

A Study of the Plant Folk Nomenclature of the Yi People in Xiaoliangshan, Yunnan Province, China, and the Implications for Protecting Biodiversity

Yi-Won A·D

University of Chinese Academy of Sciences

Yu Zhang

Yunnan Key Laboratory for Wild Plant Resources, Kunming Institute of Botany, Chinese Academy of Sciences, Kunming, China

Xiao-Yong Ding

University of Chinese Academy of Sciences

Chang-An Guo

University of Chinese Academy of Sciences

Yu-Hua Wang (✉ wangyuhua@mail.kib.ac.cn)

Yunnan Key Laboratory for Wild Plant Resources, Kunming Institute of Botany, Chinese Academy of Sciences, Kunming, China

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Abstract

Background

Folk plant nomenclature is a part of knowledge of indigenous people often used to distinguish plant species. This study aimed to document the folk botanical nomenclature of the Yi people in Xiaoliangshan, north-west Yunnan Province, which has not been systematically investigated to date. The results of this study will assist in conserving biodiversity and the language of the Yi people and will promote the transmission of ethnobotanical knowledge.

Methods

An ethnobotanical survey of plants used by the Yi people in Xiaoliangshan, Yunnan Province, was conducted from September 2019 to August 2021. Semi-structured Interviews and Key Informant Interviews were conducted to collect and document ethnobotanical information, which was then used to analyse the folk botanical nomenclature of the Yi people. In addition, the folk names of plants used by the Xiaoliangshan Yi community were compared with those of the Yi people living in the Daliangshan, where the environment is considerably different.

Results

In this study, 266 informants were interviewed, and the names of 228 indigenous plants were extracted from 3088 use reports. The nomenclature used by the local Yi people is based on plant characteristics, plant habitat, plant-use, and the local culture. The folk names and the plant species have three types of correspondence. Moreover, some plant names are related to animals or Chinese loanwords. The comparison between the folk botanical names used by the Yi people in Xiaoliangshan and those used by the Yi people in the Daliangshan shows that 55 names are identical and the Yi people in both locations use 41 identical plants.

Conclusions

There are certain similarities and differences between the folk nomenclature of the Yi people in Xiaoliangshan and those in the Daliangshan. The findings are an example of how language evolves when people from the same ethnic group live in different geographical environments for extensive periods. In addition, the numerous Chinese loanwords in the folk botanical names of the Yi people in both locations indicate that a loss of traditional knowledge may be one of the greatest challenges to preserving the cultural heritage of the Yi people and to the conservation of biodiversity.

1. Introduction

Plants have been studied and used throughout human history, and the vast number of botanical names in different languages attests to human plant knowledge [1]. Almost all cultures have names for indigenous plants [2], and as a unique naming system based on traditional ethnobotanical knowledge and indigenous language, folk botanical nomenclature reflects the linguistic rules and cultural phenomena of the local

population. Therefore, folk botanical nomenclature is an important resource that enables locals to recognise, remember and use plants, and ultimately to protect plant diversity [3]. Understanding and elucidating folk nomenclature of local plant species is an important part of ethnobotanical and anthropological research [4-7]. Many studies in China have focused on the folk botanical nomenclature of the Dai [8, 9, 2, 10] and the Mongolians [11-13]. Some researchers have documented the plant nomenclature of the Yi people in the Daliangshan Yi Autonomous Prefecture in Sichuan Province [3], where the Yi people often use monosyllabic words to name culturally important plants but use Chinese loanwords to name introduced species. The plant-naming system of the Yi people uses binomial and non-binomial forms, and a recent study on plants used in the Bimo religious rituals of the Yi people in Xiaoliangshan [14] found that plants with both binomial and non-binomial names were employed in these rituals. However, this study focused only on the use of plants by the Yi people from the perspective of religious rituals, and it is unclear whether the same nomenclature is employed for plants used for other purposes.

Hengduan Mountains, which are a popular area for studying biodiversity. The combination of the monsoon climate and the complex mountain environment makes it one of the most abundant alpine flora regions in the world [15, 16]. Various ethnic groups who live in this region, including the Yi people, depend on the region's flora for survival: plants are used for medicine, food, feed, fuel, dyes, spices, landscaping, religious ceremonies, and other purposes [17-19]. Xiaoliangshan lies in the north-western part of Yunnan Province within the Hengduan Mountains. The Yi people living in Xiaoliangshan progressively migrated there from the Daliangshan and they now constitute the main ethnic group in this area [20, 21].

Academic research on the Xiaoliangshan Yi people has focused primarily on the cultural heritage of the Yi ethnic group from the perspective of anthropology [20, 21, 22], whereas no systematic research has investigated their ethnobotanical knowledge. Combined ethnobotanic and anthropologic studies of the Yi ethnic group would enable the folk botanical nomenclature used by the Yi community in Xiaoliangshan to be established, and such research would contribute to preserving traditional botanical knowledge and promoting and protecting biodiversity within this region.

Therefore, this study aimed to document and analyse the folk botanical nomenclature of the Yi ethnic group in Xiaoliangshan. We aimed to answer the two following questions: (1) What are the rules for the plant nomenclature used by the Yi people in Xiaoliangshan? (2) What are the similarities and differences between the plant folk nomenclature of the Xiaoliangshan Yi people and those of the Yi people in the Daliangshan, who have the same cultural heritage, but live in a different environment? This paper examines the significance of their plant nomenclature methods and the effect that folk botanical nomenclature has on protecting biodiversity and preserving traditional ethnobotanical knowledge.

2. Methods

2.1 Study area and introduction to the Yi people

Xiaoliangshan (lat. 26°36'–27°56'N; long. 100°22'–101°15'E) is situated in the northwest of Yunnan Province within the middle section of the Hengduan Mountains (Figure 1). It lies on the border of Sichuan and Yunnan province and has a temperate monsoon climate characterised by warm and moist summers, cold and dry

winters, and four distinct seasons [23]. Its primary soil types are subalpine meadow soil, dark brown soil, and subalpine desert soil [24]. Due to its unique geographical location and climatic conditions, there is abundant and diverse flora within the area.

In this study, we conducted ethnobotanical research in 14 villages and 3 communities within six townships in the eastern part of Xiaoliangshan (Table 1). The Yi people are the main ethnic group within the selected research location, and their traditional lifestyle is well preserved in these communities. According to some studies, the Yi people progressively migrated to Xiaoliangshan from the Daliangshan, and they have eventually become the main ethnic group in this region [20, 21]. In the early 19th century, the Yi people in Xiaoliangshan made a living through animal husbandry, farming, and hunting and gathering [25]. Traditional Yi dwellings are made of wood or clay-and-wood [26], and their staple foods include potato, buckwheat, oats, corn, and turnip [27]. Grilling and boiling are commonly used cooking methods [27]. The Yi people firmly believe in animism and worship nature. They also believe that all living things originate from snow, which they consider to be the common ancestor of animals and plants [28]. In the Bimo belief system, the Bimo (a ritual specialist or priest) presides over all major religious activities, including offering prayers and sacrifices [29, 30]. The Yi people in Xiaoliangshan have their own language and script and they use the northern Yi dialect in their daily communication [31].

Table 1

Surveyed locations within study area.

Town	Village/community	Longitude	Latitude	Altitude[m]	Population
Dàxíng town	Well-off homes community	100.861411E	27.304879N	2255	2329
Dàxíng town	Riverside Homes Community	100.865977E	27.284771N	2255	2840
Dàxíng town	Happy Homes Community	100.864976E	27.306978N	2255	6613
Nínglì township	Nínglì Village	100.765049E	27.251272N	2400	4956
Nínglì township	Báicǎopíng Village	100.71238E	27.174713N	2400	2043
Lànníqìng township	Lànníqìng Village	100.983124E	27.225657N	2850	2891
Lànníqìng township	Dàerdì Village	100.940823E	27.275785N	2750	2398
Xīnyíngpán township	Xīnyíngpán Village	100.926102E	27.172216N	2500	4476
Xīnyíngpán township	Dōng fēng Village	100.919985E	27.187754N	2654	3441
Xīnyíngpán township	Máojiāxiāng Village	100.945282E	27.138304N	2600	4052
Pǎomǎpíng township	Pǎomǎpíng Village	100.987172E	26.996425N	2680	4009
Pǎomǎpíng township	Shālipíng Village	101.013091E	26.969145N	2720	3297
Pǎomǎpíng township	Yángchǎng Village	101.045571E	26.937666N	2480	1728
Chánzhànhé township	Chánzhànhé Village	101.180402E	26.98326N	2900	4163
Chánzhànhé township	Sāngǔshuǐ Village	101.077553E	26.973122N	2900	1627
Chánzhànhé township	Gànhǎizǐ Village	101.135092E	27.066066N	1680	1387
Chánzhànhé township	Wànmǎchǎng Village	101.095586E	27.033905N	2900	923

2.2 Ethnobotanical survey and data collection

We conducted several systematic ethnobotanical surveys and investigations in Xialoianshan from September 2019 to August 2021. We used snowball sampling to recruit a total of 266 informants, including 151 males and 115 females. The informants held various occupations, such as local farmers and herdsmen,

Bimo practitioners, students, forest rangers, and folk doctors. Key informant interviews and semi-structured interviews were conducted with the informants upon their consent. The interviews were conducted at the informants' homes, fields, shrub, and pine forests, and at sacrificial ritual locations. The first author of this article is a local member of the Yi ethnic group, whose mother tongue is the Yi language. To facilitate communication with the informants and ensure the integrity of the acquired information, all interviews were conducted and documented in Yi language. During each interview, the informants were asked the following pre-prepared questions: (1) What plants do you usually use and how do you use them? (2) What are their names? (3) Can you explain the meaning of their names?

Finally, voucher specimens of the different plants were collected in the nearby fields, farmland, and along roadsides, under the guidance of the key informants. All the collected voucher specimens were authenticated by each member of the research team in charge of this study, based on the publication "Flora of China" [32] and then stored at the Herbarium of the Kunming Institute of Botany, Chinese Academy of Sciences.

2.3 Data analysis

After informant interviews, Microsoft Excel 2016 (Microsoft Corporation, <http://www.microsoft.com/>) was used to compile the collected data. Acai Yi input (<https://www.cr173.com/soft/642454.html>) was employed to transcribe the handwritten notes into the corresponding Excel tables. The information collected in the informant interviews served as the basis for our research on the folk botanical nomenclature and classification rules of the Yi people in Xiaoliangshan.

3. Results

3.1 Plant species used by the Yi community in Xiaoliangshan

We collected a total of 3088 use reports and extracted 228 folk names of local plants, belonging to 107 families, 178 genera, and 226 species (Table 2). The record of each useful plant includes the following information: plant name in the Yi language and Yi language phonetic name, Latin name, family name of the plant species, voucher specimen number, and the number of use reports.

Table 2

Catalogue of plants used by the Yi people in Xiaoliangshan, Yunnan Province.

