water or wine; burn (32), acne (38), used to daub affected area; economic (31); ritual use (10), raw materials for making Tibetan incense.	116	0.921
<i>Phytolacca acinosa</i> Roxb.	Phytolaccaceae	wo1-yang1	QTB-JL-84	leaves	food: vegetable (13), cooked vegetable.	13	0.103
<i>Larix potaninii</i> var. <i>himalaica</i> (W.C.Cheng & L.K.Fu) Farjon & Silba	Pinaceae	long3-xin1	QTP-JPG-7	branches; stems	fuelwood (4), used to burn; craft (9), used to make Tibetan traditional wooden bowls.	13	0.103
<i>Pinus wallichiana</i> A.B.Jacks.	Pinaceae	nong1-xin1; tang3-xin1	QTB-JL-39	branches; stems	fuelwood (44), used to burn; craft (7), used to make Tibetan traditional wooden bowls; ritual use (11), used to burn in incense burner; food: vegetable (7), cooked vegetable.	73	0.579
<i>Neopicrorhiza scrophulariiflora</i> (Pennell) D.Y.Hong	Plantaginaceae	di1-da1; hong1-lei1	QTB-JL-67	roots	medicine: cold and fever (107), soaked in water; economic (18), be sold in store; veterinary medicine: fever (3), soak in water.	128	1.016
<i>Plantago asiatica</i> L.	Plantaginaceae	wo1-ma1-ka1	QTP-EBT-3117	aerial parts	medicine: hypertension (4), soaked in water; food: vegetable (3), cooked vegetable.	7	0.056
<i>Plantago asiatica</i> subsp.	Plantaginaceae	ou3-ma1-	QTB-JL-12	leaves; roots	medicine: hypertension	5	0.040

<i>densiflora</i> (J.Z.Liu) Z.Y.Li		ka3			(2), soaked in water; food: vegetable (3), cooked vegetable.		
<i>Avena fatua</i> L.	Poaceae	sei1- za1-ba1	QTB- JPG-11	aerial parts	fodder (1), used to feed cattle.	1	0.008
<i>Fargesia</i> sp.	Poaceae	niu1- dong1	QTB-JL- 118	stems	economic (1), be sold in store; food: vegetable (66), cooked vegetable; craft (19), used to make bamboo plaits; ritual use (6), used to burn in incense burner; fuelwood (2), used to burn; fodder (7), used to feed cattle.	101	0.802
<i>Poaceae</i> sp.	Poaceae	zang4- ong1- bu4	QTP- JPG-8	whole plant	fodder (7), used to feed cattle.	7	0.056
<i>Fallopia denticulata</i> (C.C.Huang) Holub	Polygonaceae	a1- lang1- ba1- lang1	QTB-JL- 122	aerial parts; roots	fodder (2), used to feed cattle; medicine: diarrhea (5), hair follicle (2), soak in water.	9	0.071
<i>Pteroxygonum denticulatum</i> (C.C.Huang) T.M.Schust. & Reveal	Polygonaceae	ren3- bu1	QTB-JL- 45	aerial parts	fodder (2), used to feed cattle.	2	0.016
<i>Fagopyrum esculentum</i> Moench	Polygonaceae	bai1- bi1-ya1	QTB-JL- 60	arieal parts	fodder (3), used to feed cattle	3	0.024
<i>Koenigia tortuosa</i> (D.Don) T.M.Schust. & Reveal	Polygonaceae	nia1- luo1	QTB-JL- 4	aerial parts; stems	dye (6), used to dye wooden bowls or clothes yellow; fodder (8), used to feed cattle; food: fruit (4), raw.	18	0.143
<i>Rheum australe</i> D. Don	Polygonaceae	qu1- wa1; jiong1	QTB-JL- 3	stems; roots	fruit (17), raw eat tender stem; dye (53), used to dye wooden bowls or clothes yellow.	70	0.556
<i>Rumex nepalensis</i> Spreng.	Polygonaceae	xiu1- ma1	EBT-PL- 86	aerial parts	fodder (2), used to feed cattle.	2	0.016
<i>Gymnaconitum gymnandrum</i> (Maxim.) Wei Wang & Z.D.Chen	Ranunculaceae	zen1- du1; du3- wa1-	QTP- EBT- 3097	roots	medicine: poisons (16), rheumatism (16), soaked in water and	36	0.286

