Learning and adaptation：A comparison of traditional plant knowledge between Daman people and Tibetans in Gyirong River Valley, Tibet, China

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Abstract

Background

"Diaspora" refers to a specific group of immigrants that have settled in different regions throughout history. In Gyirong town, Tibet, China, there exists such an ethnic group known as the "Daman people". In 2003, they were granted Chinese citizenship. The objective of this study is to document the traditional knowledge of plant use by the Daman people in Gyirong town. It aims to explore the extent to which the Daman people have incorporated local Tibetan plant use practices and whether they maintain their own distinct knowledge of plant use.

Methods

During fieldwork, ethnobotanical data were collected using various methods including free listings, key informant interviews, and semi-structured interviews. To quantify the importance of plant species in the Daman people's culture, the culture importance index (CII), informant consensus factor index (FIC), and The Index of Agreement on Species consensus (IASc) were used. To more comprehensively compare the differences in plant use between the Daman and Tibetan, this study constructed a knowledge network to compare the knowledge differences between the two groups.

Results

In this study, traditional knowledge was collected from 32 Daman informants and 126 Tibetan informants, resulting in a total of 68 species belonging to 39 families mentioned by Daman people and 111 species mentioned by Tibetans. Of these, 58 plants were used by both populations. The plants were classified into 3 first categories and 28 second categories, with 22 identical classes in both groups. The majority of use categories showed a high degree of sharing in both groups, and the Tibetan people had more plant use categories than the Daman people. Five plants with IASc value > 0.5 were identified in both groups: *Rhododendron anthopogon* D. Don, *Artemisia japonica* Thunb., *Juniperus indica* Bertol., *Gastrodia elata* Blume, and *Rheum australe* D. Don. The analysis of the knowledge network revealed a 66% overlap between the knowledge of the Daman and the knowledge of the Tibetans. Additionally, the plant knowledge of Tibetan people was found to be richer and more complex than that of the Daman people. However, the Daman people possess 30 unique knowledge items.

Conclusions

From the perspective of plant use, the history of the Daman people's discrete migration on the border between China's Tibet and Nepal allows them to retain their own knowledge of plant use. The status quo of joining Chinese nationality and settling in Gyirong town allows them to gradually integrate into the local Tibetan society. In constant communication with the Tibetan culture, the Daman acquired a great deal of traditional plant knowledge, so that they could better adapt to the natural environment of Gyirong.

Introduction

"Diasporas" refers to special immigrant groups that have dispersed across the world during different historical periods. These groups leave their homes for various reasons and often live between multiple spaces and cultures [1]. Due to their multiple identities, they are able to connect with two or more societies at the same time [2]. Historical examples of "Diasporas" include the Jews and the Hmong, who have endured hardships but remained resilient [3]. Despite living in foreign lands, members of these ethnic groups maintain a sense of ethnic identity and cultural characteristics [3, 4]. With the rise of globalization and transnational migration, "Diasporas" have become a significant focus of anthropological and ethnic studies [5–7]. Many "Discrete groups" also live along the long border of China, and their ethnic and national identities impact how they seek survival and development under state power, as well as the long-term stability of the country's border areas [8, 9].

In Gyirong town, Tibet, China, there exists an ethnic group known as the "Daman people". Unlike immigrants in the era of globalization, the Daman people have resided in the border areas between China and Nepal for over two centuries [10]. Despite living a nomadic lifestyle for an extended period, the Daman people have maintained the memories and identity of their Nepalese ancestors [2, 11]. They were stateless until 2003 when they were granted Chinese nationality.

In the historical context of their prolonged wandering, the Daman people faced the predicament of survival and chose to proactively join Chinese nationality, gradually integrating into the local Tibetan society [10]. They also consciously or unconsciously adopted many local customs, languages, and cultures under the new historical background. For instance, they celebrate the Tibetan New Year with Tibetans and partake in traditional Tibetan foods such as butter tea. Despite integrating into the local Tibetan society, the Daman people still preserve their language and some of their own ethnic customs, such as the "Dashai Festival," which takes place on the 8th day of the eighth month of the Tibetan calendar and involves the sacrifice of sheep blood. Moreover, they have inherited ironworking skills, which have become an important aspect of their identity [2].

Previous studies have primarily focused on the national identity of the Daman people from the perspectives of anthropology and political science. The objective of this study is to document the traditional knowledge of plant use among the Daman people in Gyirong town, examine their acquisition of knowledge on wild plant use from the local Tibetan culture, and determine whether they have retained their own distinct knowledge on plant use.

Materials And Methods

Study area

Gyirong Town is situated in the southwest of Shigatse City, Tibet Autonomous Region, China, and is located in the core area of Mount Everest Reserve. It is bordered by Nepal to the south, and the area is characterized by an average temperature of 10 ℃ − 13 ℃ and dominated by mountain coniferous forest and mixed coniferous and broad-leaved forest vegetation types. Known as the "back garden of the Himalayas," Gyirong Town attracts tourists from around the world [12–14]. Daman Village, with a population of 207 people in 57 households, is situated about 30 kilometers from the China-Nepal border (Fig. 1). In 2015, a magnitude-8.1 earthquake hit Nepal and caused damage to villages in Gyirong, including Daman Village. After the earthquake, the Chinese government initiated the renovation of Daman Village in Gyirong Town (Fig. 1).

Daman People

The Daman people, who are descendants of Nepalese ancestry, have distinct physical features such as blue eyes, long eyelashes, dark brown skin, and mostly curly hairstyles [2]. These features contrast with the traditional Tibetan physical traits of brown eyes, tawny skin, and straight hair. Due to their nomadic lifestyle, the Daman people have been living along the Sino-Nepalese border for a long time [15]. With no arable land or means of production, life for the Daman people has been extremely difficult.

The settlement of the Daman people, also known as "Oriental Gypsy," is located in the northwest of Gyirong Town at coordinates 85.29 east longitude and 28.41 north latitude. With an average altitude of 2,880 m, it was established with government funding in 2011 and is officially known as Daman New Village. Due to the lack of arable land and means of production, the Daman people rely on part-time work, farmer subsidies, and traditional handicraft cooperatives for income. There is no agriculture or animal husbandry in the village. Additionally, the village is rich in under-forest resources, and the collection of wild economic plants has become an important source of income for the Daman people.

Tibetans In Gyirong

The Tibetans are one of the 56 ethnic groups in China, and their distribution is divided into three regions based on dialects: Ü-Tsang, Kham, and Amdo. The Tibetans living in Gyirong Town belong to the Ü-Tsang dialect area. The local Tibetans have a rich tradition of knowledge, including handicrafts and medicinal plant knowledge, among others [13, 14, 16].

Field Survey And Data Collection

In September 2019 and September 2021, our ethnobotany fieldwork was conducted in Gyirong. 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 herdsmen. Other informants were selected by the randomized household interview method. In addition, we attempted to train Daman guides to conduct ethnobotanical semi-structured interviews. In total, traditional knowledge was collected from 32 informants. Ethnobotanical knowledge was collected by semistructured face to face interviews. 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. According to the commonly used 5W + 1H (What, Where, When, Who, Why, How) principle in ethnobotany, this study designed the following questions for semistructured interviews:

1. Would you mind listing some wild plants you have used?

2. How to use this plant?

3. Which plant parts were used, roots, stems, leaves or other parts?

4. Why do you use this species?
5. What time do you collect this plant?
The questions were designed to collect data on the (i) vernacular name of the plants, (ii) category of use, (iii) parts used, (iv) methods for preparation and administration, (v) characteristics of the plant material (dried or fresh) and (vi) collection time.

The specimens were collected from the field of 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 [17] and The Plants of the World Online was used to ensure the Latin name of the plants [18].

Data analysis

We adopted the Use report (UR), cultural important index (CII) as ethnobotanical indice. 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 [19, 20].

The cultural important index (CII) was the sum of the proportion of informants that mentioned each of the use categories for a given species [21]. This index is used to quantitatively evaluate the importance of a certain plant to Yadong Tibetans from the perspective of comprehensive value. 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:

$$CII = \sum_{U=u1}^{uNC} \sum_{i=i1}^{iN} \frac{URui}{N}$$

NC was the total number of use categories and N was the total number of informants. CII ranges between 0 and the number of all use categories. A higher CII value indicated the multiple uses of a species and a higher degree of recognition.

The informant consensus factor index (FIC) was developed by Robert T. Trotter [22]. 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:

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

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 treat certain diseases.

The Index of Agreement on Species consensus (IASc) was used to identify the proportion of culturally important species in each groups [22]. It can be assumed that it is a quantitative measure that reflects the degree of agreement or consensus among members of the group regarding their knowledge of different plant species. Overall, the research is attempting to investigate the relationship between plant knowledge and group consensus, and is using the IASc value as a way to operationalize and measure consensus within the group.

$$\text{IASc} = \frac{Pu \times (ns - nu)}{Pt \times (ns - 1)}$$

where Pu represents the number of participants who reported a use, and Pt equals the total number of participants interviewed about the species, ns is the number of use reports of a given species mentioned by all the participants and nu is the number of use types attributed to that species. IASc values vary between 0 and 1, with 0 representing no agreement sand 1 total agreement. In this paper, we determined the proportion of plant species with an IASc value > 0.5; this value was chosen as an arbitrary cutoff point for culturally important species following Vandebroek [23].

Indigenous Knowledge Network

We define knowledge as the combination of plant species and their uses. Previous comparisons focused solely on plant species and uses, but the differences in plant knowledge between two populations can be more effectively compared using the concept of knowledge networks [24]. Knowledge networks are graphs that depict the relationships between different types of plant knowledge. We drew our knowledge network using the "ggalluvial" package in R 4.2.2.