Yi language name	Yi language phonetic name	Latin name	Family	The number of use reports	Voucher number
☐☐	map bu	<i>Paris polyphylla</i> Smith	Melanthiaceae	215	QTP-EBT5000
☐☐	hxi ke	<i>Artemisia argyi</i> Lévl. et Van.	Asteraceae	165	QTP-EBT5001
☐☐	yie pie	<i>Papaver somniferum</i> L.	Papaveraceae	113	
☐☐☐	va ddot chu	<i>Berberis pruinosa</i> Franch.	Berberidaceae	106	QTP-EBT5002
☐☐	chup nuop	<i>Prinsepia utilis</i> Royle	Rosaceae	90	QTP-EBT5003
☐☐☐☐	a jji bap mop	<i>Dipsacus asper</i> Wallich ex Candolle	Caprifoliaceae	87	QTP-EBT5004
☐☐☐☐☐	va bu syt pup ssut	<i>Taxillus Tiegh.sp</i>	Loranthaceae	71	QTP-EBT5005
☐☐☐☐	vot mop ddie bbur	<i>Plantago major</i> L.	Plantaginaceae	70	QTP-EBT5006
☐☐	bbit yop	<i>Bulbophyllum Thouars.sp</i>	Orchidaceae	69	QTP-EBT5007
☐☐	chup tu	<i>Rubus biflorus</i> Buch. -Ham. ex Smith	Rosaceae	68	QTP-EBT5008
☐☐☐☐	va zza hnap zzy	<i>Potentilla lineata</i> Treviranus	Rosaceae	63	QTP-EBT5009
☐☐☐	chup nuop ssut	<i>Taxillus.sp</i>	Loranthaceae	59	QTP-EBT5010
☐☐☐	sy qi ddi	<i>Sambucus williamsii</i> Hance	Adoxaceae	58	QTP-EBT5011
☐☐☐	jy sy ssut	<i>Taxillus delavayi</i> (Van Tiegh.) Danser	Loranthaceae	53	QTP-EBT5012
☐☐☐☐	vot mop zza ke	<i>Crepis lignea</i> (Vaniot) Babcock	Asteraceae	49	QTP-EBT5013
☐☐☐	syp ap mop	<i>Lonicera calcarata</i> Hemsl.	Caprifoliaceae	48	QTP-EBT5014
☐	mge	<i>Fagopyrum tataricum</i> (L.) Gaertn.	Polygonaceae	47	QTP-EBT5015
☐☐	ap yit	<i>Malva rotundifolia</i> Linn.	Malvaceae	42	QTP-EBT5016
☐☐☐☐	vot mop jyt nyi	<i>Codonopsis pilosula</i> (Franch.) Nannf.	Campanulaceae	41	QTP-EBT5017

0000	mup sse hnap bo	<i>Clinopodium urticifolium</i> (Hance) C. Y. Wu et Hsuan ex H. W. Li	Lamiaceae	40	QTP- EBT5018
00	bbap zzip	<i>Zanthoxylum.sp</i>	Rutaceae	37	QTP- EBT5019
0000	te xy lat juo	<i>Pyrola calliantha</i> H. Andr.	Ericaceae	36	QTP- EBT5020
00	mu ku	<i>Litsea cubeba</i> (Lour.) Pers.	Lauraceae	35	QTP- EBT5021
0000	gge bu a nuo	<i>Gentiana rigescens</i> Franch. ex Hemsl.	Gentianaceae	34	QTP- EBT5022
0000	va hmip syp hmip	<i>Vaccinium</i> L.	Ericaceae	33	QTP- EBT5023
000	bbut qip ddi	<i>Sambucus adnata</i> Wall. ex DC.	Caprifoliaceae	32	QTP- EBT5024
00	dur lap	<i>Aconitum episcopale</i> Leveille	Ranunculaceae	32	QTP- EBT5025
☒	ma	<i>Fargesia yunnanensis</i> Hsueh et Yi	Poaceae	32	QTP- EBT5026
000	nip ho vo	<i>Schisandra lancifolia</i> (Rehd. et Wils.) A. C. Smith	Schisandraceae	31	QTP- EBT5027
00	chyt jy	<i>Hypericum patulum</i> Thunb. ex Murray	Hypericaceae	30	QTP- EBT5028
00	dda bbo	<i>Pteridium revolutum</i> (Bl.) Nakai	Pteridiaceae	30	QTP- EBT5029
0000	vot mop zza ke	<i>Taraxacum dasypodium</i> V. Soest	Compositae	30	QTP- EBT5030
0000	ddep bup a tu	<i>Urtica mairei</i> Levl.	Urticaceae	29	QTP- EBT5031
0000	le rre bbut cy	<i>Paeonia delavayi</i> Franch.	Paeoniaceae	29	QTP- EBT5032
000	fa xie yop	<i>Lyonia ovalifolia</i> (Wall.) Drude	Ericaceae	25	QTP- EBT5033
0	vup	<i>Rubia podantha</i> Diels	Rubiaceae	24	QTP- EBT5034
0000	hnit nra a hni	<i>Chenopodium album</i> L.	Chenopodiaceae	23	QTP- EBT5035
000	lop shet map	<i>Cimicifuga yunnanensis</i> Hsiao	Ranunculaceae	23	QTP- EBT5036
00	te ssut	<i>Taxillus caloareas</i> (Diels.) Danser	Loranthaceae	23	QTP- EBT5037

00	fut mop	<i>Geranium strictipes</i>	Geraniaceae	21	QTP-EBT5038
00	te bbo	<i>Pinus yunnanensis</i> Franch.	Pinaceae	21	QTP-EBT5039
0000	a ddu sha bbu	<i>Anemone vitifolia</i> Buch. -Ham.	Ranunculaceae	20	QTP-EBT5040
00	nzy njip	<i>Rodgersia sambucifolia</i> Hemsl.	Saxifragaceae	20	QTP-EBT5041
00	ba lat	<i>Ehretia corylifolia</i> C. H. Wright	Boraginaceae	19	QTP-EBT5042
000	ho bbo ssut	<i>Taxillus Tiegh.sp</i>	Loranthaceae	19	QTP-EBT5043
0000	gep dep map ma	<i>Mahonia duclouxiana</i> Gagn.	Berberidaceae	18	QTP-EBT5044
00	xit zhup	<i>Desmodium elegans</i> DC.	Fabaceae	18	QTP-EBT5045
0000	yo nyi ke ddut	<i>Cynanchum otophyllum</i> Schneid.	Apocynaceae	18	QTP-EBT5046
00	huo gat	<i>Populus adenopoda</i> Maxim	Salicaceae	17	QTP-EBT5047
0	hmup	<i>Cannabis sativa</i> L.	Cannabaceae	16	QTP-EBT5048
0000	pat qi xy hni	<i>Rumex nepalensis</i> Spreng. var. nepalensis	Polygonaceae	16	QTP-EBT5049
00	yy ho	<i>Salix matsudana</i> Koidz.	Salicaceae	16	QTP-EBT5050
00	ddut jy	<i>Aconitum carmichaelii</i> Debeaux	Ranunculaceae	15	QTP-EBT5051
0000	ddep bup a nuop	<i>Girardinia diversifolia</i> (Link) Friis	Urticaceae	14	QTP-EBT5052
0000	gge jot hne bbi	<i>Aristolochia griffithii</i> Hook. f. et Thoms. ex Duchartre	Aristolochiaceae	14	QTP-EBT5053
0000	hnit nra a tu	<i>Chenopodium album</i> L.	Chenopodiaceae	14	QTP-EBT5054
0000	sy lur qi py	<i>Cinnamomum tamala</i> (Buch. - Ham.) Th	Lauraceae	14	QTP-EBT5055
0000	va bu shy ggo	<i>Adenophora stricta</i> Miq.	Campanulaceae	13	QTP-EBT5056
0000	yo sse la bbo	<i>Holboellia angustifolia</i> Wallich	Lardizabalaceae	13	QTP-EBT5057
00	yyrx yyr	<i>Ophiopogon</i> Ker Gawl.sp	Asparagaceae	13	QTP-

□□□□	a mat lot si	<i>Serissa japonica</i> (Thunb.) Thunb. Nov. Gen.	Rubiaceae	12	QTP- EBT5059
□□	gop gox	<i>Leontopodium calocephalum</i> (Franch.) Beauv.	Asteraceae	12	QTP- EBT5060
□□□□	li bbi syp ddu	<i>Cornus capitata</i>	Cornaceae	12	QTP- EBT5061
□□□□	nyi mop syp vo	<i>Vitis heyneana</i> Roem. et Schult.	Vitaceae	12	QTP- EBT5062
□□□	syp ddat ssut	<i>Taxillus Tiegh.sp</i>	Loranthaceae	12	QTP- EBT5063
□□□□	a jji bbu zza	<i>Morus australis</i> var. <i>australis</i>	Moraceae	11	QTP- EBT5064
□□	ap zzit	<i>Allium mairei</i> Levl.	Amaryllidaceae	11	QTP- EBT5065
□□□	juo zy li	<i>Ipomoea cairica</i> (L.) Sweet	Convolvulaceae	11	QTP- EBT5066
□□	mge vut	<i>Illicium wardii</i> A. C. Sm.	Magnoliaceae	11	QTP- EBT5067
□□	pat qi	<i>Rumex acetosa</i> L.	Polygonaceae	10	QTP- EBT5068
□□	syp bu	<i>Docynia delavayi</i> (Franch.) Schneid.	Rosaceae	10	QTP- EBT5069
□□□□	a mat nyuo vut	<i>Cynoglossum amabile</i> Stapf et Drumm.	Boraginaceae	9	QTP- EBT5070
□□□□	bbu shy ddut zza	<i>Arisaema erubescens</i> (Wall.) Schott	Araceae	9	QTP- EBT5071
□□	ji sy	<i>Coriaria nepalensis</i> Wall.	Coriariaceae	9	QTP- EBT5072
□□	vap ga	<i>Rorippa indica</i> (L.) Hiern	Brassicaceae	9	QTP- EBT5073
□□	vap ma	<i>Brassica rapa</i> L.	Brassicaceae	9	QTP- EBT5074
□□□□	a zhat vop ji	<i>Begonia grandis</i> Dry.	Begoniaceae	8	QTP- EBT5075
□□	ap jjit	<i>Pyracantha angustifolia</i> (Franch.) Schneid.	Rosaceae	8	QTP- EBT5076
□□	bbie cy	<i>Iridaceae nom. conserv.</i> Sp	Iridaceae	8	QTP- EBT5077
□□□□	cep hlo a hni	<i>Fragaria vesca</i> L.	Rosaceae	8	QTP- EBT5078

00	gop gox	<i>Leontopodium leontopodioides</i> (Willd.) Beauv.	Asteraceae	8	QTP-EBT5079
000	ho sha vu	<i>Fallopia multiflora</i> (Thunb.) Harald.	Polygonaceae	8	QTP-EBT5080
00	rrup kot	<i>Cirsium lidjiangense</i> Petrak ex Hand. -Mazz.	Asteraceae	8	QTP-EBT5081
000	vat bbu yo	<i>Incarvillea arguta</i> (Royle) Royle	Bignoniaceae	8	QTP-EBT5082
00	bit map	<i>Ricinus communis</i> L.	Euphorbiaceae	7	QTP-EBT5083
0000	but fu zha cy	<i>Anemone rivularis</i> Buch. -Ham.	Ranunculaceae	7	QTP-EBT5084
00	it mup	<i>Zea mays</i> L.	Poaceae	7	QTP-EBT5085
0000	nyip ggu a tu	<i>Lonicera trichosantha</i> Bur. et Franch.	Caprifoliaceae	7	QTP-EBT5086
0000	qy sse mge hlop	<i>Fagopyrum esculentum</i> Moench	Polygonaceae	7	QTP-EBT5087
00	syp ga	<i>Prunus salicina</i> Lindl.	Rosaceae	7	QTP-EBT5088
00	va jy	<i>Leycesteria formosa</i> Wall.	Caprifoliaceae	7	QTP-EBT5089
0000	bbut xit ho cy	<i>Agrimonia pilosa</i> var. <i>nepalensis</i> (D. Don) Nakai	Rosaceae	6	QTP-EBT5090
00	chyt jy	<i>Hypericum forrestii</i> (Chittenden) N. Robson	Hypericaceae	6	QTP-EBT5091
000	gguo lyr vop	<i>Psammosilene tunicoides</i> W. C. Wu et C. Y. Wu	Caryophyllaceae	6	QTP-EBT5092
000	gguo lyr vop	<i>Saponaria officinalis</i> L.	Caryophyllaceae	6	QTP-EBT5093
00	nyie lyt	<i>Ligusticum sinense</i> 'Chuanxiong'	Apiaceae	6	QTP-EBT5094
0000	qy sse mge hlop	<i>Fagopyrum dibotrys</i> (D. Don) Hara	Polygonaceae	6	QTP-EBT5095
00	za qip	<i>Solanum tuberosum</i> L.	Solanaceae	6	QTP-EBT5096
0000	a ddu bba jjo	<i>Notopterygium incisum</i> Ting ex H. T. Chang	Apiaceae	5	QTP-EBT5097
000	bbu ga cy	<i>Datura stramonium</i> L.	Solanaceae	5	QTP-EBT5098

