A study of the plant folk nomenclature of the Yi people in Xiaoliangshan, Yunnan Province, China, and the implications for protecting biodiversity

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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, 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. By comparing the folk plant names of the Yi people in Xiaoliangshan with those of the Yi people in Daliangshan, we found that the plant names of the two places have some similarities and also with their own unique characters. The important folk plant names of the Yi people in Xiaoliangshan usually have a monosyllable "Y" non-binomial structure or have and "divine attributes" in their names.

Conclusions: The Yi people in Xiaoliangshan have a rich and diverse knowledge of plant naming determined by cultural, and environmental factors. The botanical nomenclature of the Yi people has distinct rules and characteristics, and the plant naming directly includes important plants that they believe to be used and protected, which is of great significance to the protection of biodiversity.

Keywords: Ethnobotany, Yi people, Xiaoliangshan, Indigenous botanical nomenclature

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 Yi nationality in academic circles. Some scholars believe that: the Yi nationality is an indigenous people in southwest China. They have long been active in the Wumeng Mountains and Jinsha River basin [25]. The Yi people experienced great migration and gradually divided into six tribes the Wu, Zha, Nuo, Heng, Bu and Mo, all of them gradually settled into the vast areas of southwest China and Southeast Asia [26, 27].

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 [28, 29]. In the past, the Liangshan Yi people belonged to the Nuo and Heng tribes of the six Yi tribes. They migrated into the Liangshan area along the Jinsha River and became the main ethnic group in the Liangshan area. At present, there are many research on ethnobotany of the Yi nationality in Daliangshan [3, 30]. Academic research on the Xiaoliangshan Yi people has focused primarily on the cultural heritage of the Yi ethnic group from the perspective of anthropology [28, 29, 31], 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.

Methods

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. 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 dis-
tinct seasons [32]. Its primary soil types are subalpine
meadow soil, dark brown soil, and subalpine desert soil
[33]. Due to its unique geographical location and climatic
conditions, there is abundant and diverse flora within the
area. According to a former biodiversity inventory of this
region, Xiaoliangshan has has 6 vegetational forms, 17
formations, and 1943 species of plants [34].

Liangshan area is a geographical concept. It is home to
the largest group of Yi people in China. The Yi people call
the Liangshan area as "森林茂密的高山", which means the densely
forested alpine area. In the present administrative divi-
sions, Liangshan area is divided into Daliangshan and
Xiaoliangshan. Daliangshan belongs to China's Sichuan
Province including Xichang City, while Xiaoliangshan
on the other side belongs to China's Yunnan Province
including Ninglang County, Lijiang City. "Da" means
"big" and "Xiao" means "small" in Chinese. In fact, people
divide Liangshan into "Daliangshan" and "Xiaoliangshan",
not only from the perspective of the difference in area
size, but also from the residential history of Yi people
in the two places by the size of population. In this study,
Xiaoliangshan refers specifically to Ninglang Yi Autono-
mous County of Yunnan Province (Fig. 1).

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 Xiao-
liangshan from the Daliangshan, and they have eventu-
ally become the main ethnic group in this region [28,
31]. In the early nineteenth century, the Yi people in
Xiaoliangshan made a living through animal husbandry,
farming, and hunting and gathering [35]. Traditional
Yi dwellings are made of wood or clay-and-wood [36],
and their staple foods include potato, buckwheat, oats,
corn, and turnip [37]. Grilling and boiling are com-
monly used cooking methods [37]. 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 [38]. In the Bimo belief system, the Bimo (a
ritual specialist or priest) presides over all major reli-
gious activities, including offering prayers and sacri-
fices [39, 40]. The Yi people in Xiaoliangshan have their
own language and script and they use the northern Yi dialect in their daily communication [41].

**Ethnobotanical survey and data collection**

We conducted several systematic ethnobotanical surveys and investigations in Xialoangshan from September 2019 to August 2021 (Fig. 2). 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