Results

Wild useful plant diversity and frequently utilized species

The Daman people mentioned a total of 68 species and subspecies from 39 families, with the majority belonging to Rosaceae (11), Compositae (7), and Polygonaceae (4). Herbaceous plant species were the most commonly used by the Daman people (42 species, 60.9%), followed by trees (17, 24.6%) and shrubs (10, 14.5%). *Pinus wallichiana* A.B.Jacks (UR = 32, CII = 1.000) and *Rhododendron anthopogon* D. Don (32, 1.000) were the most frequently used plants, followed by *Polygonatum cirrhifolium* (Wall.) Royle (29, 0.906), *Artemisia japonica* Thunb.(26, 0.813), and *Gastrodia elata* Blume (26, 0.813) (Table 1). In comparison, Tibetans in Gyirong mentioned a total of 111 species and subspecies from 39 families [25].

The two ethnic groups mentioned a total of 129 species and subspecies, belonging to 48 families. Rosaceae was the most represented family with 15 species, followed by Compositae with 9 and Polygonaceae with 6. Among these, 58 species were commonly known by both ethnic groups. Only one of the top ten plants used by Daman and Tibetans was the same, which was *Rhododendron anthopogon* D. Don, a plant used for beverages and Tibetan incense. Of the 129 species, 18 were endemic to China, one was listed as an endangered species by the Information System of Chinese Rare and Endangered Plants (ISCREP), and four were Near-threatened and seven were Vulnerable [26].

Comparison Of Used Part Of Plants

Fruits were found to be the most commonly used plant part by both the Daman (21.33%) and Tibetan (21.01%) communities in Gyirong, followed by roots (18.67%) for the Daman and aerial parts (15.94%) for the Tibetans. Branches and leaves were also commonly used by both groups. Notably, the Daman people use the tubers of *Arisaema tortuosum* (Wall.), which were not used by the Tibetans (Table 1). (Fig. 2) provides a graphical representation of these findings.

Comparison Of Ues Categories

We organized all plants into 3 main categories and 28 subcategories, with 22 shared subcategories between the two ethnic groups. At the main category level, both Daman and Tibetan people demonstrated similar patterns of plant use, with the majority of species being edible plants, followed by medicinal plants and other categories. However, at the subcategory level, there were significant differences. In terms of edible plants, both Daman and Tibetans primarily utilized vegetables and wild fruits, but the Tibetans employed a greater variety of edible plant species. Notably, the Daman people exhibited greater knowledge of starch plants and their uses (Fig. 3).

We categorized medicinal plants into 17 secondary categories and found that the use of medicinal plants by Daman and Tibetans varied greatly, with only ten categories being the same. Skin disorders and veterinary medicine were the most notable categories, with Tibetans reporting knowledge of four plant species while the Daman people had no related knowledge (Fig. 4).

The catalog of other categories comprises 7 sub-categories. The Tibetans exhibit greater richness in this aspect of plant use compared to the Daman people. Specifically, in fodder and craft, the Daman people have not reported any knowledge, while the Tibetans have demonstrated considerable knowledge (Fig. 5).

Comparison Of Fic

The FIC values for the 29 categories ranged from 0 to 1, with an average of 0.789, indicating a high degree of shared knowledge between the ethnic groups (Table 2). Both medicinal and edible plant knowledge had high FIC values, suggesting that these categories of knowledge are widely shared. Similarly, dyeing and ritual plants also had high FIC values, indicating that they are shared among the groups to a great extent. However, the use of veterinary medicinal plants had lower FIC values, suggesting that this knowledge should be particularly noted and protected (Fig. 6). Additional details can be found in the supplementary material [see Additional file 1].

Iasc Matrix Of Two Groups

The aim of this study was to examine the relationship between plant knowledge and group consensus at the cultural level. To achieve this, we ranked plant species based on their IASc value and used a cutoff value of IASc > 0.5 to identify highly consented species [27]. In the Daman group, we found 13 plant species with an IASc value greater than 0.5, with *Rhododendron anthopogon* D. Don (IASc = 0.907) being the highest ranked species. Similarly, in the Tibetan group, we identified 17 plant species with an IASc value greater than 0.5, with *Allium prattii* C.H.Wright (0.993) being the highest ranked species. There were only five plant species with an IASc value greater than 0.5 in both groups, including *Rhododendron anthopogon* D. Don (IAScDaman = 0.907, IAScTibetan = 0.703), *Artemisia japonica* Thunb. (0.660, 0.564), *Juniperus indica* Bertol. (0.625, 0.518), *Gastrodia elata* Blume (0.660, 0.518), and *Rheum australe* D. Don (0.565, 0.524) (Fig. 7). Additional information is available in the supplementary material [see Additional file 2].

Comparison Of Indigenous Knowledge Networks

This study aimed to compare the plant knowledge of two cultural groups. The results indicate that the Tibetan people demonstrated a richer and more complex understanding of plants than the Daman people (Fig. 8). Specifically, we found that the Daman people possessed 90 pieces of plant knowledge, while the Tibetans in Gyirong had a much larger knowledge base of 226 plant species (Fig. 9). Among the total knowledge base, there were 60 pieces of overlapping knowledge shared between the two groups. Additionally, 30 pieces of knowledge were specific to the Daman people, while 166 pieces of knowledge were specific to the Tibetans (Fig. 9). For a more detailed breakdown of these findings, please see the supplementary materials [Additional file 3]

Discussion

Important plant uses of Daman

Our study identified several plants that were deemed important based on their CII (cultural importance index) values. These plants were found to have a wide range of uses and were highly regarded and accepted by the local community.

Pinus wallichiana A.B.Jacks. is the most commonly reported wild plant in Daman village. It has a wide distribution across Bhutan, Nepal, India, and China. Our survey found that the phloem flakes of this plant were consumed directly, or processed into long strips, boiled, and used as a type of "pine bark noodles." The seeds were also eaten directly by the Daman people, while the branches and dried pine cones were highly valued as fuelwood materials. In Yadong county, the seeds are used as nuts [28]. In Nepal and India, the resin of *P. wallichiana* is used as a stimulant, stomachic, and remedy for gonorrhea. When applied externally as a plaster, it helps abscesses to suppurate. The wood is considered diaphoretic and is widely used to treat burning sensations, fainting, cough, and ulceration. Additionally, the oleoresin extracted from the wood is used to treat scorpion stings and snake bites [29, 30]. Notably, our study recorded the edible bark of *P. wallichiana* for the first time.

Rhododendron anthopogon D. Don is predominantly found in high altitude areas of China (southern Tibet), Bhutan, Nepal, and India. It holds significant cultural value as an important Tibetan incense plant and is widely used in various Tibetan regions, including the Tibetans of Yadong and the Lhoba of Douyu [28, 31]. The flower of *R. anthopogon* is also used as an herbal tea by people in Dolpa, Humla, and Mustang District, Nepal, and has been found to be effective in treating gastritis, common cold, indigestion, and as a diuretic [29].

Polygonatum cirrhifolium F. Delaroche is highly valued by the Daman people as both a wild vegetable and medicine. The young leaves of this plant are eaten as a vegetable, while its roots are used as a tonic medicine. *P. cirrhifolium* is primarily distributed in southern Tibet, Nepal, and India, and Tibetans in Yadong consider it to be an important wild economic plant [28]. The root juice of *P. cirrhifolium* is used as a tonic and taken in cases of fractures by people in Dolpa district and Mustang district, Nepal [29]. Additionally, in Manang District, Nepal, this plant is used to treat cough, fever, and to increase sexual potency [32].

Artemisia japonica Thunb is widely distributed in East and South Asia and is used as Tibetan incense and medicine in these areas [28, 32–35]. The Daman people use the plant to fumigate the body and treat rheumatoid arthritis by spreading it under stone slabs and setting it on fire. Additionally, it is burned as Tibetan incense by the Daman people.

Gastrodia elata Blume is an important economic plant for the Daman people, who collect its roots in the mountains and sell them to drug dealers. Sun-dried *G. elata* roots can fetch up to 500 yuan per 500g, and the roots are also used as a tonic by the locals.

Similarity Of Plant Use Between Daman People And Local Tibetan People

The plant use structure and species between Daman and Tibetan communities in Gyirong exhibit high similarity. Of the 28 subcategories, 23 are the same, and 58 of the 68 plants used by the Daman people are also used by the local Tibetans. Further analysis of the FIC values revealed that the 22 identical usage categories showed a high degree of sharing between both groups (Fig. 6) [22, 36]. The knowledge network analysis also showed a 66% overlap in plant knowledge between the Daman people and Tibetans. This may be due to the Daman people being scattered among Tibetans, which has led to a relatively close relationship in other aspects of social life, despite limited personal interaction [2, 10].

After analyzing the IASc of each plant, we identified five plants that occupy a critical position in both groups and belong to the first quadrant. *Rhododendron anthopogon* D. Don (IAScDaman = 0.907, IAScTibetan = 0.703), *Artemisia japonica* Thunb. (0.660, 0.564), and *Juniperus indica* Bertol. (0.625, 0.518) are all traditional Tibetan ritual plants used for daily incense sacrifice and are highly valued by the Daman people, playing a significant role in their lives [28, 38]. *Gastrodia elata* Blume (0.660, 0.518) is an example of a significant economic plant for the locals, and they collect it along with other Tibetan medicines such as *Fritillaria cirrhosa* D. Don and *Saussurea tridactyla* Sch.Bip. ex Hook.f. to improve their livelihood [40]. However, compared to the Tibetans, the Damans have limited access to the scope and quantity of these medicinal plants they can collect [41].

In summary, the Daman people have gained a significant amount of traditional plant knowledge from the Tibetans, which has played a crucial role in helping them adapt to the unique environment of Gyirong. Through their understanding of Tibetan culture and customs, the Daman people have been able to integrate into the local Tibetan cultural groups seamlessly. This integration has facilitated a better understanding and cooperation between the two groups, allowing them to coexist in harmony.