000	bbut cha fu	<i>Bupleurum marginatum</i> Wall. ex DC.	Apiaceae	5	QTP- EBT5099
000	bbut o jjie	<i>Bidens pilosa</i> L.	Asteraceae	5	QTP- EBT5100
00	di pu	<i>Pseudognaphalium chrysocephalum</i> Hilliard & B. L. Burtt	Caprifoliaceae	5	QTP- EBT5101
000	gup sup bu	<i>Davallia trichomanoides</i> Blume	Davalliaceae	5	QTP- EBT5102
0000	hxie ggat vat zza	<i>Phytolacca acinosa</i> Roxb.	Phytolaccaceae nom. conserv.	5	QTP- EBT5103
0000	hxie zy vap ga	<i>Capsella bursa-pastoris</i> (L.) Medic.	Cruciferae nom. conserv.	5	QTP- EBT5104
0000	lo ggur bbar zziep	<i>Zanthoxylum bungeanum</i> Maxim.	Rutaceae	5	QTP- EBT5105
000	ma bie cy	<i>Verbena officinalis</i> L.	Verbenaceae	5	QTP- EBT5106
0000	mop mo zy ly	<i>Elaeagnus umbellata</i> Thunb.	Elaeagnaceae	5	QTP- EBT5107
00	rrup kot	<i>Cirsium shansiense</i> Petrak	Asteraceae	5	QTP- EBT5108
00	syp hmi	<i>Juglans regia</i> L.	Juglandaceae	5	QTP- EBT5109
00	syp vo	<i>Amygdalus persica</i>	Rosaceae	5	QTP- EBT5110
0000	a nyie hxi xy	<i>Stellaria vestita</i> Kurz	Caryophyllaceae	4	QTP- EBT5111
0000	bbu shy cap hlo	<i>Duchesnea indica</i> (Andr.) Focke	Rosaceae	4	QTP- EBT5112
00	chyt jy	<i>Hypericum acmosepalum</i> N. Robson	Hypericaceae	4	QTP- EBT5113
00	chyt jy	<i>Hypericum monogynum</i> L.	Hypericaceae	4	QTP- EBT5114
000	huo mop to	<i>Clematis armandii</i> Franch.	Ranunculaceae	4	QTP- EBT5115
00	jy bbo	<i>Toxicodendron succedaneum</i> (L.) O. Kuntze	Anacardiaceae	4	QTP- EBT5116
00	nyie lyt	<i>Angelica</i> L. sp	Apiaceae	4	QTP- EBT5117
00	nyie lyt	<i>Angelica likiangensis</i> Wolff	Apiaceae	4	QTP- EBT5118

□□□□	shop shot mop a nuo	<i>Rubus niveus</i> Thunb.	Rosaceae	4	QTP- EBT5119
□□□□	shuo ma a hni	<i>Rhododendron delavayi</i> Franch.	Ericaceae	4	QTP- EBT5120
□□	sy zyt	<i>Lithocarpus cleistocarpus</i> (Seemen) Rehder et E. H. Wilson	Fagaceae	4	QTP- EBT5121
□□□	vat mop ne	<i>Hedera nepalensis</i> var. <i>sinensis</i> (Tobl.) Rehd.	Araliaceae	4	QTP- EBT5122
□□□□	vot mop rrup kot	<i>Arctium lappa</i> L.	Asteraceae	4	QTP- EBT5123
□□□□	a ddu bba jjo	<i>Heracleum</i> L. sp	Umbelliferae	3	QTP- EBT5124
□□□□□□	a ddu bba jjo it zy	<i>Pimpinella candolleana</i> Wight et Arn.	Apiaceae	3	QTP- EBT5125
□□□	bbap zzip ssut	<i>Taxillus</i> .sp	Loranthaceae	3	QTP- EBT5126
□□	bep bu	<i>Asparagus filicinus</i> D. Don	Asparagaceae	3	QTP- EBT5127
☒ ☒☒☒	cep hlo a hni	<i>Fragaria gracilis</i> Losinsk.	Rosaceae	3	QTP- EBT5128
□	dda	<i>Coniogramme intermedia</i> Hieron.	Pteridaceae	3	QTP- EBT5129
□□□□	ddip sse ka dda	<i>Hylotelephium spectabile</i> (Bor.) H. Ohba	Crassulaceae	3	QTP- EBT5130
□□	gge bu	<i>Halenia elliptica</i> D. Don	Gentianaceae	3	QTP- EBT5131
□□	ho bbo	<i>Alnus nepalensis</i> D. Don	Betulaceae	3	QTP- EBT5132
□□	jje bbo	<i>Cyclobalanopsis glauca</i> (Thunberg) Oersted	Fagaceae	3	QTP- EBT5133
□□	jop hop	<i>Incarvillea mairei</i> (Lévl.) Grierson	Bignoniaceae	3	QTP- EBT5134
□□	lie sy	<i>Eucommia ulmoides</i> Oliver	Eucommiaceae	3	QTP- EBT5135
□□	lop fip	<i>Vicia amoena</i> Fisch.	Papilionaceae	3	QTP- EBT5136
☒	ma	<i>Phyllostachys sulphurea</i> (Carr.) A. et C. Riv	Poaceae	3	QTP- EBT5137
□□	nbie cy	<i>Iris wattii</i> Baker	Iridaceae	3	QTP- EBT5138

☒ ☒	pat qi	<i>Rumex</i> L. sp	Polygonaceae	3	QTP-EBT5139
☐☐	shox shot	<i>Rubus pileatus</i> Focke	Rosaceae	3	QTP-EBT5140
☐☐☐☐	shuo ma a hni	<i>Rhododendron traillianum</i> Forrest et W. W. Smith.	Ericaceae	3	QTP-EBT5141
☐☐☐	te shy jjix	<i>Stellera chamaejasme</i> L.	Thymelaeaceae	3	QTP-EBT5142
☐☐☐	vie ap shy	<i>Pseudognaphalium chrysocephalum</i> Hilliard & B. L. Burtt	Asteraceae	3	QTP-EBT5143
☐	vup	<i>Rubia alata</i> Roxb.	Rubiaceae	3	QTP-EBT5144
☐☐	yiep co	<i>Galinsoga parviflora</i> Cav.	Asteraceae	3	QTP-EBT5145
☒ ☒	a hxa	<i>Arisaema saxatile</i> Buchet	Araceae	2	QTP-EBT5146
☐☐☐☐	a jji lot gga	<i>Berchemia yunnanensis</i> Franch.	Rhamnaceae	2	QTP-EBT5147
☐☐☐☐	a mat lat chu	<i>Smilax ferox</i> Wall. ex Kunth	Smilacaceae	2	QTP-EBT5148
☐☐☐☐	a zhat xy si	<i>Polygonatum cirrhifolium</i> (Wall.) Royle	Asparagaceae	2	QTP-EBT5149
☐☐	bbop ddot	<i>Aconitum carmichaelii</i> Debeaux	Ranunculaceae	2	QTP-EBT5150
☐☐☐	bbut jjy yy	<i>Prunella vulgaris</i> L.	Lamiaceae	2	QTP-EBT5151
☐☐☐☐	bbut tip xu ge	<i>Campylotropis hirtella</i> (Franch.) Schindl.	Fabaceae	2	QTP-EBT5152
☐☐☐☐	hxie ggat vat zza	<i>Colocasia esculenta</i> (L.) Schott.	Araceae	2	QTP-EBT5153
☐☐☐☐	lo ggur ap jjit	<i>Cotoneaster pannosus</i> Franch.	Rosaceae	2	QTP-EBT5154
☐☐	mgap hniep	<i>Cerasus yunnanensis</i> (Franch.) Yü et Li	Rosaceae	2	QTP-EBT5155
☐☐	mu jjip	<i>Acorus calamus</i> L.	Acoraceae	2	QTP-EBT5156
☐☐	ry zot	<i>Equisetum diffusum</i> D. Don	Equisetaceae	2	QTP-EBT5157
☐☐☐☐	shuo ma a ge	<i>Rhododendron decorum</i> Franch.	Ericaceae	2	QTP-EBT5158

□□□□	shuo ma ma ge	<i>Rhododendron traillianum</i> Forrest et W. W. Smith.	Ericaceae	2	QTP- EBT5159
□□	si six	<i>Pinus armandii</i> Franch.	Pinaceae nom. conserv.	2	QTP- EBT5160
□□□	ssup lot juo	<i>Keteleeria evelyniana</i> Mast.	Pinaceae	2	QTP- EBT5161
□□□	ssup shut hni	<i>Tsuga dumosa</i> (D. Don) Eichler in Engler u. Prantl	Pinaceae nom. conserv.	2	QTP- EBT5162
□□	syp yi	<i>Armeniaca mume</i> Sieb.	Rosaceae	2	QTP- EBT5163
□□□	va vu gop	<i>Elsholtzia blanda</i> (Benth.) Benth	Lamiaceae	2	QTP- EBT5164
□□	vat dut	<i>Pisum sativum</i> L.	Fabaceae	2	QTP- EBT5165
□□□□	vop qip shop shot	<i>Rubus sachalinensis</i> Lévl.	Rosaceae	2	QTP- EBT5166
□□	vot hxit	<i>Oxyria digyna</i> (L.) Hill.	Polygonaceae	2	QTP- EBT5167
□□	vot nzy	<i>Debregeasia longifolia</i> (Burm. F.) Wedd.	Urticaceae	2	QTP- EBT5168
□□□□	ry ddu o nuo	<i>Arundinella hookeri</i> Munro ex Keng	Poaceae	2	QTP- EBT5169
□□	a bba	<i>Dioscorea polystachya</i> Turczaninow	Dioscoreaceae	1	QTP- EBT5170
□□□□	a hle va ry	<i>Cyperus</i> L. sp	Cyperaceae	1	QTP- EBT5171
□□□□	a jji jie ddot	<i>Bauhinia brachycarpa</i> Wall. ex Benth.	Fabaceae	1	QTP- EBT5172
□□□	a ngy gop	<i>Lyonia compta</i> (W. W. Smith et Jeffr.) Hand. -Mazz.	Ericaceae	1	QTP- EBT5173
□□□□	a nyie bbyp zy	<i>Cyclosorus dentatus</i> (Forssk.) Ching	Thelypteridaceae	1	QTP- EBT5174
□□□□	a nyie sip sit	<i>Rosa helenae</i> Rehd. et Wils.	Rosaceae	1	QTP- EBT5175
□□□□	a nyut sy tur	<i>Corylus yunnanensis</i> (Franch.) A. Camus	Corylaceae nom. conserv.	1	QTP- EBT5176
□□□□	a zhat xy si	<i>Polygonatum kingianum</i> Coll. et Hemsl.	Asparagaceae	1	QTP- EBT5177
□□	ba lat	<i>Populus yunnanensis</i>	Salicaceae	1	QTP- EBT5178
□□	ba ry	<i>Danthonia cumminsii</i> J. D.	Poaceae	1	QTP-