		ten3- du1			apply to the affected area; economic (4), be sold in store.		
<i>Aconitum jilongense</i> W.T.Wang & L.Q.Li	Ranunculaceae	beng3- ga1	QTB- JPG-1	roots	medicine: diarrhea (24), soak in water.	24	0.190
<i>Eriocapitella rivularis</i> (Buch.-Ham. ex DC.) Christenh. & Byng	Ranunculaceae	cei1-di1- ma1	QTB- JPG-9	aerial parts	fodder (1), used to feed cattle.	1	0.008
<i>Clematis rehderiana</i> Craib	Ranunculaceae	ba1-ji1- ma1	EBT-PL- 84	leaves	food: vegetable (2), cooked vegetable.	2	0.016
<i>Delphinium kamaonense</i> Huth	Ranunculaceae	jia1- bei1- mei1- duo1	QTB-JL- 37	aerial parts	fodder (1), used to feed cattle.	1	0.008
<i>Berchemia flavescens</i> (Wall.) Wall. ex Brongn.	Rhamnaceae	bo1- ge1-da4	QTB-JL- 93	fruits	food: fruit (45), raw.	45	0.357
<i>Chaenomeles thibetica</i> T.T.Yu	Rosaceae	bai1-la1	QTB-JL- 109	fruits	food: fruit (19), raw; fuelwood (3), used to burn.	22	0.175
<i>Fragaria nubicola</i> (Lindl. ex Hook.f.) Lacaita	Rosaceae	long1- mei1; sei1- duo1- zhe3- xin1	QTB-JL- 9	fruits; stems	fruit (83), raw; ritual use (3), used to burn in incense burner.	86	0.683
<i>Argentina anserina</i> (L.) Rydb.	Rosaceae	chu1- ma1	QTP- EBT- 3055	roots	food: starche (60), cooked and eat with yogurt or rice.	60	0.476
<i>Prinsepia utilis</i> Royle	Rosaceae	bu1- long1- che4- mang1	QTB-JL- 38	seeds	economic (9), be sold in store.	9	0.071
<i>Prunus holosericea</i> (Batal.) Kost.	Rosaceae	a1-lu1- ba3-lu1	QTB-JL- 91	fruits	food: fruit (6), raw.	6	0.048
<i>Prunus mira</i> Koehne	Rosaceae	kang3- bu4	QTB-JL- 69	fruits	food: fruit (53), raw.	53	0.421
<i>Rosa macrophylla</i> Lindl.	Rosaceae	sei1- duo1	QTB-JL- 29	branches; fruits	fuelwood (3), used to burn; food: fruit (11), raw.	14	0.111
<i>Rosa sericea</i> Lindl.	Rosaceae	gu1- jiu1- ma1; gun1- zhong1	QTB-JL- 17	fruits; branches	food: fruit (91), raw; fuelwood (1), used to burn; medicine: digestion (1), raw.	94	0.746
<i>Rubus aurantiacus</i> Focke ex Sarg.	Rosaceae	ni1-na1	QTB-JL- 14	fruits	food: fruit (6), raw.	6	0.048

<i>Rubus austrotibetanus</i> T.T.Yu & L.T.Lu	Rosaceae	nia1- lang1	QTB-JL- 82	fruits	food: fruit (55), raw.	55	0.437
<i>Rubus biflorus</i> Buch.- Ham. ex Sm.	Rosaceae	nie1- sen1; nia1- lang1	QTB-JL- 83	fruits	food: fruit (9), raw.	9	0.071
<i>Rubus niveus</i> Thunb.	Rosaceae	nia1- lang2	QTB-JL- 13	fruits	food: fruit (68), raw.	68	0.540
<i>Griffitharia vestita</i> (Wall. ex G.Don) Rushforth	Rosaceae	na1-zi1	QTB-JL- 5	fruits; branches	food: fruit (55), raw; fuelwood (1), used to burn; ritual use (2), used to burn in incense burner.	58	0.460
<i>Thomsonaria ochracea</i> (Hand.-Mazz.) Rushforth	Rosaceae	ca1-le1- ba1	QTB-JL- 92	branches	fuelwood (17), used to burn; tool (3), used to make handle; ritual use (1), used to burn in incense burner.	21	0.167
<i>Zanthoxylum bungeanum</i> Maxim.	Rutaceae	ei1-ma1	QTB-JL- 8	fruits; seeds	food: seasoning (83), vegetable (14), cooked it with meat; economic (3), be sold in store; medicine: endocrine (3), raw or soak in water; fuelwood (1), used to burn.	104	0.825
<i>Salix babylonica</i> f. <i>babylonica</i>	Salicaceae	jiang1- ma1	QTB-JL- 108	branches	fodder (5), used to feed cattle; fuelwood (3), used to burn; ritual use (3), used to burn in incense burner.	11	0.087
<i>Salix trichocarpa</i> C.F. Fang	Salicaceae	lang1- ma1	QTB-JL- 47	branches; flowers; stems	fuelwood (15), used to burn; ritual use (14), used to burn in incense burner; fodder (1), used to feed cattle; craft (3), used to make wooden bowl; food: vegetable (2), flower buds can be fried and eaten.	35	0.278
<i>Schisandra elongata</i> (Blume) Baill.	Schisandraceae	gong1- zhu1	QTB-JL- 117	fruits	food: fruit (7), raw.	7	0.056
<i>Tamarix chinensis</i> Lour.	Tamaricaceae	ong1- bu4	QTB-JL- 18	branches	ritual use (1), burned to	1	0.008