Differences In Plant Culture Under The Background Of Immigration

The perception of nature can vary between ethnic groups and is often influenced by specific cultural traditions [42]. In our study, we aimed to identify the unique cultural identity of the Daman people, while also exploring the similarities and differences in their plant use practices compared to the local Tibetans. Due to their distinct experiences and knowledge, the Daman people have developed unique methods and uses for plants that differ from those of the Tibetans.

Before 2003, the Daman people were stateless and did not have access to their own land. As a result, they had to work for people in Gyirong Township or Nepal in exchange for food [2]. According to one informant, "At that time, I went to Nepal to work, and I could only exchange a handful of rice for a day of farm work." The Daman people frequently suffered from hunger and food scarcity, which compelled them to learn about edible plants in order to survive. Some of their knowledge of edible plants was passed down by local Tibetans, while other knowledge was discovered by the Daman people themselves. For instance, they recognized the importance of *Arisaema tortuosum* (Wall.) Schott as a food substitute, a plant which local Tibetans did not mention. *Sedum multicaule* Wall. ex Lindl. was also used by the Daman people to treat foot trauma, which was common due to their year-round residence in the valleys for their livelihood.

From the perspective of use categories, there still exists a cultural gap between the Daman and the Tibetans. In the area of fodder, the Daman people have very limited knowledge compared to the local Tibetans. This is due to the fact that the Daman traditionally had a small scale of cattle farming, and after the 2015 earthquake, they moved to new houses without cowsheds, which led to a further decline in their knowledge of feed plants.

In addition, the Daman people lack knowledge about traditional handicrafts, which is in contrast to the local Tibetans who have a wealth of botanical knowledge for making wooden bowls, with sharing practices across different villages. These differences in plant knowledge reflect the cultural diversity among different ethnic groups.

Conclusion

The Daman people's history of discrete migration along the China-Nepal border has enabled them to maintain their own knowledge of plant use. As they join the Chinese nationality and settle in Gyirong, they gradually integrate into the local Tibetan society. As they continue to integrate into Tibetan society, their lives become more stable. However, as younger generations continue to integrate, the unique culture of the Daman people is being lost. Blacksmithing skills that were once their livelihood are disappearing with the establishment and outsourcing of cooperatives. Therefore, it is crucial to educate young people on local biocultural diversity to prevent the continuous abandonment of their ethnic culture.

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. 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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References

1. Zou JZ. Boreder,Boundary and Boundary Domin. Journal of Minzu University of China. 2010; 1: 11-14.
2. Zhou JX, Yang J. Diaspora and the Reconstruction of identity: A Case study of the Daman People on the China-Nepal Border. Journal of Minzu University of Guangxi. 2012; 34 (5): 78-83. doi: CNKI:SUN:GXZS.0.2012-05-016.
3. Liu F. Dispersion and aggregation: ethnic identity of cross-border "Hmong" people]. Heilongjiang National Series. 2009; 6: 143-146. doi: 10.3969/j.issn.1004-4922.2009.06.031.
4. Zhang X. The Familial Organization of the Miao People in American Society. Ethno-National Studies. 2021; 6: 13. doi: 10.3969/j.issn.0256-1891.2007.06.007.
5. Beine M, Docquier F, Ozden C. Diasporas. Journal of Development Economics. 2011; 95(1): 30-41. doi: 10.1016/j.jdeveco.2009.11.004.
6. Li Y. "Diaspora group" ethics under globalization: problems and solutions. Contemporary World and Socialism. 2008; (3):5.
7. Zhou JX, Yang J. [The context and trend of transnational ethnic studies in China]. Journal of Hubei Minzu University. 2019; 37(6):10.
8. Zhou J. Borders, borderers and States: Three aspects of transnational ethnic studies. Guangxi Ethnic Studies. 2017; 3:1-8.
9. Liu Y, Na S. Investigation on the relationship between ethnic communication and identity in Daman village, Gyirong, Zang-Nepal corridor. China Tibetology. 2015; 3: 138-147
10. Hou LL. National identity and reasons of Daman people from the perspective of ethnic politics. Chi Zi. 2015; 12: 55-55.
11. Zhang CY. Daman: In the valley of happiness. Tibet Geographic. 2007; 6: 74-91.
12. ZhangYF. Millennium Gyirong. China Tibetology Publishing House; 2006.
13. Wang DG, Li Q. Investigation of ecological resources and evaluation of tourism development in Gyirong Valley. Tibetan Studies. 2007: 3: 8. doi: CNKI:SUN:XZYJ.0.2007-03-011.
14. Yang BY. Set out for Gyirong. Tibet Geographic. 2007; 6:14. doi: CNKI:SUN:XZMS.0.2007-06-010.
15. Zhang CY. The stateless Daman people. Chinese National Geography. 2003; (8): 4.
16. Ding XY, Guo CA, Hu HB, Wang YH. Plants for making wooden bowls and related traditional knowledge in the Gyirong Valley, Tibet, China. J Ethnobiol Ethnomed. 2002; 18 (1).
17. Editoral Committee of Flora of China, Flora of China. Beijing, Science Press; 2013
18. Board of Trustees of the Royal Botanic Gardens, Kew. The Plants of the World Online. Published on the internet. https://powo.science.kew.org/.
19. Reyes-Garcia V, Huanca T, Vadez V, Leonard W, Wilkie D. Cultural, practical, and economic value of wild plants: A quantitative study in the Bolivian Amazon. Econ. Bot. 2006; 60 (1): 62-74. doi: 10.1663/0013-0001(2006)60[62:CPAEVO]2.0.CO;2.
20. Cook FEM. Economic Botany Data Collection Standard. The International Working Group on Taxonomic Databases for Plant Sciences (TDWG) by the Royal Botanic Gardens, Kew. 1995. ISBN: 0947643710.

21. Tardío J, Pardo-de-Santayana M. Cultural importance indices, a compara-tive analysis based on the useful wild plants of Southern Cantabria Northern Spain. Econ. Bot. 2008; 62: 24-39. doi: 10.1007/s12231-007-9004-5.
22. Troter R, Logan M. Informant consensus: a new approach for identifying potentially effective medicinal plants. In: Etkin NL, editor. Indigenous medicine and diet: biobehavioural approaches. New York: Redgrave Bedford Hills; 1986. p. 91-112.
23. Vandebroek I. The dual intercultural and intracultural relationship between medicinal plant knowledge and consensus. Econ Bot. 2010; 64(4): 303-317.
24. Camara-Leret R, Fortuna MA, Bascompte J. Indigenous knowledge networks in the face of global change. PNAS. 2019;116(20): 9913-9918. doi: 10.1073/pnas.1821843116.
25. Guo CA, Ding XY, Hu HB, Zhang Y, Yang HZ, Wang YH. An ethnobotanical study on wild plants used by Tibetan people in Gyirong Valley, Tibet, China. J Ethnobiol Ethnomed. 2022; 18(1). doi: 10.1186/s13002-022-00565-1.
26. Institute of Botany, Chinese Academy of Sciences. Information System of Chinese Rare and Endangered Plants (ISCREP). https://www.plantplus.cn/rep/.
27. Ceuterick M, Vandebroek I, Torry B, Pieroni A. Cross-cultural adaptation in urban ethnobotany: the Colombian folk pharmacopoeia in London. J Ethnopharmacol. 2008; 120 (3): 342-359; doi: 10.1016/j.jep.2008.09.004.
28. Guo CA, Ding XY, Addi YW, Zhang Y, Zhang XQ, Zhuang HF,Wang YH. An ethnobotany survey of wild plants used by the Tibetan people of the Yadong River Valley, Tibet, China. J Ethnobiol Ethnomed. 2022; 18 (1): 28; doi: 10.1186/s13002-022-00518-8.
29. Kunwar RM, Nepal BK, Kshhetri HB, Rai SK, Bussmann RW. Ethnomedicine in Himalaya: a case study from Dolpa, Humla, Jumla and Mustang districts of Nepal. J Ethnobiol Ethnomed. 2006; 2: 27. doi: 10.1186/1746-4269-2-27.
30. Singh L, Dixit P, Srivastava RP, Pandey S, Verma PC, Saxena G. Ethnobotany and Pharmacology of Pinus Species Growing Naturally in Indian Himalayas: A Plant Review. Curr Pharm Biotechnol. 2019; 20 (15): 1281-1287; doi: 10.2174/1389201020666190819153600.
31. Chen WY, Yang T, Yang J, Qiu ZC, Ding XY, Wang YH, Wang YH. Wild plants used by the Lhoba people in Douyu Village, characterized by high mountains and valleys, in southeastern Tibet, China. J Ethnobiol Ethnomed. 2021; 17 (1): 46. doi: 10.1186/s13002-021-00472-x.
32. Bhattarai S, Chaudhary RP, Taylor RSL. Ethnomedicinal plants used by the people of Manang district, central Nepal. J Ethnobiol Ethnomed. 2006; 2: 41. doi: 10.1186/1746-4269-2-41.
33. Kang J, Kang YX, Ji XL, Guo QP, Jacques G, Pietras M, Luczaj N, Li DW, Łuczaj Ł. Wild food plants and fungi used in the mycophilous Tibetan community of Zhagana (Tewo County, Gansu, China). J. Ethnobiol Ethnomed 2016; 12: 21. doi:10.1186/s13002-016-0094-y.
34. Li S; Zhang Y; Guo YJ; Yang LX; Wang YH. Monpa, memory, and change: an ethnobotanical study of plant use in Medog County, South-east Tibet, China. J Ethnobiol Ethnomed. 2020; 16 (1): 5. doi: 10.1186/s13002-020-0355-7.
35. Joshi N, Ghorbani A, Siwakoti M, Kehlenbeck K. Use pattern and indigenous knowledge of wild medicinal plants among three ethnic groups in Makawanpur district, Central Nepal. J Ethnopharmacol. 2020; 262: 113219; doi: 10.1016/j.jep.2020.113219.
36. Heinrich M, Edwards S, Moerman DE, Leonti M. Ethnopharmacological field studies: a critical assessment of their conceptual basis and methods. J Ethnopharmacol. 2009; 124 (1): 1-17.
37. Kunwar RM, Fadiman M, Cameron M, Bussmann RW, Thapa-Magar KB, Rimal B, Sapkota P. Cross-cultural comparison of plant use knowledge in Baitadi and Darchula districts, Nepal Himalaya. J Ethnobiol Ethnomed. 2018; 14: 40. doi: 10.1186/s13002-018-0242-7.
38. Li ML, Xu JC. The “Wei sang” custom of Tibetan families in Yunnan——Taking two Tibetan communities in Diqing Tibetan Autonomous Prefecture as an example. Ethno- nat'l.Studies. 2007; 169 (6): 46-55.
39. Chen, YY, Bao, ZX, Li ZZ. High allozymic diversity in natural populations of Mycoheterotrophic Orchid Gastrodia elata, an endangered medicinal plant in China. BIOCHEM SYST ECOL. 2011; 2011; 39 (4-6): 526-535. doi: 10.1016/j.bse.2011.07.013.
40. Wang DD, Chen X, Atanasov AG, Yi X, Wang S. Plant Resource Availability of Medicinal Fritillaria Species in Traditional Producing Regions in Qinghai-Tibet Plateau. Front. Pharmacol. 2017; 8: 502. doi: 10.3389/fphar.2017.00502.
41. Salick J, Byg A, Amend A, Gunn B, Law W, Schmidt H. Tibetan Medicine Plurality. ECON BOT. 2006; 60 (3): 227-253. doi: 10.1663/0013-0001(2006)60[227:TMP]2.0.CO;2.
42. Kloek ME, Buijs AE, Boersema JJ, Schouten MGC, Management. Cultural echoes in Dutch immigrants' and non-immigrants' understandings and values of nature. J Environ Plan Manag. 2017; 61(5-6): 1-23. doi: 10.1080/09640568.2017.1319803.
43. Wu ZH, Barosh PJ, Ha GH, Yao X, Xu YQ, Liu J. Damane induced by the 25 April 2015 Nepal earthquake in the Tibetan border region of China and increased post-seismic hazards. Nat Hazards Earth Syst Sci. 2019; 19 (4): 873-888. doi: 10.5194/nhess-19-873-2019.
44. Zhou JX. A straggler who crosses a boundary: A survey of villages of Nepali descent in Gyirong border area of Tibet. China: The ethnic PH. 2014. ISBN: 9787105132751.
45. Ma Y, Luo BS, Zhu Q, Ma DX, Wen Q, Feng JC, Xue DY. Changes in traditional ecological knowledge of forage plants in immigrant villages of Ningxia, China. J Ethnobiol Ethnomed. 2019; 15 (1): 65; doi: 10.1186/s13002-019-0333-0.