		Hooker			EBT5179
00	bba juo	<i>Musella lasiocarpa</i> (Franchet) C. Y. Wu ex H. W. Li	Musaceae	1	QTP- EBT5180
00	bbit syp	<i>Impatiens delavayi</i> Franch.	Balsaminaceae	1	QTP- EBT5181
000	bbu bbo di	<i>Commelina communis</i> Linn.	Commelinaceae	1	QTP- EBT5182
0000	bbut che ji cy	<i>Lycopodium japonicum</i> Thunb. ex Murray	Lycopodiaceae	1	QTP- EBT5183
000	bbut chy ni	<i>Ageratina adenophora</i> (Sprengel) R. M. King & H. Robinson	Asteraceae	1	QTP- EBT5184
00	bo hop	<i>Mentha asiatica</i> Boriss. -Bekrj.	Lamiaceae	1	QTP- EBT5185
0000	chyt sse la ot	<i>Decaisnea insignis</i> (Griffith) J. D. Hooker et Thomson	Lardizabalaceae	1	QTP- EBT5186
0000	ddut bu o hni	<i>Pieris formosa</i> (Wall.) D. Don	Ericaceae	1	QTP- EBT5187
00000	die gu shut ap mu	<i>Taxus yunnanensis</i> W.C. Cheng & L.K. Fu	Taxaceae	1	QTP- EBT5188
00	hly vo	<i>Perilla frutescens</i> (L.) Britt.	Lamiaceae	1	QTP- EBT5189
00	hly vo	<i>Elsholtzia ciliata</i> (Thunb.) Hyland.	Lamiaceae	1	QTP- EBT5190
00	hxa cu	<i>Schima argentea</i> Pritz.	Theaceae	1	QTP- EBT5191
00	hxa cu	<i>Ternstroemia gymnanthera</i> (Wight et Arn.) Beddome	Pentaphylacaceae	1	QTP- EBT5192
00	jy sy	<i>Coriaria terminalis</i>	Coriariaceae	1	QTP- EBT5193
0000	lap bbo la bbo	<i>Holboellia latifolia</i> Wall.	Lardizabalaceae	1	QTP- EBT5194
0000	lo ggur syp ga	<i>Rhamnus virgata</i> Roxb.	Rhamnaceae	1	QTP- EBT5195
00	ma mup	<i>Galium spurium</i> L.	Rubiaceae	1	QTP- EBT5196
00	mu hxit	<i>Oxyria sinensis</i> Hemsl.	Polygonaceae	1	QTP- EBT5197
0000	nyip ggu le zhy	<i>Celastrus stylosus</i> Wall.	Celastraceae	1	QTP- EBT5198
0000	pat qi a tu	<i>Ligularia caloxantha</i> (Diels)	Asteraceae	1	QTP-

		Hand. -Mazz.			EBT5199
00	put nuop	<i>Juncus effusus</i> L.	Juncaceae	1	QTP-EBT5200
00	put nuop	<i>Juncus yunnanensis</i> A. Camus	Juncaceae	1	QTP-EBT5201
00	qi py	<i>Curcuma longa</i> L.	Zingiberaceae	1	QTP-EBT5202
00	rut shy	<i>Quercus guyavifolia</i> H. Léveillé	Fagaceae	1	QTP-EBT5203
00	rut shy	<i>Quercus aquifolioides</i> Rehd. et Wils.	Fagaceae	1	QTP-EBT5204
0000	ryp ddu uo nuo	<i>Arundinella hookeri</i> Munro ex Keng	Poaceae	1	QTP-EBT5205
00	shuo ma	<i>Rhododendron</i> .sp	Ericaceae	1	QTP-EBT5206
00	shuo ma	<i>Rhododendron simsii</i> Planch.sp	Ericaceae	1	QTP-EBT5207
00	shuo ma	<i>Rhododendron simsii</i> Planch.sp	Ericaceae	1	QTP-EBT5208
0000	shuo ma mgep zzy	<i>Fargesia yunnanensis</i>	Ericaceae	1	QTP-EBT5209
00	shut bbo	<i>Juniperus rigida</i> Sieb. et Zucc.	Cupressaceae	1	QTP-EBT5210
00	shut bbo	<i>Juniperus formosana</i> Hayata	Cupressaceae	1	QTP-EBT5211
000	sy a jjie	<i>Acer</i> L. sp	Sapindaceae	1	QTP-EBT5212
0000	syp bu a ge	<i>Chaenomeles cathayensis</i>	Rosaceae	1	QTP-EBT5213
000	syp bu ssut	<i>Taxillus Tiegh</i> .sp	Loranthaceae	1	QTP-EBT5214
00	syp nda	<i>Pyrus pyrifolia</i> (Burm. F.) Nakai	Rosaceae	1	QTP-EBT5215
000	syp vo ssut	<i>Taxillus Tiegh</i> .sp	Loranthaceae	1	QTP-EBT5216
0000	va bu syt pup	<i>Rosa sericea</i> Lindl.	Rosaceae	1	QTP-EBT5217
0000	va bu syt pup	<i>Rosa sweginzowii</i> Koehne	Rosaceae	1	QTP-EBT5218
0000	vat ba sy	<i>Parthenocissus semicordata</i>	Vitaceae	1	QTP-

	lyr	(Wall.) Planch.			EBT5219
□□□□	vot mop zy ly	<i>Solanum nigrum</i> L.	Solanaceae	1	QTP-EBT5220
□□	yip syt	<i>Coriandrum sativum</i>	Apiaceae	1	QTP-EBT5221
□□□□	yy zy ka py	<i>Polygonum nepalense</i> Meisn.	Polygonaceae	1	QTP-EBT5222
□□□□	yy zy ka py	<i>Persicaria</i> (L.) Mill.sp	Polygonaceae	1	QTP-EBT5223
□□	zzit lyr	<i>Pistacia weinmanniifolia</i> J. Poisson ex Franchet	Anacardiaceae	1	QTP-EBT5224
□□	ma ke	<i>Fargesia spathacea</i> Franch.	Poaceae	1	QTP-EBT5225
□□□□	cep hlo a tu	<i>Fragaria nilgerrensis</i> Schlecht. ex Gay	Rosaceae	1	QTP-EBT5226

3.2 Folk nomenclature of plant species in the Xiaoliangshan Yi community

Based on the plant names listed in Table 1, the folk nomenclature criteria for naming local plants used in the Yi ethnic community are based on the following (Figure 2): plant characteristics (127 species), cultural characteristics (91 species), usage (15 species) and plant habitat (11 species), and these are described in the following sub-sections.

3.2.1 Plant names based on characteristics

In this study, we documented 127 species with indigenous names that are based on plant characteristics. These species can be divided into four categories (although some species overlap categories), as follows: plant morphology (two types), plant taste, and plant scent. Of the 127 species, 99 names are based on plant morphology, and these are divided into two types: the first directly reflects the morphological characteristics of the plant and the second uses animal-related concepts and characteristics to describe the plant. In this second nomenclatural group, many of the plants have animal names (Table 3). Examples of plants in these categories are as follows: the locals use the term, ꞑꞑ (Yi language phonetic name ꞑꞑ *bba jjo*), in the Yi language for plants from the Umbelliferae family, which relates to the hollow stem of these plants; the Yi name for *Bidens pilosa* L. is ꞑꞑꞑ (ꞑꞑꞑ *bbut o jjie*), which means "pitchforked-head grass"; and *Anemone vitifolia* Buch.-Ham., which is also known as wild cotton, is named ꞑꞑꞑꞑ (ꞑꞑꞑꞑ *a ddu sha bbu*), which relates the wool-like surface of the plant's achene to the hair of the fox. In addition, the leaf apexes of *Polygonatum kingianum* Coll. et Hemsl. and *Polygonatum cirrhifolium* (Wall.) Royle, which belong to the *Polygonatum* genus, are rolled downwards like a bird's claw, and these are named ꞑꞑꞑꞑ (ꞑꞑꞑꞑ *a zhat xy si*), which means "magpie's claws". Of the 127 plant

species with names based on plant characteristics, 26 reflect the colour of the plant; for example, the Yi name for *Pseudognaphalium chrysocephalum* Hilliard & B. L. Burt is 黄花 (vie ap shy), which means "yellow flower".

In addition, the names of nine species relate to the plant's taste. For example, *Prunella vulgaris* L. is named 蜂蜜草 (bbut jjy yy), which means "honey grass", and it is named in relation to the honey-like taste of its nectar. Furthermore, the Yi name for *Begonia grandis* Dry. is 猪屎草 (a zhat vop ji), which means "magpie's sauerkraut", and it is so-named because of the sauerkraut-like taste of its stem.

Finally, one plant species is named based on its scent: *Ageratina adenophora* (Sprengel) R. M. King & H. Robinson is named 臭草 (bbut chy ni), which means "stinky grass", because the whole plant has a distinctly unpleasant odour.

Table 3

Plant names based on animals in the Yi language.

Snake	<i>Arisaema erubescens</i> (Wall.) Schott	𐄂𐄂𐄂	bbu shy ddot zza	𐄂𐄂:"snake"+𐄂𐄂:"Poisonous food"	QTP-EBT5038
Goat	<i>Decaisnea insignis</i> (Griffith) J. D. Hooker et Thomson	𐄂𐄂𐄂	chyt sse la ot	𐄂𐄂:"The goat cub"	QTP-EBT5060
Pig	<i>Colocasia esculenta</i> (L.) Schott.	𐄂𐄂𐄂	hxie ggat vat zza	𐄂𐄂:"Han Chinese"+𐄂𐄂:"Pig feed"	QTP-EBT5095
Pig	<i>Phytolacca acinosa</i> Roxb.	𐄂𐄂𐄂	hxie ggat vat zza	𐄂𐄂:"Han Chinese"+𐄂𐄂:"Pig feed"	QTP-EBT5096
Bird	<i>Capsella bursa-pastoris</i> (L.) Medic.	𐄂𐄂𐄂	hxie zy vap ga	𐄂𐄂:"bird"	QTP-EBT5097
Cattle	<i>Paeonia delavayi</i> Franch.	𐄂𐄂𐄂	le rre bbut cy	𐄂𐄂"cattle"	QTP-EBT5107
Foal	<i>Clinopodium urticifolium</i> (Hance) C. Y. Wu et Hsuan ex H. W. Li	𐄂𐄂𐄂	mup sse hnap bo	𐄂𐄂𐄂"foal"+"ear"	QTP-EBT5127
Cock	<i>Adenophora stricta</i> Miq.	𐄂𐄂𐄂	va bu shy ggo	𐄂𐄂:"cock"	QTP-EBT5186
Cock	<i>Rosa sericea</i> Lindl.	𐄂𐄂𐄂	va bu syt pup	𐄂𐄂:"cock"	QTP-EBT5187
Chicken	<i>Berberis pruinosa</i> Franch.	𐄂𐄂	va ddot chu	𐄂𐄂𐄂"chicken claws "+𐄂𐄂"thorn "	QTP-EBT5190
Chicken	<i>Potentilla lineata</i> Treviranus	𐄂𐄂𐄂	va zza hnap zzy	𐄂𐄂𐄂"chicken feed "+𐄂𐄂𐄂"Short ears"	QTP-EBT5194
Sow	<i>Plantago major</i> L.	𐄂𐄂𐄂	vot mop ddie bbur	𐄂𐄂:"sow"+𐄂𐄂:"An earthen embankment between fields"	QTP-EBT5206
Sow	<i>Codonopsis pilosula</i> (Franch.) Nannf.	𐄂𐄂𐄂	vot mop jyt nyi	𐄂𐄂:"sow"+𐄂𐄂:""	QTP-EBT5207
Sow	<i>Arctium lappa</i> L.	𐄂𐄂𐄂	vot mop rrup kot	𐄂𐄂:"sow"+𐄂𐄂:"Cirsium"	QTP-EBT5208
Sow	<i>Solanum nigrum</i> L.	𐄂𐄂𐄂	vot mop zy ly	𐄂𐄂:"sow"+𐄂𐄂:"Small bell"	QTP-EBT5209
Sow	<i>Taraxacum dasypodium</i> V. Soest	𐄂𐄂𐄂	vot mop zza ke	𐄂𐄂:"sow"+𐄂:"food "+𐄂:"bitter"	QTP-EBT5210

Note: Animal-related words in the Yi language and the Yi language phonetic name are shown in bold.

3.2.2 Plant names based on habitat

Many plant names in the Yi language are based on their native habitat (Table 4). Terms that describe the plant's habitat (such as the Yi word, 野, which means "wild") are often used in the plant's name. For example, the Yi name for *Cotoneaster pannosus* Franch. is 野刺楸, which means "firethorn that grows in the wild". This word distinguishes it from *Pyracantha angustifolia* (Franch.) Schneid., which is commonly planted around local dwellings. The Yi name for *Hedera nepalensis* var. *sinensis* (Tobl.) Rehd. is 崖珠, in which 崖 means "cliff" and 珠 means "bead" because this plant is often found on cliff walls and it produces round bead-like fruit. Similarly, the names of many plants that generally grow near water or a swamp have the prefix "水" or "泽", which mean "water" and "swamp", respectively; for example, *Polygonum nepalense* Meisn. is named "水泽" in the Yi language and the willow tree is called "泽柳".