					sacrifice to the dead.		
<i>Taxus wallichiana</i> Zucc.	Taxaceae	sei1-ge1-xia4	QTB-JL-31	branches; fruits	fuelwood (11), used to burn; food: fruit (5), raw.	16	0.127
<i>Urtica ardens</i> Link	Urticaceae	suo3-wa1	QTP-JPG-5	leaves	food: vegetable (36), cooked vegetable.	36	0.286
<i>Urtica urens</i> L.	Urticaceae	suo3-wa1	QTP-JPG-4	leaves	food: vegetable (23), cooked vegetable.	23	0.183
<i>Viburnum cotinifolium</i> D. Don	Viburnaceae	gei1-jiu1-ma1	QTB-JL-51	fruits	food: fruit (4), raw.	4	0.032
<i>Viburnum nervosum</i> D. Don	Viburnaceae	ka3-la1-suo1	QTB-JL-102	fruits	food: fruit (6), raw.	6	0.048

Table 3

A price list from a shop in Gyirong

Botanical taxon	Local name(s)	Parts	Price (RMB/500g)
<i>Zanthoxylum bungeanum</i> Maxim.	ei1-ma1	fruits	50/500g
<i>Allium przewalskianum</i> Regel	zen1-bu1	leaves	50/500g
<i>Gastrodia elata</i> Blume	tian3-ma3	roots	1200/500g
<i>Polygonatum sibiricum</i> F.Delaroche	rang3-ma1-xia-jia1	roots	190/500g
<i>Gymnadenia orchidis</i> Lindl.	wang1-bu1-la1-ba1	roots	500/500g
<i>Rhodiola himalensis</i> (D. Don) S.H. Fu	suo3-la1-ma3-bu4	roots	150~750/500g
<i>Fritillaria cirrhosa</i> D.Don	bai1-mu4	bulbs	700~1000/500g
<i>Rhododendron anthopogon</i> D. Don	po1-lu1	flowers	50/500g
<i>Pinus wallichiana</i> A.B.Jacks.	tang3-xin1	pollen	500/500g
<i>Carum carvi</i> L.	guo1-nie1	seeds	50/500g
<i>Taraxacum sikkimense</i> Hand.-Mazz.	se4-ji4-mei3-duo3	whole plant	80/500g
<i>Solanum tuberosum</i> L.	a3-lou3	tuber	25/500g
<i>Capsicum annuum</i> L.	ku1-sa1	fruits	50/500g
<i>Ganoderma</i> sp.	po1-lu4-xia1-mo4	fruiting body	600~1200/500g
<i>Cordyceps sinensis</i> (Berk.) Sacc.	ya1-za1-gong1-bu4	fruiting body	30~50/piece
Wooden spatulas			10/piece
Wooden bowls			80 ~250/piece
Bamboo products			150~300/piece
Gourd ladle			25/piece
Tibetan incense powder			15 yuan/jar