Tables

Table 1 List of plants used by Daman people in Gyirong

Local name(s)	Botanical family	Botanical taxon	Voucher	Parts used	Local use□No. of Urs□	Cl
jia1-duo1-suo3-wa1	Adoxaceae	*Viburnum nervosum* D. Don	QTB-JL-102	fruits	food:fruit(14),eaten raw	0.
niu1-cei1-ma1	Amaranthaceae	*Chenopodium album* L.	QTB-JL-42	leaves	food:vegetable(18),stir-fried	0.
guo1-ba1	Amaryllidaceae	*Allium chrysanthum* Regel	QTB-JL-21	bulbs	food:seasoning(1),cooked with other food;vegetable(2),stir-fried	0.
zen1-bu1;ri3-guo3	Amaryllidaceae	*Allium przewalskianum* Regel	QTP-EBT-3200	whole plants	food:seasoning(6),cooked with other food;vegetable(18),stir-fried	0.
guo1-nie1	Apiaceae	*Carum carvi* L.	QTB-JL-63	leaves	food:vegetable(1),stir-fried	0.
ba1-ji1	Apocynaceae	*Cynanchum auriculatum* Royle ex Wight	QTB-JL-79	fruits	food:fruit(6),eaten raw	0.
dong1-ma1-ei1-ma1	Araceae	*Arisaema tortuosum* (Wall.) Schott	QTB-JL-77	tubers	food:starche(2),ground, fermented, and then cooked	0.
jia1-cei1-ma1	Araliaceae	*Aralia* sp.	QTB-JPG-10	leaves	food:vegetable(3),stir-fried	0.
san1-jing1	Araliaceae	*Panax pseudoginseng* Wall.	QTP-EBT-3084	roots	medicine: tonic(7),decoction	0.
ra1-ma1-xia3-jia1	Asparagaceae	*Polygonatum sibiricum* F.Delaroche	QTB-JL-26	roots	food:vegetable(9),stir-fried;medicine:tonic(20),decoction	0.
jia1-la-1-suo3-wa1;giu1-lu1	Berberidaceae	*Berberis xanthophlaea* Ahrendt	QTB-JL-27	leaves	medicine:diarrhea(2),decoction	0.
da1-ge1-ba1	Betulaceae	*Betula utilis* D.Don	QTB-JL-7	branches	fulewood(2),burned	0.
mang1-zhu1-cei1-ma1	Brassicaceae	*Thlaspi arvense* L.	QTB-JL-35	leaves	food:vegetable(13),stir-fried	0.
sei1-ma1	Cannabaceae	*Cannabis sativa* L.	QTB-JL-78	barks	tool(3),used to make rope	0.
bang1-bu4	Caprifoliaceae	*Nardostachys jatamansi* (D.Don) DC.	QTB-JL-123	roots	medicine:cough(1),decoction;ritual use(11),burned	0.
bang1-ma1	Compositae	*Artemisia calophylla* Pamp.	QTB-JL-50	aerial parts	ritual use(4),burned;medicine:rheumatism (2),decoction	0.
sang1-kang1-ba1	Compositae	*Artemisia japonica* Thunb.	QTB-JL-59	aerial parts	ritual use(18),burned;medicine:rheumatic arthritis (8),decoction	0.
bang1-ma1-ge1-dong1	Compositae	*Artemisia younghusbandii* J. R. Drumm. ex Pamp.	QTB-JL-49	aerial parts	medicine:fever(1),decoction	0.
di1-di1-li1	Compositae	*Crepis elongata* Babc.	QTB-JL-98	roots	medicine:digestion(5)gynaecopathia(6),decoction	0.
gang3-la1-mei3-duo1	Compositae	*Saussurea tridactyla* Sch.Bip. ex Hook.f.	QTB-JL-66	whole plants	economic(1),be sold;medicine:arthritis(12),decoction	0.
si1-li1-mei3-duo3	Compositae	*Senecio raphanifolius* Wall. ex DC.	QTP-EBT-3066	whole plants	medicine: typhia(5),decoction	0.
se1-ji1-mei3-duo3	Compositae	*Taraxacum sikkimense* Hand.-Mazz.	QTB-JL-110	whole plants	medicine:endocrine(2),decoction	0.
ca1-lu1	Coriariaceae	*Coriaria terminalis* Hemsl.	QTP-EBT-3005	fruits	food:fruit(3),eaten raw	0.
suo3-la1-	Crassulaceae	*Rhodiola*	QTB-JL-	roots	medicine:hypertension(2),decoction	0.

ma3-bu4		*himalensis* (D. Don) S.H. Fu	124			
si1-lu1-mei3-duo3	Crassulaceae	*Sedum multicaule* Wall. ex Lindl.	QTB-JL-94	aerial parts	medicine:injuries(3),apply to the affected area	0.
ruo1-ruo1	Cucurbitaceae	*Herpetospermum pedunculosum* (Ser.) C.B. Clarke	QTB-JL-22	seeds	medicine:cold(2),decoction	0.
ma1-ma1-dong3-cei1	Cucurbitaceae	*Solena heterophylla* Lour.	QTB-JL-80	fruits	food:fruit(4),eaten raw	0.
xiu1-bai1	Cupressaceae	*Juniperus indica* Bertol.	QTB-JL-57	branches	ritual use(20),burned	0.
xiu1-bo1	Cupressaceae	*Juniperus tibetica* Kom.	QTB-JL-64	branches	ritual use(11),burned	0.
da1	Dennstaedtiaceae	*Pteridium aquilinum* var. *latiusculum* (Desv.) Underw. ex A. Heller	QTB-JL-10	leaves	food:vegetable(15),stir-fried	0.
zha1-lu1	Elaeagnaceae	*Elaeagnus umbellata* Thunb.	QTB-JL-18	fruits	food:fruit(14),eaten raw	0.
da1-ru1	Elaeagnaceae	*Hippophae salicifolia* D.Don	QTB-JL-16	fruits;branches	food:fruit(3),eaten raw;seasoning(2),cooked with other food;fuelwood(1),burned	0.
ba1-lu1	Ericaceae	*Rhododendron anthopogon* D. Don	QTB-JL-115	branches	ritual use(30),burned;food:beverage(2),boiled with water	1.
mei1-dang1	Ericaceae	*Rhododendron arboreum* Sm.	QTB-JL-30	branches	fuelwood(16),burned	0.
tu1-tu1-le4-du3-ba4	Euphorbiaceae	*Euphorbia micractina* Boiss.	QTB-JL-85	whole plants	medicine: poison(9),decoction	0.
bei1-luo1	Fagaceae	*Quercus semecarpifolia* Sm.	QTB-JL-25	branches	fulewood(3),burned	0.
da1-ga1	Juglandaceae	*Juglans regia* L.	QTB-JL-88	pericarp;branches	dye(18),used to dye the fruit black;fuelwood(1),burned;food:fruit(2),eaten raw	0.
bai1-mu1	Liliaceae	*Fritillaria cirrhosa* D. Don	QTP-EBT-3012	bulbs	economic(1),be sold;medicine:cough, cold(12),decoction	0.
bo1-ruo4	Liliaceae	*Lilium nepalense* D.Don	QTB-JL-120	bulbs	medicine:tonic(9),decoction	0.
jiang1-ba1-la1-mu1	Malvaceae	*Malva verticillata* L.	QTB-JL-36	roots;leaves	medicine:digestion(4),decoction;food:vegetable(14),stir-fried	0.
tian3-ma3	Orchidaceae	*Gastrodia elata* Blume	QTP-JPG-3292	roots	economic(4),be sold;medicine:tonic(22),decoction	0.
ang1-bu1-la1-ba1	Orchidaceae	*Gymnadenia orchidis* Lindl.	QTB-JL-56	roots	medicine:tonic(3),decoction;vegetable(1),stir-fried	0.
wang1-ya1	Phytolaccaceae	*Phytolacca acinosa* Roxb.	QTB-JL-84	roots;leaves	medicine:poison(2),decoction; food:vegetable(11),stir-fried	0.
tang3-ge1-ru3-bai1;tang3-xin1	Pinaceae	*Pinus wallichiana* A.B.Jacks.	QTB-JL-39	barks;seeds;branches	food:vegetable(11),stir-fried;fruit(2),eaten raw;fulewood(19),burned	1.
di1-da1	Plantaginaceae	*Neopicrorhiza scrophulariiflora* (Pennell) D.Y.Hong	QTB-JL-67	roots	medicine:cold(16),decoction	0.
niu1-lu1	Poaceae	*Fargesia* sp.	QTB-JL-118	stems	food:vegetable(9),stir-fried	0.
jiang1-ma1	Poaceae	Poaceae sp.	QTP-JPG-8	aerial parts	food:fodder(2),feed the cattle	0.
a1-lang1-ba1-lang1	Polygonaceae	*Fallopia denticulata* (C.C.Huang) Holub	QTB-JL-122	roots	medicine:cold(5),decoction	0.
qu1-zha1	Polygonaceae	*Rheum australe* D.	QTB-JL-	roots,stems	dye(19),used to dye yellow;food:fruit(3),eaten raw	0.