Table 4

Plant names based on their habitat in the Yi language.

Yi language name	Yi language phonetic name	Latin name	Interpretation	Voucher number
ꞑꞑꞑꞑ	lo ggur ap jjit	<i>Cotoneaster pannosus</i> Franch.	ꞑꞑ: "In the wild"	QTP-EBT5110
ꞑꞑꞑꞑ	lo ggur bbar zziep	<i>Zanthoxylum bungeanum</i> Maxim.	ꞑꞑ: "In the wild"	QTP-EBT5111
ꞑꞑꞑꞑ	lo ggur syp ga	<i>Rhamnus virgata</i> Roxb.	ꞑꞑ: "In the wild"	QTP-EBT5112
ꞑꞑꞑ	te shy jjix	<i>Stellera chamaejasme</i> L.	ꞑꞑ: "By the pine roots"	QTP-EBT5183
ꞑꞑꞑꞑ	te xy lat juo	<i>Pyrola calliantha</i> H. Andr.	ꞑꞑ: "Under the pine tree"	QTP-EBT5185
ꞑꞑꞑ	vat bbu yo	<i>Incarvillea arguta</i> (Royle) Royle	ꞑ: "The cliff"	QTP-EBT5199
ꞑꞑꞑ	vat mop ne	<i>Hedera nepalensis</i> var. <i>sinensis</i> (Tobl.) Rehd.	ꞑ: "The cliff"	QTP-EBT5202
ꞑꞑꞑꞑ	vot mop ddie bbur	<i>Plantago major</i> L.	ꞑꞑ: "An earthen embankment between fields"	QTP-EBT5206
ꞑꞑ	yy ho	<i>Salix matsudana</i> Koidz.	ꞑ: "At the water's edge"	QTP-EBT5221
ꞑꞑꞑꞑ	yy zy ka py	<i>Polygonum nepalense</i> Meisn.	ꞑꞑ: "At the edge of the swamp"	QTP-EBT5222
ꞑꞑꞑꞑ	yy zy ka py	<i>Persicaria</i> (L.) Mill.sp	ꞑꞑ: "At the edge of the swamp"	QTP-EBT5223
ꞑꞑ	za qip	<i>Solanum tuberosum</i> L.	ꞑ: "In the soil"	QTP-EBT5225

Note: Habitat-related words in the Yi language and the Yi language phonetic name are shown in bold in the table.

3.2.3 Plant names based on culture

Cultural heritage is another important element reflected in the folk botanical nomenclature of the Yi people. The influence of culture on the botanical nomenclature of the Yi community is reflected in the two types of names used: the first type is based on the Yi ethnic culture and the second is based on the combined effect of the Yi and Han cultures. Of the documented plants, the names of 71 species are based on the traditional culture of the Yi people; most of these plant names contain semantically vague phonetic symbols, such as ꞑꞑ, ꞑꞑꞑ, ꞑꞑꞑ, ꞑ, ꞑ, ꞑ and ꞑꞑ, which are transmitted orally. There are 18 species of plants with names that reflect the fusion between the traditional Yi culture and the Han culture, and most of these plants are of economic importance (Table 5). Of these, 11 are used for medicinal purposes, six are used as fodder, and one is used as

food. Most of these plant names are derived from Chinese transliteration: some are direct transliterations of the Chinese name into the Yi language, and some have a Yi-language prefix added to a Chinese transliteration; for example, the folk name for *Musella lasiocarpa* (Franchet) C. Y. Wu ex H. W. Li and *Musa basjoo* Sieb. et Zucc. is 芭蕉. This Yi name is romanised as "bba juo" which sounds like its Chinese name "ba jiao". Lycopods are called 蕨草, which is romanised as "bbut che ji cy"; this is a transliteration of the plant's common Chinese name "*choujin cao*" with the prefix "bbut" added to indicate a herbaceous plant.

Table 5

Chinese loanwords in the folk plant names of the Yi community in Xiaoliangshan.

Yi language name	Yi language phonetic name	Chinese name (common name)	Chinese phonetic name	Latin name	Voucher number
ꞑꞑ	bba juo	ꞑꞑꞑꞑ(ꞑꞑ)	dì yǒng jīn lián(bā jiāo)	<i>Musella lasiocarpa</i> (Franchet) C. Y. Wu ex H. W. Li	QTP-EBT5028
ꞑꞑꞑ	bbut cha fu	ꞑꞑꞑꞑꞑꞑꞑ	zhú yè chái hú ꞑꞑꞑꞑꞑꞑ	<i>Bupleurum marginatum</i> Wall. ex DC.	QTP-EBT5039
ꞑꞑꞑꞑ	bbut che ji cy	ꞑꞑꞑꞑꞑꞑ	shí sōng (chōu jīn cǎo)	<i>Lycopodium japonicum</i> Thunb. ex Murray	QTP-EBT5040
ꞑꞑꞑꞑ	bbut tip xu ge	ꞑꞑꞑꞑꞑꞑꞑꞑ	máo háng zi shāo (tiě xuè téng)	<i>Campylotropis hirtella</i> (Franch.) Schindl.	QTP-EBT5045
ꞑꞑꞑꞑ	bbut xit ho cy	ꞑꞑꞑꞑꞑꞑꞑ	huáng lóng wěi (xiān hè cǎo)	<i>Agrimonia pilosa</i> var. <i>nepalensis</i> (D. Don) Nakai	QTP-EBT5046
ꞑꞑ	bep bu	ꞑꞑꞑꞑꞑꞑꞑꞑ	yáng chǐ tiān mén dōng (bǎi bù)	<i>Asparagus filicinus</i> D. Don	QTP-EBT5047
ꞑꞑ	bit map	ꞑꞑ	bì má	<i>Ricinus communis</i> L.	QTP-EBT5048
ꞑꞑ	bo hop	ꞑꞑꞑ	jiǎ bò he	<i>Mentha asiatica</i> Boriss. - Bekrj.	QTP-EBT5049
ꞑꞑꞑꞑ	but fu zha cy	ꞑꞑꞑꞑꞑꞑꞑ	cǎo yù méi (hǔ zhǎng cǎo)	<i>Anemone rivularis</i> Buch. -Ham.	QTP-EBT5050
ꞑꞑ	dur lap	ꞑꞑꞑꞑꞑꞑꞑ	xī nán wū tóu (dǔ lǎ)	<i>Aconitum episcopale</i> Leveille	QTP-EBT5070
ꞑꞑꞑ	gup sup bu	ꞑꞑꞑ	gǔ suì bǔ	<i>Davallia trichomanoides</i> Blume	QTP-EBT5081
ꞑꞑꞑ	ho sha vu	ꞑꞑꞑ	hé shǒu wū	<i>Fallopia multiflora</i> (Thunb.) Harald.	QTP-EBT5089
ꞑꞑ	it mup	ꞑꞑꞑꞑꞑꞑꞑ	yù shǔ shǔ (yù mǐ)	<i>Zea mays</i> L.	QTP-EBT5098
ꞑꞑ	lop fip	ꞑꞑꞑꞑꞑ ꞑꞑꞑꞑꞑ	shān yě wān dòu (lǚ féi)	<i>Vicia amoena</i> Fisch.	QTP-EBT5113
ꞑꞑꞑ	lop shet map	ꞑꞑꞑꞑ	yún nán shēng má	<i>Cimicifuga yunnanensis</i> Hsiao	QTP-EBT5114
ꞑꞑꞑ	ma bie cy	ꞑꞑꞑ	mǎ biān cǎo	<i>Verbena officinalis</i> L.	QTP-EBT5117
ꞑꞑ	vat dut	ꞑꞑ	wān dòu	<i>Pisum sativum</i> L.	QTP-EBT5200
ꞑꞑ	yiep co	ꞑꞑꞑꞑꞑꞑꞑ	niú xī jú (yáng cǎo)	<i>Galinsoga parviflora</i> Cav.	QTP-EBT5217

3.2.4 Plant names based on their common usage

Naming plants based on their common usage is another method of nomenclature used by the Yi people in Xiaoliangshan (Table 6), and of the documented species, the names of 10 plants directly reflect their use. For example, *Paeonia delavayi* Franch., which is commonly used by the locals as strain-injury medication for humans and cattle, is named 牛筋草, which means "strain injury medicine for cattle". Similarly, *Iris wattii* Baker is often used by the locals to treat pneumonia, and its Yi name is 牛筋, which means "pneumonia medicine". *Rubus sachalinensis* Lévl. is locally called "牛筋草". When its fruit matures, the locals begin turnip planting. The Yi term "牛筋" means "planting turnips"; therefore, the plant's name directly reflects its indicator function.

Table 6

Plant names based on their common use by the Yi community in Xiaoliangshan.

Yi language name	Yi language phonetic name	Interpretation	Latin name	Family	Voucher number
牛筋草	bbit yop	A medicine for cracked skin	<i>Bulbophyllum Thouars.sp</i>	Orchidaceae	QTP-EBT5007
牛筋草	le re bbut cy	A medicine used to cure tiredness of cattle	<i>Paeonia delavayi</i> Franch.	Paeoniaceae	QTP-EBT5032
牛筋草	bbu ga cy	A medicine for toothache	<i>Datura stramonium</i> L.	Solanaceae	QTP-EBT5098
牛筋	nbie cy	A medicine for pneumonia	<i>Iris wattii</i> Baker	Iridaceae	QTP-EBT5138
牛筋草	vot mop zza ke	Sow's feed	<i>Crepis lignea</i> (Vaniot) Babcock	Asteraceae	QTP-EBT5013
牛筋草	vot mop zza ke	Sow's feed	<i>Taraxacum dasypodium</i> V. Soest	Compositae	QTP-EBT5030
牛筋草	a zhat vop ji	sauerkraut	<i>Begonia grandis</i> Dry.	Begoniaceae	QTP-EBT5075
牛筋草	te xy lat juo	A kind of tea that grows under pine trees	<i>Pyrola calliantha</i> H. Andr.	Ericaceae	QTP-EBT5020
牛筋草	vop qip shop shot	Planting rutabaga	<i>Rubus sachalinensis</i> Lévl.	Rosaceae	QTP-EBT5166
牛筋草	a nyut sy tur	Used for making chisel handles	<i>Corylus yunnanensis</i> (Franch.) A. Camus	Corylaceae nom. conserv.	QTP-EBT5176

3.3 Analysis of the basic structure of traditional plant names of the Yi people in Xiaoliangshan

In the folk nomenclature system of the Yi people in Xiaoliangshan, plant names have a binomial or non-binomial structure (Figure 3). A binomial folk plant name consists of two Yi words: one of these is the core or the primary name and the other is a modifier used to describe or clarify the core word. A non-binomial plant name consists of one Yi word. Of the local plants documented in this study, 67 species have binomial names and 161 have non-binomial names. The following examples show the binomial structure of folk botanical names in the Xiaoliangshan ethnic community, where a modifier is added to the core word to highlight its characteristics.:

Example 1

Latin name: *Ageratina adenophora* (Sprengel) R. M. King & H. Robinson

Yi name: ꨀ (core word)+ ꨀꨀ (modifier)

Meaning: smelly (modifier) + (core word)

Example 2

Latin name: *Rhododendron decorum* Franch.

Yi name: ꨀꨀ (core word) + ꨀꨀ (modifier)

Meaning: Big (modifier) + Azalea (core word)

Plant names with a non-binomial structure consist of one semantically ambiguous core word or a Chinese word transliterated into the Yi language; for example, ꨀꨀ (Chinese prickly ash), ꨀꨀ (wild onion) and ꨀꨀ (Asparagus filicinus).