| Table 1 Surveyed locations within study area |
|---------------------------------------------|
| Town            | Village/community            | Longitude   | Latitude   | Altitude (m) | Population |
| Dàxing town     | Well-off homes community     | 100.861411E | 27.304879N | 2255         | 2329       |
| Dàxing town     | Riverside Homes Community    | 100.865977E | 27.284771N | 2255         | 2840       |
| Dàxing town     | Happy Homes Community        | 100.864976E | 27.306978N | 2255         | 6613       |
| Ningli township | Ningli Village              | 100.765049E | 27.251272N | 2400         | 4956       |
| Ningli township | Bāicǎoping Village          | 100.71238E  | 27.174713N | 2400         | 2043       |
| Lǎnnìqìng township | Lǎnnìqìng Village     | 100.983124E | 27.225657N | 2850         | 2891       |
| Lǎnnìqìng township | Dāerdì Village          | 100.940823E | 27.275785N | 2750         | 2398       |
| Xìnyìngpánpíng township | Xìnyìngpánpíng Village | 100.926102E | 27.172216N | 2500         | 4476       |
| Xìnyìngpánpíng township | Dōng fēng Village       | 100.919985E | 27.187754N | 2654         | 3441       |
| Xìnyìngpánpíng township | Mǎojìxiāng Village     | 100.945282E | 27.138304N | 2600         | 4052       |
| Pàomǎping township | Pàomǎping Village       | 100.987172E | 26.996425N | 2680         | 4009       |
| Pàomǎping township | Shālǐping Village        | 101.013091E | 26.969145N | 2720         | 3297       |
| Pàomǎping township | Yǎngchǎng 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 | Gànghǎizi Village     | 101.135092E | 27.066066N | 1680         | 1387       |
| Chánzhànhé township | Wānmáčǎng Village       | 101.095586E | 27.033905N | 2900         | 923        |

Fig. 2 Yi women in traditional dress & Yi village & interviewing in the wild (from left to right)
### 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 |
|------------------|---------------------------|------------|--------|----------------------------|----------------|
| .abstract. | map bu | Paris polyphylla Sm. | eae | 215 | EBT5000 |
| xii ke | Artemisia argyi H. Lév. & Vaniot | Compositae | Papaveraceae | 165 | EBT5001 |
| yie pie | Papaver somniferum L. | ae | 113 |
| va diot chu | Berberis pruinosa Franch. | ae | 106 | EBT5002 |
| chup nuop | Prinsepia utilis Royle | Rosaceae | 90 | EBT5003 |
| a jji bap mop | Dipsacus asper Wall. ex C.B. Clarke | eae | 87 | EBT5004 |
| va bu syt pup suet | Taxillus balansae (Lecomte) Danser | ae | 71 | EBT5005 |
| vot mop ddie bbur | Plantago asiatica L. | eae | 70 | EBT5006 |
| bbit yop | Bulbophyllum abbreviatum (Rchb.f.) | Orchidaceae | 69 | EBT5007 |
| chup tu | Rubus biflorus Buch. -Ham. ex Smith | Rosaceae | 68 | EBT5008 |
| va zza hnap zey | Potentilla lineata Trevir. | Rosaceae | 63 | EBT5009 |
| Code | Name | Genus | Family | Code | Name | Genus | Family |
|------|------|-------|--------|------|------|-------|--------|
| ebag | chap maop sut | Taxillus balanosae (Lecointe) Danser | Loranthaceae | ae | 59 | EBT5010 | QTP- |
| ykt | sy qi ddi | Sambucus williamsii Hance | Adoxaceae | 58 | EBT5001 | QTP- |
| cgy | jy sy sut | Taxillus davayi (Tiegh.) Danser | Loranthaceae | ae | 53 | EBT5012 | QTP- |
| nby | vott mop zza ke | Crepis lingua (Vaniet) Babé | Compositae | 49 | EBT5013 | QTP- |
| yhd | syap ap mop | Lonicera calcarata Hemsl. | Caprifoliaceae | eae | 48 | EBT5014 | QTP- |
| d | mge | Fagopyrum tataricum (L.) Gaertn. | Polygonaceae | ae | 47 | EBT5015 | QTP- |
| d | ap yit | Malva verticillata L. | Malvaceae | 42 | EBT5016 | QTP- |
| mdh | vott mop jty nty | Codonopsis pilosula (Franch.) Nannf. | cee | 41 | EBT5017 | QTP- |
| fdo | mup sse hnap bo | Clinopodium chinense subsp. grandiflorum (Maxim.) H.Hara | Lamiaceae | 40 | EBT5018 | QTP- |
| hh | bhap zzip | Zanthoxylum hungeanum Maxim. | Rutaceae | 37 | EBT5019 | QTP- |