		Don	3			
xiu1-ma1	Polygonaceae	*Rumex nepalensis* Spreng.	EBT-PL-86	whole plants	fodder(4),feed the cattle	0.
zen1-du1	Ranunculaceae	*Aconitum gymnandrum* Maxim.	QTP-EBT-3097	whole plants	medicine:poison,decoction(7)	0.
beng3-ma1	Ranunculaceae	*Aconitum Gyirongense* W.T.Wang & L.Q.Li	QTB-JPG-1	roots	medicine:inflammation(2),detoxification(3),decoction	0.
bo1-ge1-da1	Rhamnaceae	*Berchemia flavescens* (Wall.) Wall. ex Brongn.	QTB-JL-93	fruits	food:fruit(18),eaten raw	0.
bai1-la1	Rosaceae	*Chaenomeles thibetica* T.T.Yu	QTB-JL-109	fruits	food:fruit(6),eaten raw	0.
bang1-sei1	Rosaceae	*Fragaria nubicola* (Lindl. ex Hook.f.) Lacaita	QTB-JL-9	fruits	food:fruit(10),eaten raw	0.
chu1-ma1	Rosaceae	*Potentilla anserina* L.	QTP-EBT-3055	roots	food:starche(6),boiled	0.
bu1-long1-che4-mang1	Rosaceae	*Prinsepia utilis* Royle	QTB-JL-38	fruits	economic(2),be sold	0.
a1-lu1-ba1-la	Rosaceae	*Prunus holosericea* (Batal.) Kost.	QTB-JL-91	fruits	food:fruit(2),eaten raw	0.
a1-xiu1-kang1-bu4	Rosaceae	*Prunus mira* Koehne	QTB-JL-69	fruits	food:fruit(20),eaten raw	0.
gu1-jiu1-ma1	Rosaceae	*Rosa sericea* Wall. ex Lindl.	QTB-JL-17	fruits	food:fruit(16),burned	0.
nia1-lang1-sei3-bo1;nia1-nang1	Rosaceae	*Rubus aurantiacus* Focke	QTB-JL-14	fruits	food:fruit(14),burned	0.
nia1-lang	Rosaceae	*Rubus austrotibetanus* T.T.Yu & L.T.Lu	QTB-JL-82	fruits	food:fruit(18),eaten raw;medicine:dispel the effects of alcohol(1),decoction	0.
na1-zi1	Rosaceae	*Sorbus cuspidata* (Spach) Hedl.	QTB-JL-5	fruits	food:fruit(12),eaten raw	0.
ca1-le1-ba1	Rosaceae	*Sorbus ochracea* (Hand.-Mazz.) Vidl	QTB-JL-92	branches	tool(3),used to make axe handles;fuelwood(3),burned	0.
ei1-ma1	Rutaceae	*Zanthoxylum bungeanum* Maxim.	QTB-JL-8	pericarp	food:seasoning(11),cooked with other food	0.
lang1-ma1	Salicaceae	*Salix trichocarpa* C.F. Fang	QTB-JL-47	stems	fuelwood(3),burned	0.
sei1-ge1-xin1	Taxaceae	*Taxus wallichiana* Zucc.	QTB-JL-31	stems	tool(5),the stem is used to make tools	0.
suo3-wa1	Urticaceae	*Urtica ardens* Link	QTP-JPG-5	leaves	food:vegetable(11),boiled with water	0.

Table 2 Use categories and FIC of plants used by Daman

Local use		Damag		FIC
		Ns	Urs	
edible				
	fruit	18	167	0.8976
	seasoning	4	20	0.8421
	vegetable	14	129	0.8984
	beverage	1	2	1.0000
	starche	2	8	0.8571
medicine				
	poison	3	20	0.8947
	inflammation	1	2	1.0000
	detoxification	1	3	1.0000
	infections	2	6	0.8000
	digestive system disorders	4	12	0.7273
	gynaecopathia	1	6	1.0000
	respiratory system disorders	5	36	0.8857
	nutritional disorders	5	59	0.9310
	injuries	1	3	1.0000
	endocrine system disorders	1	2	1.0000
	muscular-skeletal system disorders	3	22	0.9048
	circulatory system disorders	1	2	1.0000
Other				
	dye	2	37	0.9722
	economic	4	8	0.5714
	fodder	2	6	0.8000
	fuelwood	7	22	0.7143
	ritual use	6	94	0.9462
	tool	3	11	0.8000

Figures

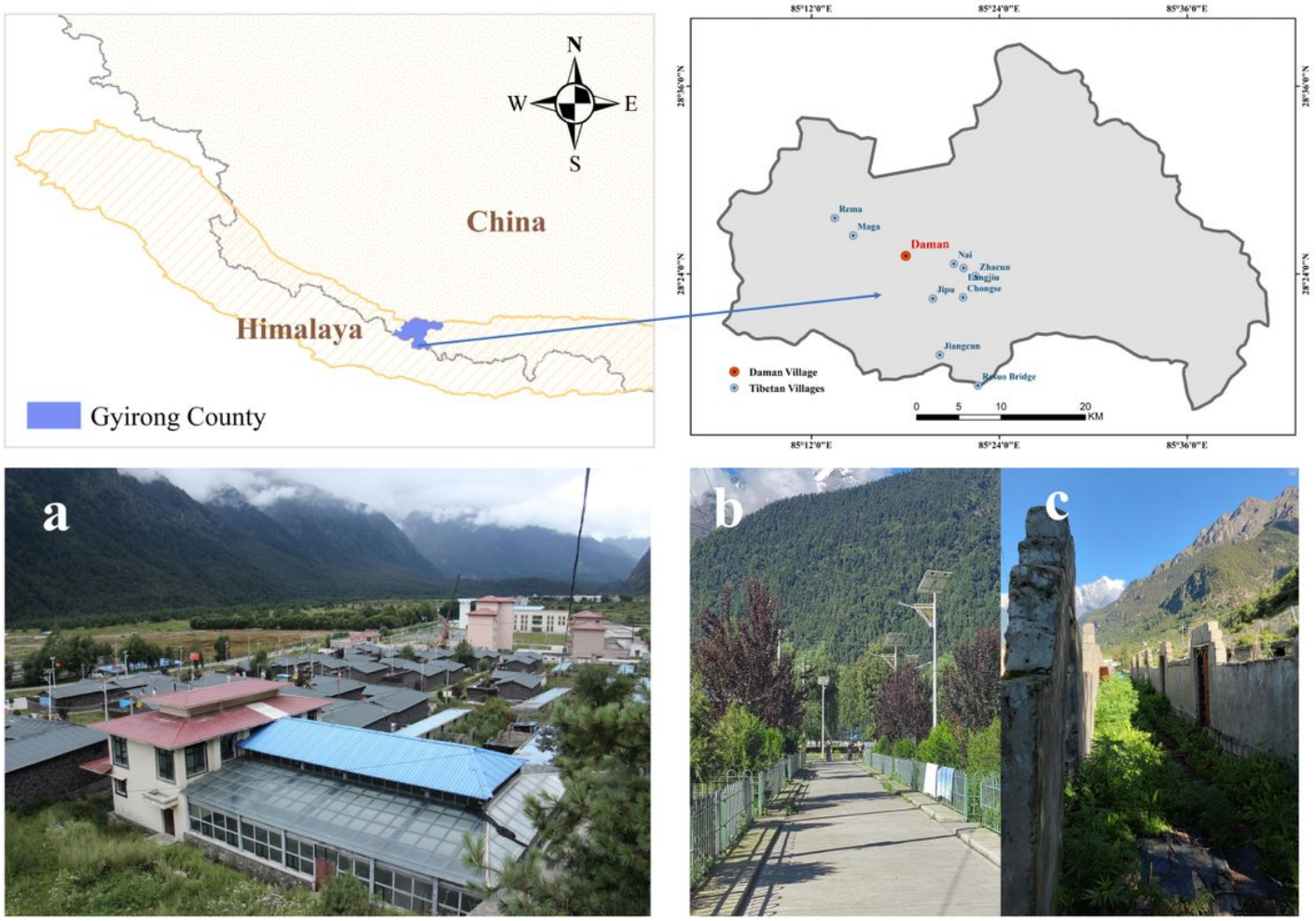

Figure 1

he Location and Environment of the Daman Settlement. **a** an overall view of Daman village **b** the road in Daman village **c** Daman village before the earthquake