3.4 Correspondence between plant names and species in the folk nomenclature of the Yi people in Xiaoliangshan

This study found that not all folk plant names and taxonomic species have a one-to-one correspondence; some plant species have multiple folk names, and one folk name may be used for multiple species (Figure 4). The name to species correspondence is elucidated as follows:

(1) One folk plant name corresponds to one species. Of the folk names, 171 correspond to one plant species; for example, the folk name ꨀꨀꨀꨀ (*a jji bbu zza*) corresponds only to *Morus australis* var. *australis*; ꨀꨀꨀꨀ (*bbu shy ddut zza*) corresponds only to *Arisaema erubescens* (Wall.) Schott; ꨀꨀ (*chup nuop*) corresponds only to *Prinsepia utilis* Royle; ꨀꨀ (*dda bbo*) corresponds only to *Pteridium revolutum* (Bl.) Nakai; ꨀꨀꨀꨀ (*gep dep map ma*) corresponds only to *Mahonia duclouxiana* Gagn.; ꨀꨀ (*huo gat*) corresponds only to *Populus adenopoda*

Maxim; ꯃꯇ (jy bbo) corresponds only to *Toxicodendron succedaneum* (L.) O. Kuntze; ꯃꯇꯃꯇꯃꯇꯃꯇ li bbi syp ddu) corresponds only to *Cornus capitata* and ꯃꯇ (mu ku) corresponds only to *Litsea cubeba* (Lour.) Pers..

(2) Two folk names corresponding to one plant species. Of the plant names, four have two folk names corresponding to one scientific name. *Chenopodium album* L. is an edible wild plant commonly used by locals for food and fodder. As the locals classify it as two different plants, it has two different Yi names: ꯃꯇꯃꯇ (hnit nra a hni) and ꯃꯇꯃꯇꯃꯇ (hnit nra a tu). Similarly, *Rhododendron traillianum* Forrest et W. W. Smith. has two corresponding Yi names, ꯃꯇꯃꯇꯃꯇ (shuo ma a hni) and ꯃꯇꯃꯇꯃꯇꯃꯇ (shuo ma ma ge).

(3) One folk name corresponding to multiple plant species. Of the plant names, 53 have folk plant names that correspond to multiple plant species. For example, four different plant species correspond to the Yi name ꯃꯇꯃꯇ (chyt jy): *Hypericum acmosepalum* N. Robson, *Hypericum monogynum* L., *Hypericum forrestii* (Chittenden) N. Robson, and *Hypericum patulum* Thunb. x Murray; two different species correspond to the Yi name ꯃꯇꯃꯇ (jy sy): *Coriaria terminalis* and *Coriaria nepalensis* Wall.; and two different species correspond to the Yi name ꯃꯇꯃꯇ (shut bbo): *Juniperus rigida* Sieb. et Zucc. and *Juniperus formosana* Hayata.

3.5 Comparison between folk botanical nomenclature of the Yi people in Xiaoliangshan and the Yi people in the Daliangshan

We compared the folk botanical nomenclature of the Yi people in the Daliangshan [3] with that of the Yi community in Xiaoliangshan (Figure 5) and found that the plant names and usages of the Yi people in the two places overlapped to a certain extent. More specifically, the two places have 55 plant names in common (Figure 5A), corresponding to approximately 24% of the total number of plant names collected in Xiaoliangshan. However, only 18 out of the 55 names represent the same species in both places and the remaining names represent different species. Most of these 18 identical plant species have been used by the local people for a very long time and they have non-binomial Yi names (for example ꯃꯇ, ꯃꯇ, and ꯃꯇ). The other 37 plant names that are common to both places refer to different plants; however, the plants belong to the same family or genus in modern taxonomy, or they have some similar attributes. For example, the Yi name ꯃꯇꯃꯇ is used for three species of the Pinaceae family: in the Daliangshan it refers to *Abies fabri* (Mast.) Craib and *Larix potaninii* Batalin, whereas in Xiaoliangshan it refers to *Tsuga dumosa* (D. Don) Eichler in Engler u. Prantl. In addition, the Yi name ꯃꯇꯃꯇ represents three different species of the Artemisia genus: *Artemisia annua* L. and another species of wormwood in the Daliangshan, and *Artemisia indica* Willd. in Xiaoliangshan. In the Daliangshan, the Yi name ꯃꯇꯃꯇ represents *Crataegus pinnatifida* Bunge and *Crataegus scabrifolia* (Franch.) Rehder, whereas in Xiaoliangshan, it refers to *Docynia delavayi* (Franch.) Schneid.. Similarly, in the Daliangshan, the Yi word, ꯃꯇꯃꯇ, refers to *Populus* sp. L., whereas in Xiaoliangshan, it refers to *Populus yunnanensis* and *Ehretia corylifolia* C. H. Wright.

4. Discussion

4.1 Characteristics of folk plant nomenclature of the Yi people in Xiaoliangshan

Many ethnic groups name plant species based on what the plant resembles [2,9,33, 34]. This method reflects a direct approach of recognising plants through the human senses, and it is based on the plants' visual appearance and taste. All such information is contained in the indigenous plant name. Similarly, the Yi people in Xiaoliangshan named plants based on their characteristics, and the names are often related to the characteristic shape, colour, smell, or taste of the plant. In addition to directly describing plant characteristics, the folk plant names used by the Xiaoliangshan Yi people are often based on animals, a nomenclature practice that is common in other places [3,35, 36, 37]. The frequent use of animal names for plants can be explained by the traditional livelihood of the Yi people, which involves various animals. Some studies have reported that to adapt to the demands of the mountainous environment in southwestern China, the Yi people formed a lifestyle based on farming and pastoral practices, and their dependence on livestock has thus been relatively high [22, 38]. It is therefore likely that when naming local plants, some of the salient features of a plant would stimulate a certain sensory response in the observer and cause them to associate the plant with a familiar object, which was ultimately used in the name selected for the plant. Due to the semi-pastoral lifestyle of the Yi people, it would be easy for an observer to assign suitable animal characteristics to a plant and use them to describe the plant, which is a nomenclature practice similar to that of the Mongolian herders [36].

Of the indigenous plant names of the Yi people in Xiaoliangshan, many include words that describe the plant's habitat, such as water, swamp, and field. This practice is also common in the folk plant nomenclature of the Mongolian and the Tung ethnic groups [39, 40]. Adding a habitat-related word to the plant's name would likely help distinguish it from other species and make it easier to find and collect. For example, the Yi people believe that *Rhamnus virgata* Roxb. is a wild plum (*Prunus salicina* Lindl.), so they use a habitat-based name to reflect the similarities and the differences between the two plant species. Another example is *Plantago major* L., which is a type of plant often used by the locals as pig feed; the Yi name of this plant reflects its habitat, which provides a clue to locals about where to find it.

Folk plant nomenclature is also based on oral traditions [41-43]. This study found that many plant names that are transmitted orally often contain semantically ambiguous phonetic symbols, and this finding is consistent with those of other studies of folk plant names used in traditional rituals within this area [14]. It is believed that in this type of nomenclature, in which the plant name is assigned directly and passed on orally, the unique name refers to the biological organism itself, and no further semantic analysis is therefore required.

In addition to the local Yi culture, the Han culture has also impacted the folk nomenclature of the Yi community in Xiaoliangshan. Many foreign plants have been introduced to the community, and the majority are used for medicinal purposes. The Yi people either directly transliterate the Chinese names of the introduced plants or add a Yi-language prefix to the Chinese transliteration. It is believed that these Chinese loanwords were introduced to Xiaoliangshan in a brief window of time during the 1960s when there was a lack of medical care in China, and the "barefoot doctor" policy was implemented [44]. The local government

conducted basic medical training for barefoot doctors lasting four to six months [45], and they were later employed in local villages as healthcare providers, which may have helped spread knowledge about Chinese herbal medicine in the Xiaoliangshan area. The increased use of borrowed Chinese names may also be related to the popularisation of standard Mandarin in basic education, ethnic integration, and the transformation of traditional lifestyles in the Xiaoliangshan region, and this was determined by another study based on the folk botanical nomenclature of the Yi people in Daliangshan [3].

With respect to the function-based plant nomenclature of the Yi people in Xiaoliangshan, the indigenous names employed reflect the plant's use or its value to humans and animals. This is similar to the function-based plant names used by the Han ethnic group [46]. For example, the Yi name of *Paeonia delavayi* Franch., which is used by the locals to treat injuries in humans and cattle, directly reflects the plant's use. It is believed that this practice is also related to the traditional livelihood of the Yi people. The Yi people are nomadic farmers, and cattle are the main source of power used in their traditional farming practices [47]. As wasteland reclamation is labour intensive, both humans and animals, but especially cattle, would often suffer strain injuries. Therefore, the plant that was used as a folk remedy for strain injuries has been given an indigenous name that reflects this use. Similarly, the Yi name for *Rubus sachalinensis* Lévl. reflects its indicator plant function. The Yi people in Xiaoliangshan have a long-standing practice of turnip cultivation, and this overwintering vegetable is sown seasonally and continues to be a staple food of the Yi people [48]. However, turnips are formed approximately three months after flowering [49, 50], and such a short growth cycle means that locals need to correctly assess the optimum sowing time for the crop. The fruiting period of *Rubus sachalinensis* Lévl. is from August to September [51], which coincides with the time when the locals begin turnip planting. Therefore, the indigenous name for *Rubus sachalinensis* Lévl. reflects this indicator plant's function of notifying the Yi people that it is time to sow turnips.

This study found that the Yi people named useful plants using a binomial and non-binomial structure. This is consistent with the findings of a study focusing on plants used in religious rituals [14]. The binomial structure for the botanical nomenclature used by the Yi people is similar to that of the Dai and Han ethnic groups [9,52]. It is believed that this naming structure is used due to practical considerations: it enables the locals to learn important information about different plants, including their life form, habitat, and functions, which ultimately makes it easier to recognise and remember useful plants. The non-binomial names tend to reflect the characteristics of the local language; these names are generally transmitted orally using semantically ambiguous phonetic symbols. Plants such as *Fagopyrum tataricum* (L.) Gaertn., *Cannabis sativa* L., and *Oryza sativa* L. have been cultivated by the Yi people for a very long time [53-55], and the ancient Yi names of these plants have a monosyllabic no-binomial structure. They are often used as root words when naming more complex plants, which indicates their important roles in the lives of the local Yi people [56].

This study found that there were three types of correspondence between plant names used by the Yi people in Xiaoliangshan and the plant species, namely: one plant name for one plant species, two plant names for one plant species, and one plant name for multiple plant species. These correspondence types are similar to those found by Raven et al., who studied the folk nomenclature and taxonomy of indigenous plants in Mexico [4], and to those of the Chinese Mongolian ethnic group [36]. Investigating the correspondence between folk plant names and plant species enables us to better understand how the Yi people in

Xiaoliangshan perceive and recognise plants. This is especially true when multiple indigenous names are given to one plant species, or when one indigenous name corresponds to multiple plant species. For example, the locals classify *Chenopodium album* L. as two plants, which is reflected by the folk nomenclature. Both names emphasise colour (黑黑黑 and 白白白), even though *Chenopodium album* L. is a plant that is widely distributed and has many morphological variations [57]. Another example is that four different species of *Hypericum* are all named 黄 in the Yi language. These species are primarily found in southwestern China [58], and they are all important medicinal plants used in Xiaoliangshan to treat the same health problem. It is thus believed that they share one indigenous name in Xiaoliangshan because they have a similar form and function.

4.2 The cultural connotations of the folk plant nomenclature of the Yi people in Xiaoliangshan

With respect to the relationship between culture and ethnobotanical knowledge, ethnobotanists Cassandra L. Quave and Andrea Pieroni stated that regardless of the living environment, the decisions and behaviour of an ethnic group of people are influenced by their culture [59]. Therefore, ethnobotanical knowledge can reveal how the same ethnic group living in different geographical locations interacts with the environment. The Yi people in Xiaoliangshan and those in the Daliangshan belong to the same ethnic group, but their living environments differ. Therefore, comparing the folk names of the plant species used by the two groups of Yi people can enhance our understanding of how the Yi language evolved to provide a basis for selecting appropriate measures to protect traditional knowledge.