Table 4

Use categories and FIC

Local use	Secondary usecategories	Ns	Urs	FIC
<i>Edible plants</i>		62	1533	0.9602
	Fruits	30	617	0.9529
	Seasonings	9	173	0.9535
	Vegetables	27	677	0.9615
	Beverages	1	6	1.0000
	starches	1	60	1.0000
<i>Medicinal plants</i>		32	614	0.9494
	poison	2	18	0.9412
	inflammation	1	32	1.0000
	poisonings	1	23	1.0000
	infections	2	11	0.9000
	digestive system disorders	7	53	0.8846
	respiratory system disorders	4	134	0.9774
	nutritional disorders	5	108	0.9626
	endocrine system disorders	2	6	0.8000
	muscular-skeletal system disorders	5	142	0.9716
	genitourinary system disorders	2	19	0.9444
	skin disorders	4	48	0.9362
	veterinary medicine	4	8	0.5714
	nervous system disorders	2	7	0.8333
	circulatory system disorders	4	74	0.9589
	eyes	1	4	1.0000
<i>Other use</i>		71	1298	0.9460
	tools	5	21	0.8000
	crafts	10	123	0.9262
	dyes	4	87	0.9651
	economic plants	22	261	0.9192
	fodders	20	63	0.6935
	fuelwoods	19	215	0.9159
	ritual plants	24	528	0.9564