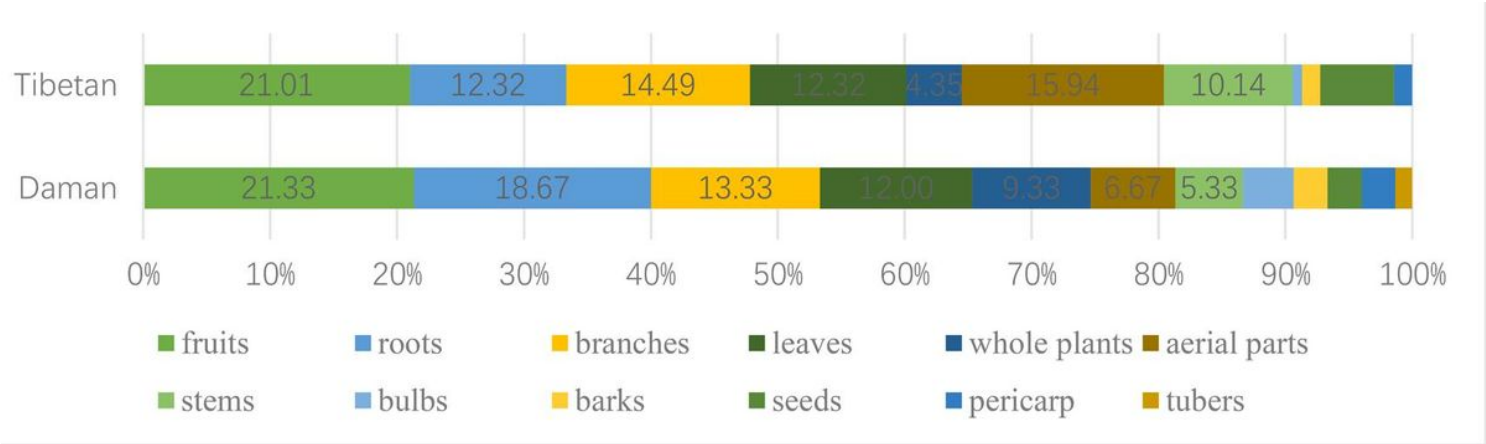

Figure 2

Comparison of used part of plants

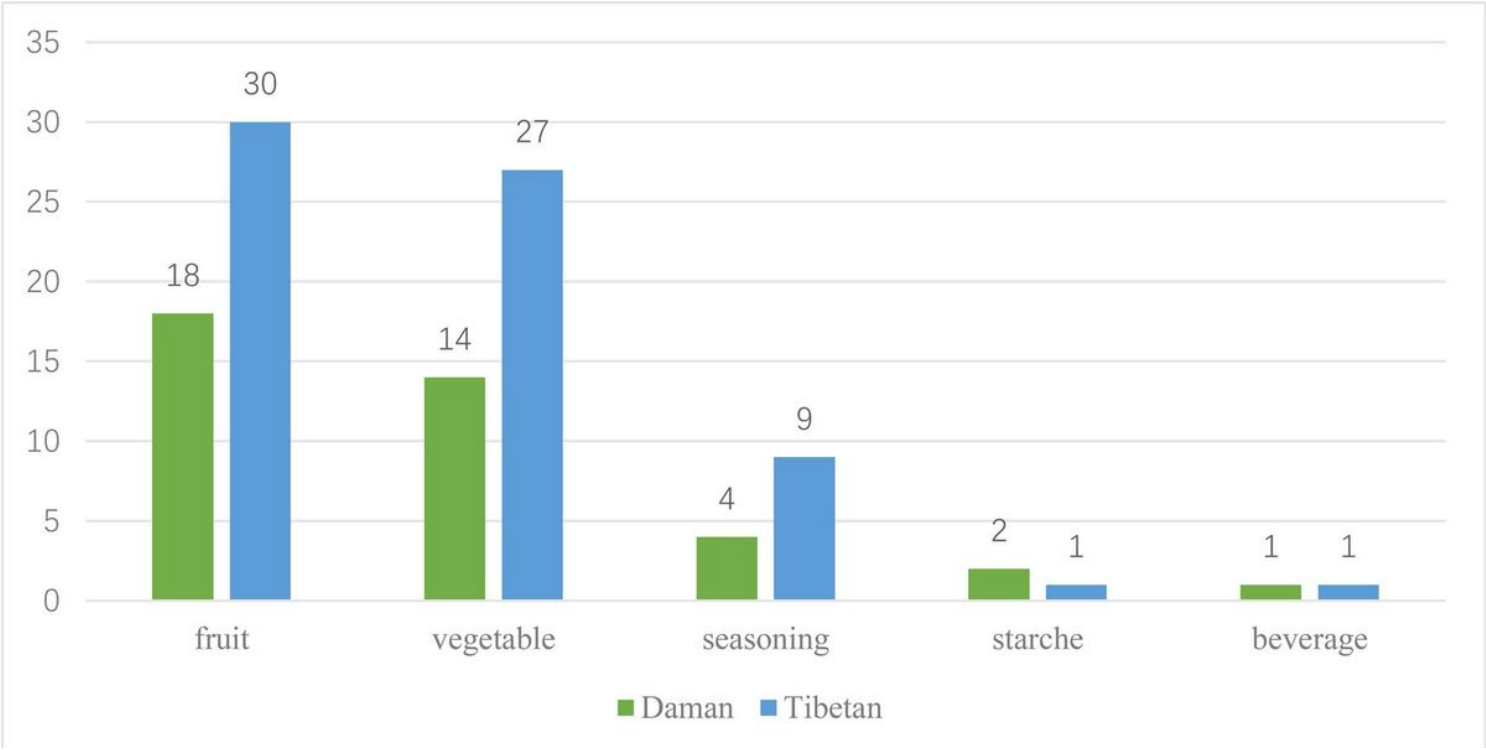

Figure 3

Comparison of species and quantity of edible plants

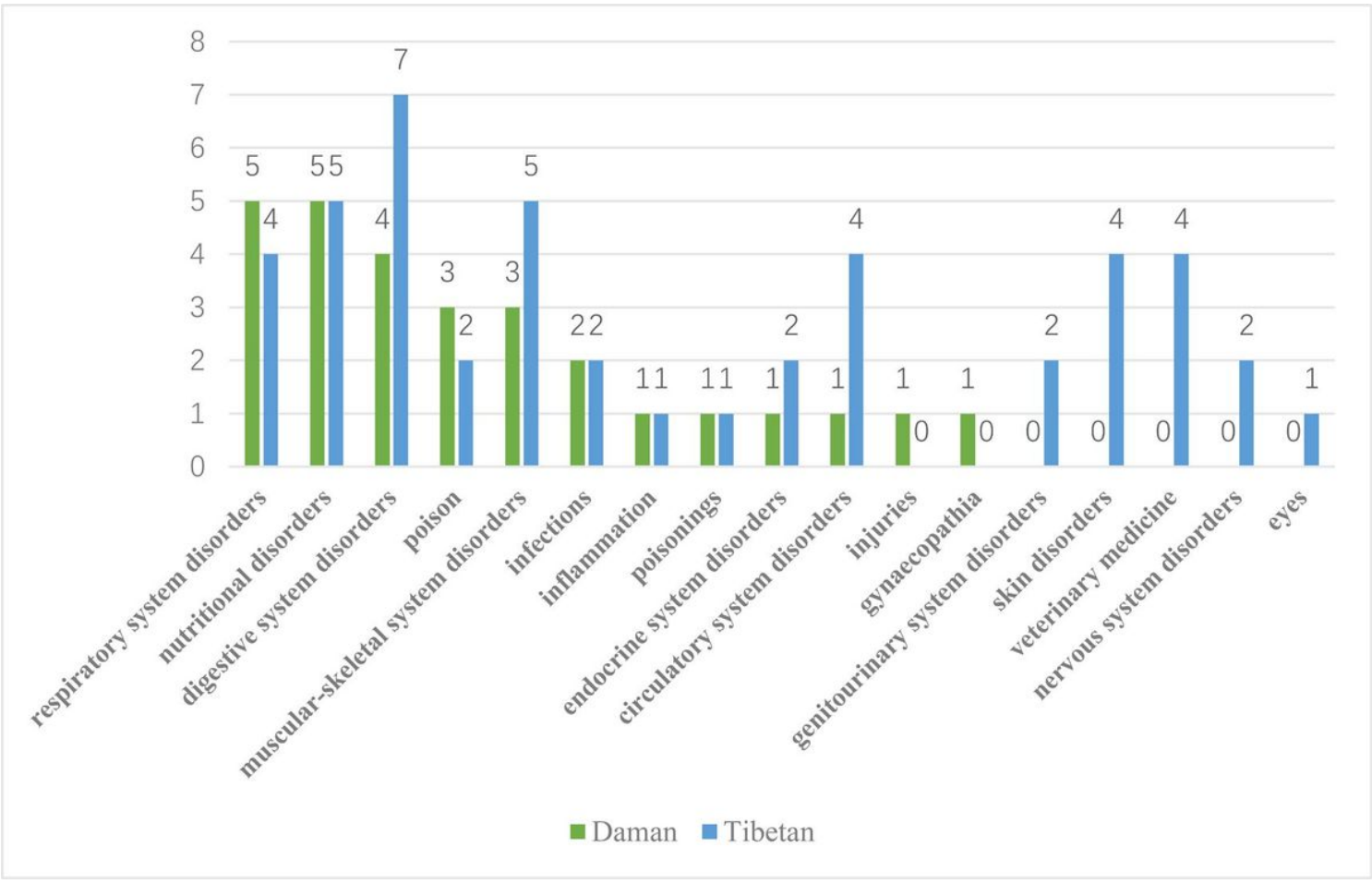

Figure 4

Comparison of species and quantity of medicinal plants

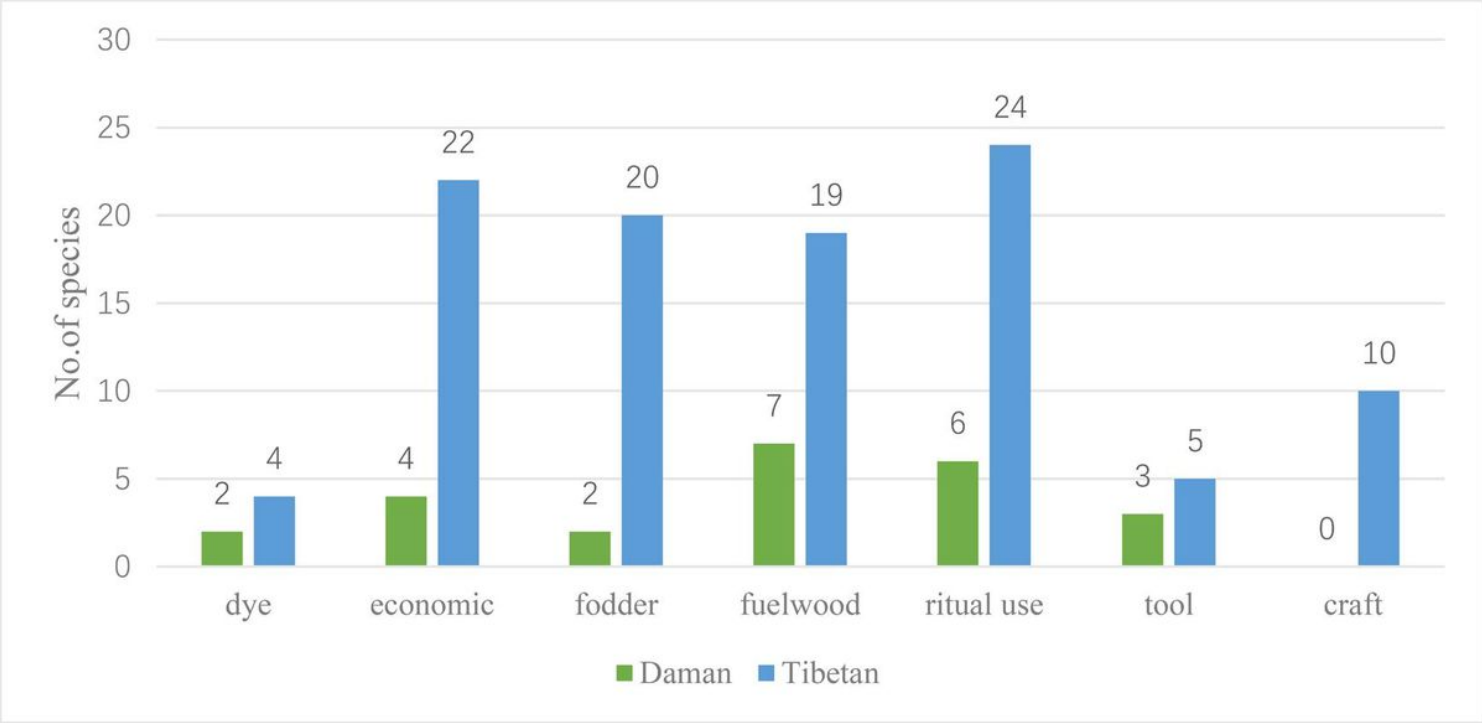

Figure 5

Comparison of species and quantity of other use plants

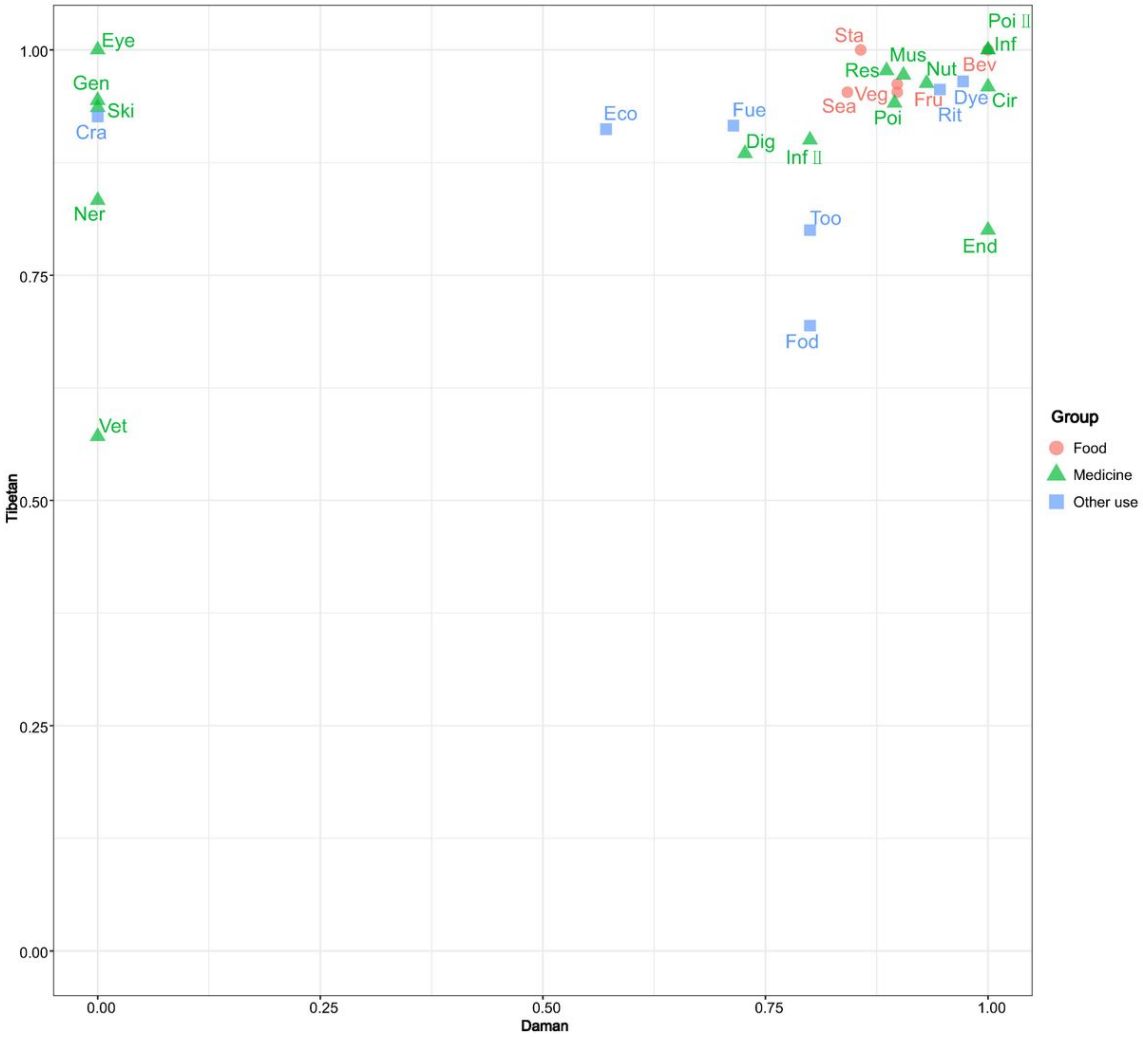

Figure 6

Matrix of FIC index. Fru = fruit, Sea = seasoning, Veg = vegetable, Bev = beverage, Sta = starche, Poi = poison, Inf = inflammation, Poi = detoxification, Inf = infections, dig = digestive system disorders, Res = respiratory system disorders, Nut = nutritional disorders, End = endocrine system disorders, Mus = muscular-skeletal system disorders, Gen = genitourinary system disorders, Ski = skin disorders, Vet = veterinary medicine, Ner = nervous system disorders, Cir = circulatory system disorders, Eye = eyes disorders, Gyn = gynaecopathia, Inj = injuries, Too = tool, Cra = craft, Dye = dye, Eco = economic, Fod = fodder, Fue = fuelwood, Rit = ritual use.