In this study, we found the Yi people in the Xiaoliangshan, and the Daliangshan refer to different plant species that correspond to the same indigenous name and plant species that have different indigenous names. It was found that 37 indigenous plant names refer to different plants in the two places, but all these plants belong to the same family or genus (Table 1), or they have certain modern taxonomic similarities. It is considered that this phenomenon may be related to the following circumstances: for plants belonging to the same genus or family, such as fir, redwood, and hemlock, it is believed that when the Yi people, who migrated from the Daliangshan to the unfamiliar environment of Xiaoliangshan, encountered a plant that resembled a familiar species, the newly discovered plant was given the same name as the plant it resembled. For example, it is believed that *Crataegus pinnatifida* Bge., *Crataegus scabrifolia* (Franch.) Rehd., and *Docynia delavayi* (Franch.) Schneid. have all been given the same name because they all produce sour-tasting fruit. In addition, *Chaenomeles cathayensis* is called 黄黄黄 in the Yi language and it also has sour fruit; the main part of its indigenous name indicates that the Xiaoliangshan Yi people classified it as the same species as the other three plants. In summary, it is believed that the Yi people living in the two different environments use the same indigenous name for different plant species because the plants were named based on a common characteristic by those who migrated to Xiaoliangshan.

In addition, the study found that there are 41 plant species in common between the two areas: 27 have identical indigenous names and 14 have different names. Among the 14 species with different names, the folk names of *Eucommia ulmoides* Oliv., *Taraxacum mongolicum* Hand. -Mazz. and *Aristolochia debilis*

Siebold & Zucc used by the Yi community in the Daliangshan are Chinese loanwords, whereas the indigenous names of these plants are retained in Xiaoliangshan. This could be attributed to the fact that the Yi people in Xiaoliangshan are still using traditional plant knowledge, and the indigenous names of these plants have thus been preserved despite the introduction of Han culture into the community. For example, the boiled root of *Eucommia ulmoides Oliv.* is used to treat bruises and backaches, dandelion is used to reduce inflammation and clear away toxins and *Aristolochia* is often used to treat stomach ailments and for deworming. All these plants are easily accessible local resources. In contrast, ethnobotanical research conducted in the Daliangshan demonstrated that the folk nomenclature of plant species in this region has been largely replaced by that of the Han ethnic group [3]. These findings provide valuable insights for the protection of ethnobotanical knowledge; the continuous practice of ethnobotanical knowledge based on existing records may greatly contribute to its preservation.

4.3 The significance of the plant nomenclature of the Yi ethnic group in Xiaoliangshan

Hengduan Mountains is a global diversity hotspot [60], but China's accelerated urbanisation progress has resulted in a severe loss of biodiversity within this region [61]. To protect biodiversity more effectively in ethnic minority areas, it is necessary to first preserve cultural diversity, and particularly to protect aspects of ethnic cultures that are closely related to biodiversity. The folk nomenclature of fauna and flora are important parts of cultural diversity and are essential for use in biodiversity conservation [62]. This is reflected primarily in the following two aspects: first, from a local perspective, folk nomenclature reflects an indigenous knowledge and understanding of individual plants and their unique characteristics, and it contains important information about plant attributes. The traditional knowledge constituted by these individual plants, including diverse germplasm and traditional medicine resources that have been used for centuries by the ethnic group, is a treasure trove of material and cultural wealth [63]. Therefore, as an important part of ethnic and cultural diversity, folk botanical nomenclature is extremely relevant in biodiversity conservation practices [64]. Second, from the overall perspective of biodiversity conservation, ethnobiological nomenclature reflects the relationship between living organisms and habitats. It is the indigenous epistemology of a complex natural system involving individual organisms and the environment. The use and knowledge of the folk nomenclature of living organisms permit people with non-scientific backgrounds to participate in biodiversity conservation efforts [65]. Many studies have investigated the relationship between cultural diversity and biodiversity, and the positive effect of regional traditional cultures on biodiversity conservation has been widely recognised in the scientific community [66]. For example, studies have shown that biodiversity and cultural diversity overlap in their geographical distribution [67, 68]. For the Yi people in Xiaoliangshan, naming plant species is a rich cultural tradition that was formed as a means of managing and using local plant resources. This traditional knowledge is essential for the protection and sustainable development of local biodiversity.

The folk botanical nomenclature of the Yi people in Xiaoliangshan is an integral part of their traditional knowledge, and it needs to be preserved for future generations. In recent years, accelerated urbanisation and the introduction of foreign culture have greatly affected the traditional knowledge of the Yi people in

Xiaoliangshan. One manifestation of this trend is the increasing economic migration of young people to large cities [69] and their gradual assimilation into urban society; they thus have fewer opportunities to use their native Yi language. Due to the assimilation process between the Yi people and the Chinese culture, the language is being increasingly affected. In addition, young people from the Yi ethnic group remaining in Xiaoliangshan now use many Chinese loanwords due to the internet and other mass media usage. Certain popular internet terms have already become an integral part of their language on a large scale, and these are gradually replacing the Yi language [70]. Furthermore, under the recent Poverty Alleviation Resettlement policy, many Yi ethnic group members have been relocated from the mountains to urban areas [71]. The most significant consequence of these above factors is the loss of the local language, and language is the core of culture and the means of transmitting traditional knowledge.

The indigenous nomenclature of plant species is a proper naming system that reflects the rules of the local Yi language. Some studies have shown that the loss of native languages in indigenous communities impairs the transfer of traditional knowledge between different generations, lowers their sense of ethnic identity, and adversely affects the mental and physical health of the indigenous people [72]. In Xiaoliangshan, the loss of the traditional Yi knowledge is obvious; for example, during the interviews conducted in this study, we found that the names of many wild plants commonly collected during the Great Famine in China in the 1960s [73] are now only known by a few aged community members. In addition, the names of plants that are still commonly used for medicinal purposes or as feed are only known by middle-aged and older community members. When shown photographs of different plants, the younger community members recognised the plants, but either could not name them in the Yi language or they only knew the names used by the Han ethnic group, even though their parents were very familiar with and used these plants.

This gradual loss of ethnobotanical names equates to a loss of traditional knowledge and ethnic culture. Studies have shown that the potential for humans to acquire resources from nature through language will become increasingly difficult with the loss of particular languages. Because indigenous languages are closely related to the pharmaceutical knowledge of ethnic groups, it is believed that the demise of indigenous languages will have a greater impact on pharmaceutical knowledge than on the loss of biodiversity [74]. The use of folk botanical names enables us to harness benefits from natural plant resources. Therefore, from the perspective of cultural heritage, creating standardised records of the ethnobotanical nomenclature of the Yi people in Xiaoliangshan and the rules they used to name plants is critical for preserving this valuable traditional knowledge.

5. Conclusions

The Yi ethnic group lives in Xiaoliangshan within north-western Yunnan and in the Daliangshan. Due to the challenging geography and the lack of transportation to the region, the Yi people in Xiaoliangshan historically had very little contact with the outside world. This study used ethnological research methods to document the indigenous plant nomenclature of 226 locally used plant species belonging to 178 genera and 107 families. The nomenclature used by the Yi people in Xiaoliangshan has either a binomial or non-binomial name structure, and four primary factors are used to name plant species: plant characteristics, plant habitat, plant-use, and cultural attributes. The folk names of plants and their corresponding scientific names have the

following three types of relationships: one plant name for one plant species, two plant names for one plant species, and one plant name for multiple plant species. The folk nomenclature of the Yi ethnic group in Xiaoliangshan has both similarities and differences to that of the Yi group in the Daliangshan, and this is attributed to the relationship between the vitality of the ethnic culture, the extent to which traditional knowledge is practiced by the ethnic community, and the geographical environment in which they live. This study of the folk botanical nomenclature of the Yi ethnic group in Xiaoliangshan will help promote the preservation of traditional knowledge and biodiversity conservation in this area. However, this study only focused on an analysis of ethnobotanical nomenclature, and further research is thus needed to determine whether similar nomenclature rules are used for other living organisms, such as animals and fungi.

Declarations

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Authors' contributions

Yu-Hua Wang organized the study team and provided technical support and guidance. Yu-Hua Wang, Yu Zhang, and Yi-Won A·D designed and executed the research plan. Yi-Won A·D recorded and organized the data and wrote the manuscript. Yi-Won A·D, Xiao-Yong Ding and Chang-An Guo identified the specimen and checked the information. 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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Ethics 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.

Availability of data and materials

Please contact author for data requests.

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Figures

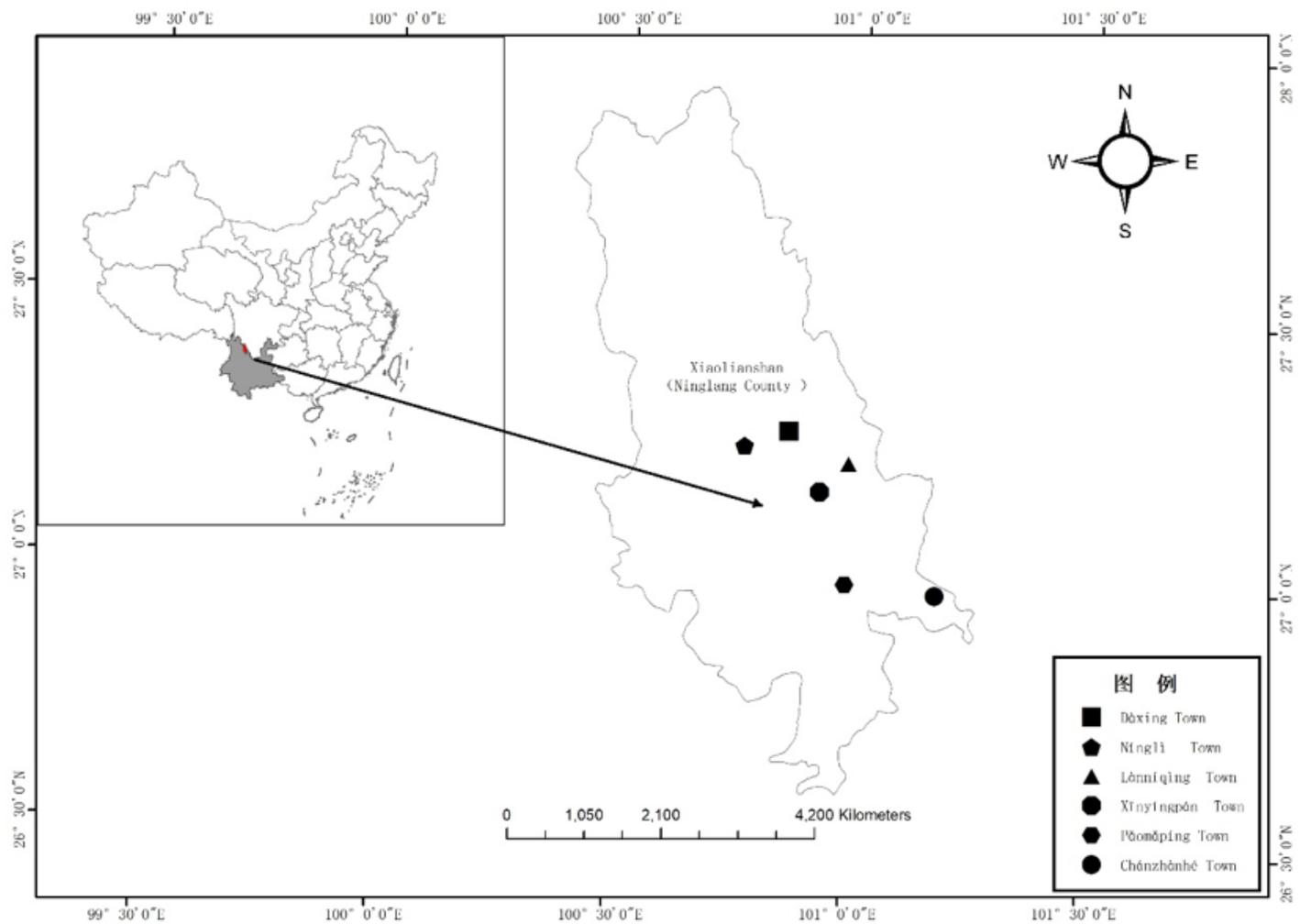


Figure 1

Study area location: Xiaoliangshan, Yunnan Province, China.