Figures

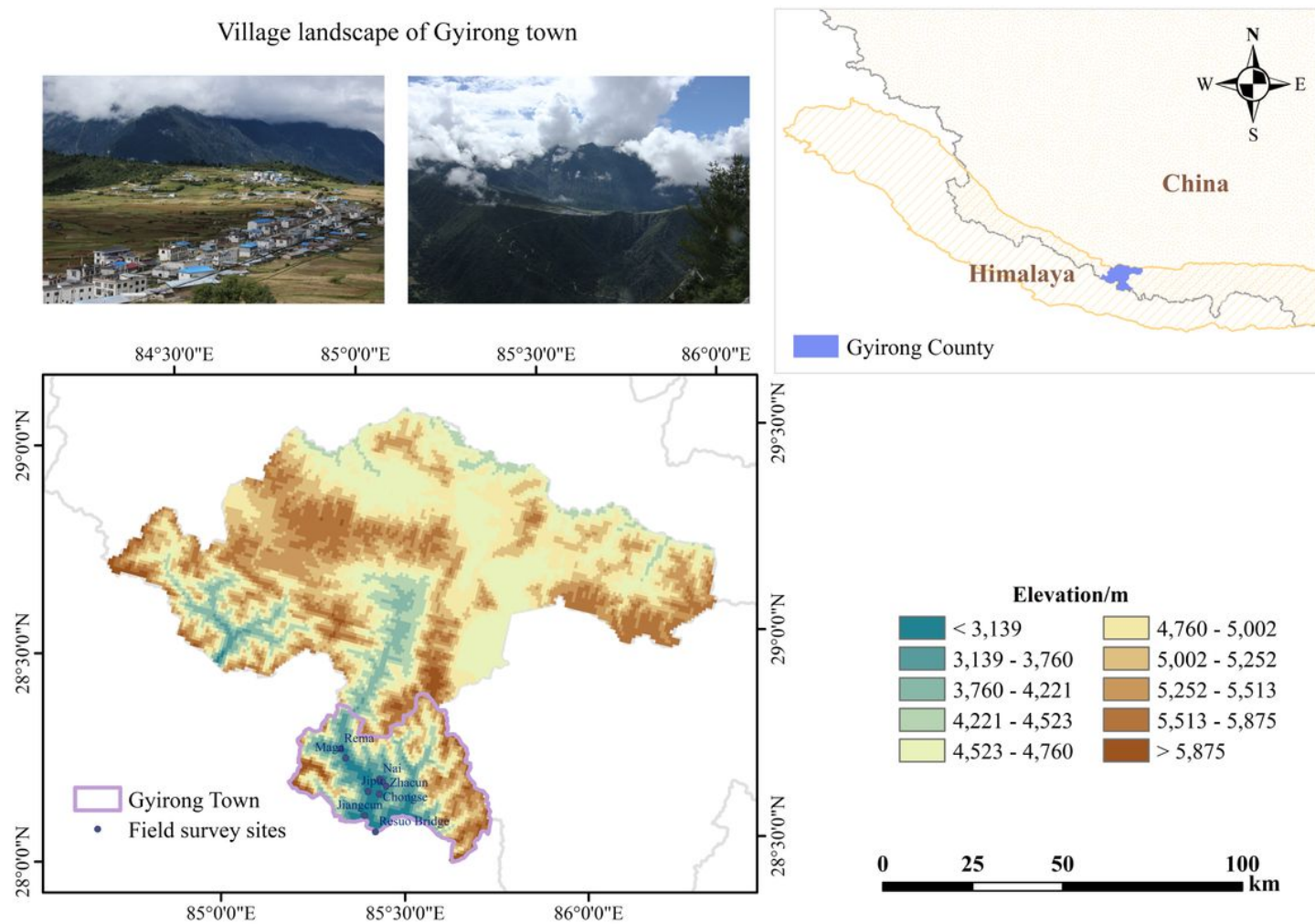


Figure 1

Map showing the location

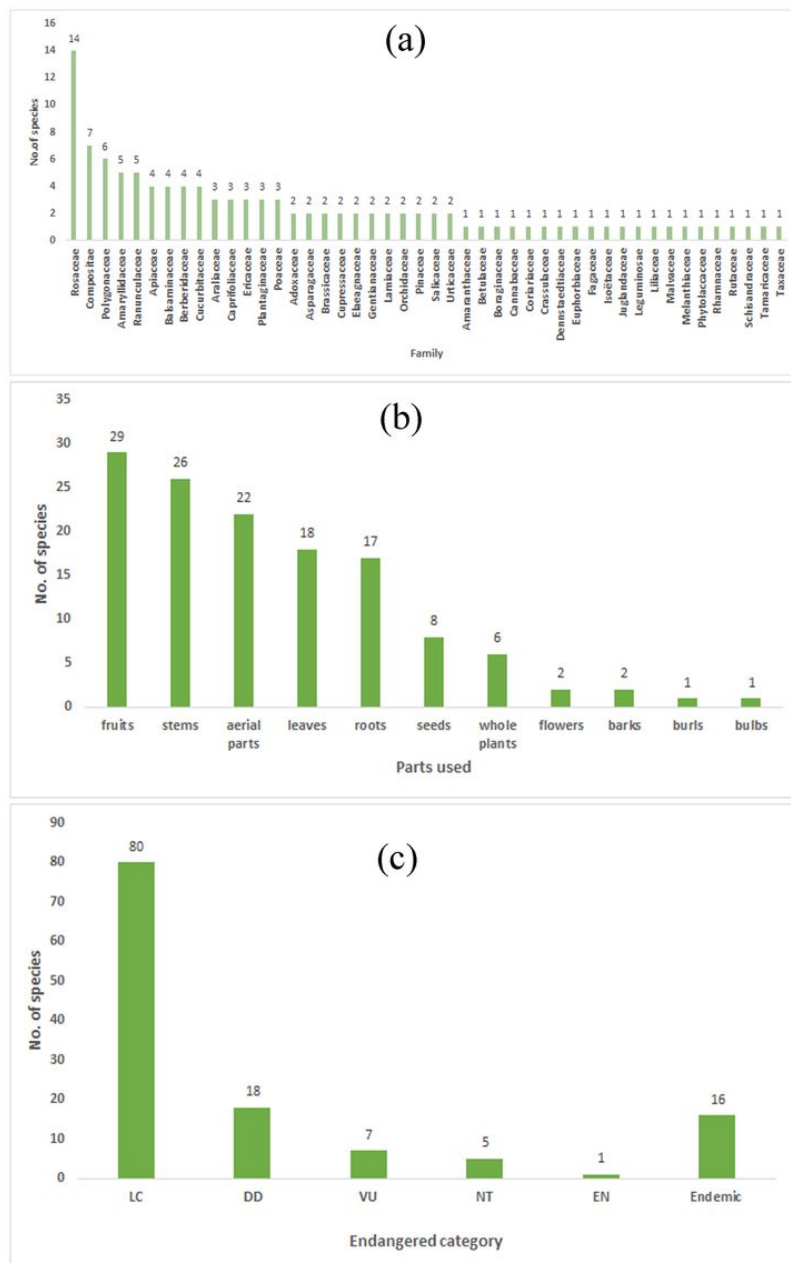


Figure 2

The diversity of wild plants used by locals.



Figure 3

The most frequently reported edible plants **a** *Allium prattii*, **b** *Zanthoxylum bungeanum*, **c** *Rosa sericea*; **d** *Pteridium aquilinum* var. *latiusculum*; **e** *Fragaria nubicola*



Figure 4

Some medicinal plants in study area. **a** *Fritillaria cirrhosa*; **b** *Panax pseudoginseng*; **c** *Betula utilis*; **d** *Gymnadenia orchidis*; **e** *Ophiocordyceps* sp.; **f** *Gastrodia elata*; **g** *Ganoderma* sp.; **h** *Rhodiola himalensis*; **i** *Artemisia calophylla*



Figure 5

Other use categories. **a** some economic plants are sold in shops; **b** some plants used to “Sang”; **c** a Tibetan woman gathering fodder plants; **d** fuelwoods