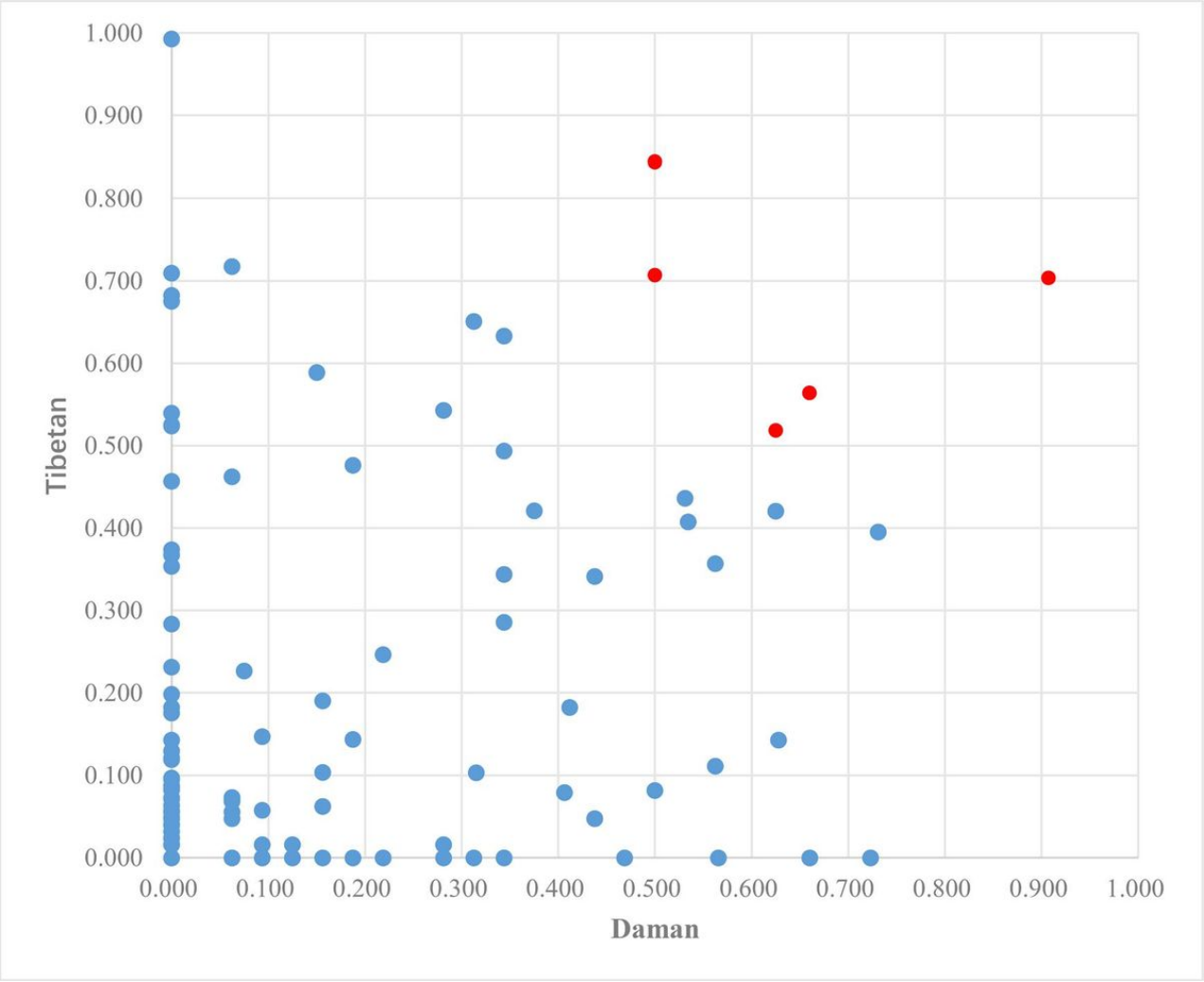

Figure 7

Matrix of IASc index

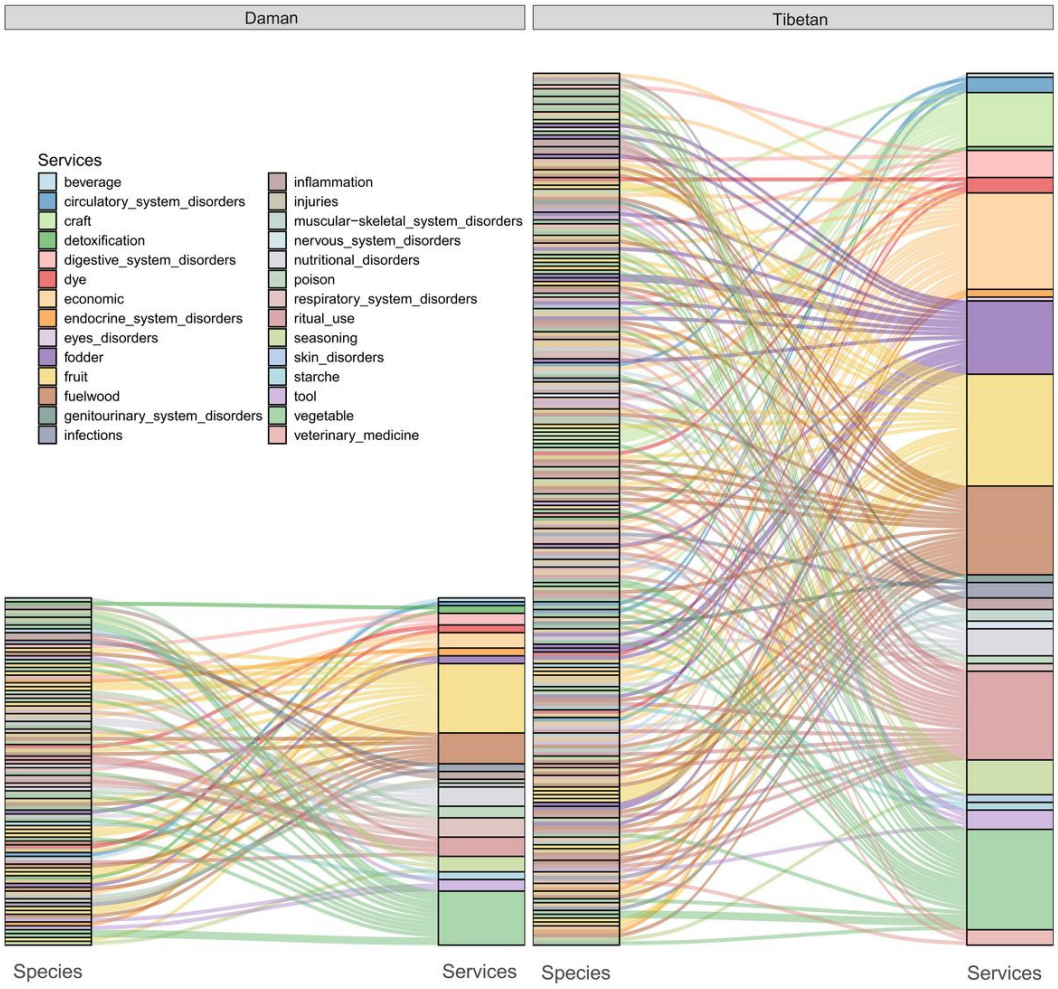

Figure 8

Indigenous plant knowledge networks of Daman and Tibetan

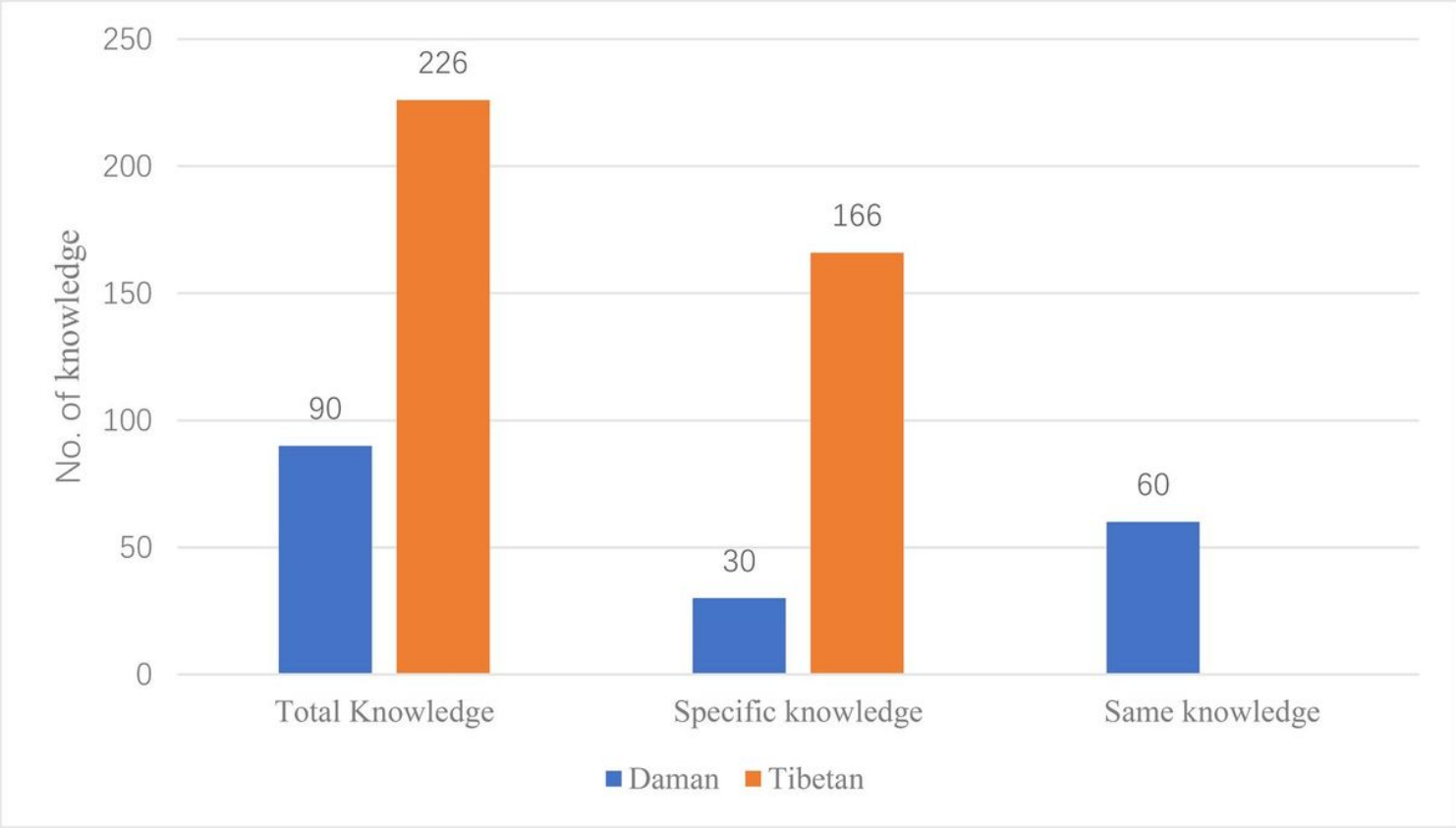

Figure 9

Comparison of knowledge quantity

Supplementary Files

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- Additionalfile3.docx