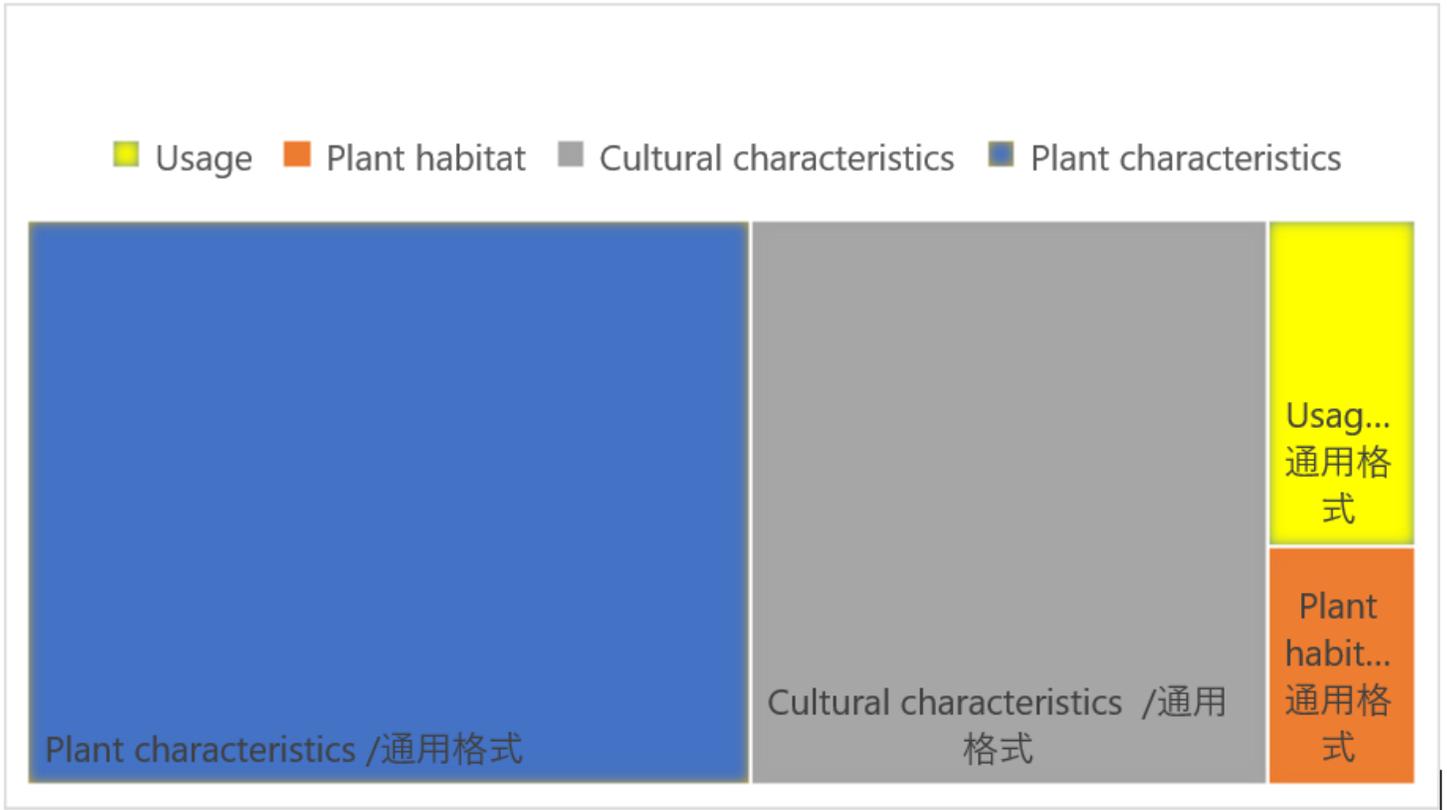


Figure 2

Folk nomenclature criteria for naming plant species in the Yi community of Xiaoliangshan. Note: The numbers represent the plant species named using each method.

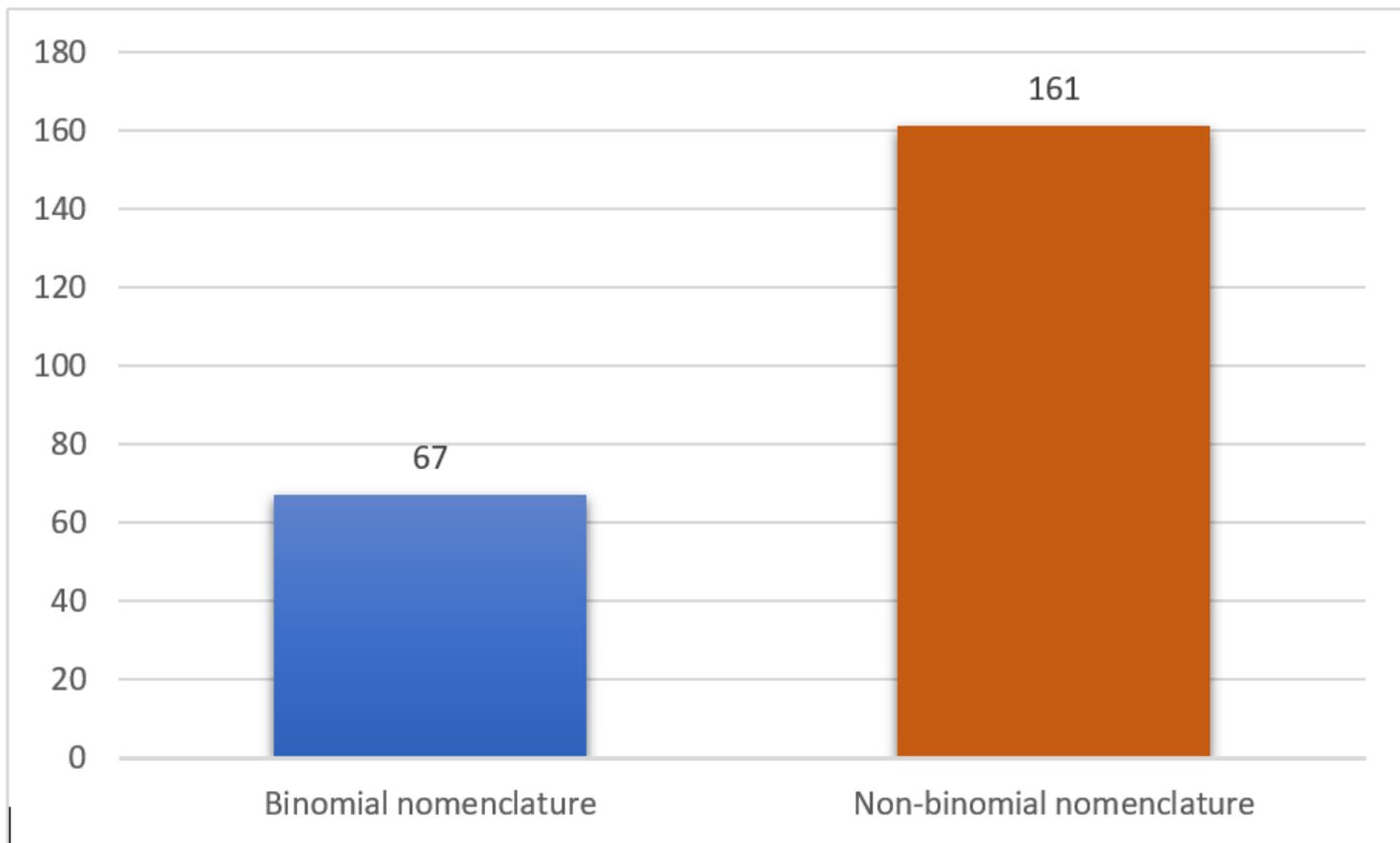


Figure 3

The basic structure of folk plant names used by the Yi people in Xiaoliangshan.

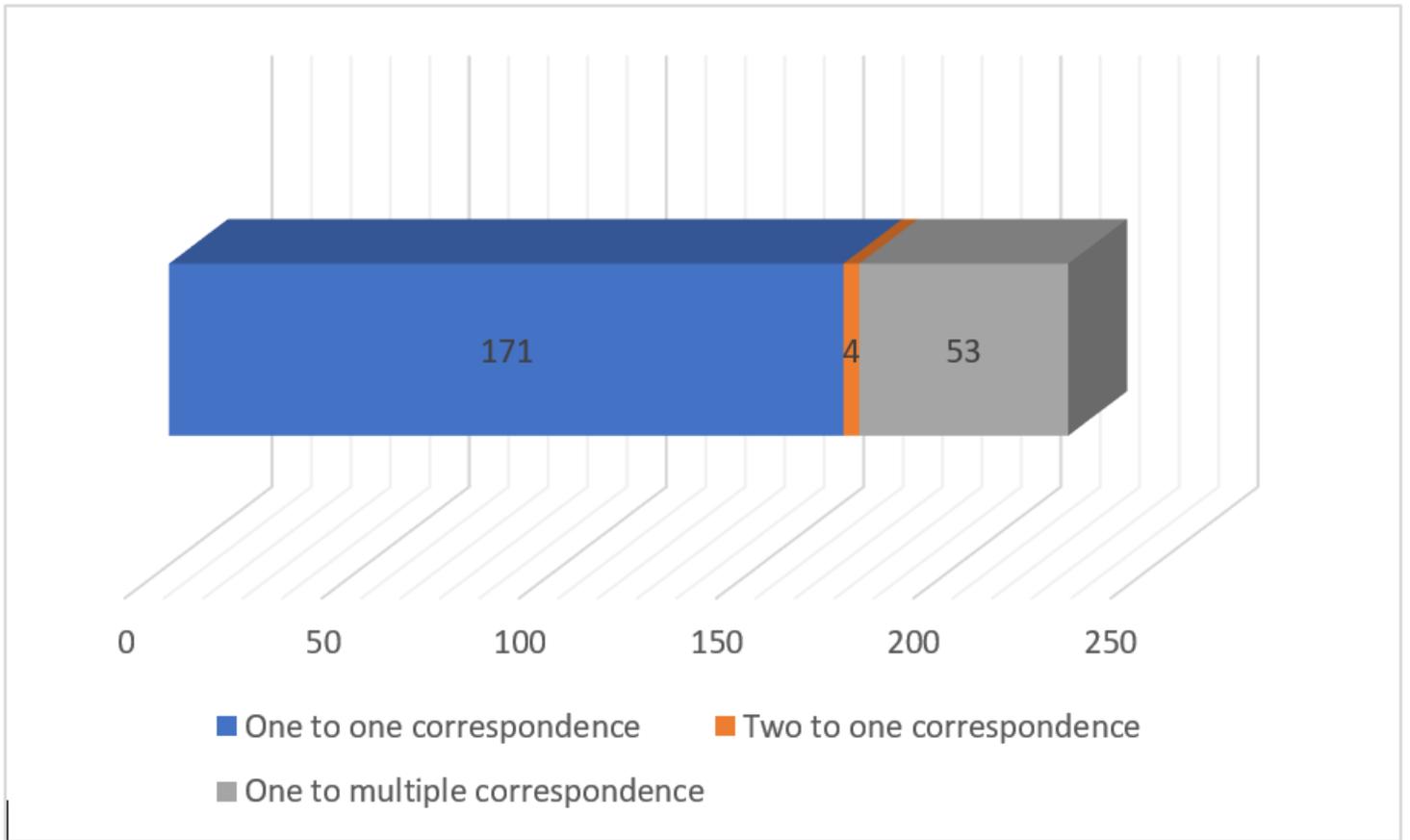


Figure 4

Correspondence between folk botanical names used by the Xiaoliangshan Yi people and plant species. Note: The different colours represent the corresponding relationships between the folk names of plants used by the Yi people and plant species: blue indicates a one-name-to-one-species relationship; Orange indicates a two-names-to-one-species relationship and grey indicates a one-name-to-multiple-species relationship.



Figure 5

Comparison between the folk botanical nomenclature of the Yi people in Xiaoliangshan and the Yi people in the Daliangshan. Note: A shows the overlap between the names of Yi plants in Xiaoliangshan and those in Daliangshan; B shows the plants used in both places and the overlap.