| tt | te xy lat jao | Pyrola calliantha Andres | Ericaceae | 36 | EBT5020 | QTP- |
| n | nu ku | Litsea cubeba (Lour.) Pers. | Lauraceae | 35 | EBT5021 | QTP- |
| iln | gge bu a mo | Gentiana rigorosa Franch. ex Hemsl. | ae | 34 | EBT5022 | QTP- |
| hwh | va hmpy syhmp | Vaccinium delavayi Franch. | Ericaceae | 33 | EBT5023 | QTP- |
| wy | bbut qip ddi | Sambucus adnata Wall. ex DC. | Adoxaceae | 32 | EBT5024 | QTP- |
| d | dur lap | Aconitum episcopale H. Lév. | Ranunculaceae | eae | 32 | EBT5025 | QTP- |
| d | ma | Fargesia yunnanensis Hsueh & T.P. Yi | Poaceae | 32 | EBT5026 | QTP- |
| d | nip ho vo | Schisandra lanceolata (Rehder & E.H. Wilson) A.C.Sm. | Schisandraceae | eae | 31 | EBT5027 | QTP- |
| d | chy jy | Hypericum patulum Thumb. | Hypericaceae | ae | 30 | EBT5028 | QTP- |
| e | dda bbo | Pteridium revolutum (Blume) Nakai | Dennstaedtiaceae | 30 | EBT5029 | QTP- |
| bby | vott mop zsa ke | Taraxacum dasypodum Soest | Compositae | 30 | EBT5030 | QTP- |
| Code | Name | Family | Code | Name | Family |
|------|------|--------|------|------|--------|
| ddep bup a tu | *Urtica maiorita H. Lév.* | Urticaceae | 29 | EBT5031 | QTP- |
| le rre bhu cy | *Paeonia delavayi Franch.* | Paeoniaceae | 29 | EBT5032 | QTP- |
| fa xie yop | *Lyonia ovalifolia (Wall.) Drude* | Ericaceae | 25 | EBT5033 | QTP- |
| vup | *Rubia proantha Diels* | Rubiaceae | 24 | EBT5034 | QTP- |
| hmit nra a hni | *Chenopodium album L.* | Amaranthaceae | 23 | EBT5035 | QTP- |
| lop shet map | *Actaea yunnanensis (P.K. Hsiang)* | Ranunculaceae | 23 | EBT5036 | QTP- |
| te ssut | *Taxillus calocerae (Diels) Danzer* | Geraniaceae | 23 | EBT5037 | QTP- |
| fis tsep | *Geranium strictipes R. Kauth* | e | 21 | EBT5038 | QTP- |
| te bbo | *Pinus yunnanensis Franch.* | Pinaceae | 21 | EBT5039 | QTP- |
| a dhu sa bhu | *Anemone vitifolia Buch. -Ham. ex DC.* | Saxifragaceae | 20 | EBT5040 | QTP- |
| nzy njip | *Rodgersia sambucifolia Hemsl.* | Boraginaceae | 20 | EBT5041 | QTP- |
| ba lat | *Ehretia corylifolia C. H. Wright* | Loranthaceae | 19 | EBT5042 | QTP- |
| ho bbo ssut | *Taxillus delavayeii (Tiegh.) Danzer* | Berberidaceae | 19 | EBT5043 | QTP- |
| gep dep map ma | *Mahonia decoluixiana Gagnep.* | Apocynaceae | 18 | EBT5044 | QTP- |
| xit zhup | *Desmodium elegans DC.* | Leguminosae | 18 | EBT5045 | QTP- |
| yo nji ke ddut | *Cynanchum otophyllum C.K. Schneid.* | Salicaceae | 18 | EBT5046 | QTP- |
| huo gat | *Populus adenopoda Maxim.* | Cannabaceae | 17 | EBT5047 | QTP- |
| hmu | *Cannabis sativa L.* | Cannabinaceae | 16 | EBT5048 | QTP- |
| pat cî xy hmi | *Rumex nepalensis Spreng.* | Polygonaceae | 16 | EBT5049 | QTP- |
| yy bo | *Salix babylonica L.* | Salicaceae | 16 | EBT5050 | QTP- |
| ddur jy | *Aconitum carmichaelii Debeaux* | Ranunculaceae | 15 | EBT5051 | QTP- |
| ddep bup a nuop | *Girardinia diversifolia (Link) Friis* | Urticaceae | 14 | EBT5052 | QTP- |
### Table 2 (continued)

| Code | Local Name | Scientific Name | Family | QTP | Code | Local Name | Scientific Name | Family | QTP |
|------|------------|-----------------|--------|-----|------|------------|-----------------|--------|-----|
| bge jol hme bbi | Thaumom ex Duch. | Aristolochiaceae | 14 | EBT5053 | hnit nra atu | Chenopodium album L. | 14 | EBT5054 |
| sitt hla bho | Cinnamomum tamala (Buch. -Ham.) T. |  | QTP | sy lur qi py | Nees & Eberm. | Lauraceae | 14 | EBT5055 |
| va bu shy ggo | Adenophora stricta Miq. |  | QTP | yo see la bbo | Holboellia angustifolia Wall. | 13 | EBT5057 | yyr xyr | Ophiopogon bodinieri H. Lév. | Asparagaceae | QTP | 13 | EBT5058 |
| a mat lot si | Serissa japonica (Thunb.) Thunb. | Rubiaceae | 12 | EBT5059 | gop gox | Antennaria rosea subsp. confinis | Compositeae | 12 | EBT5060 |
| li bbi syp ddu | Cornus capitata Wall. | Cornaceae | 12 | EBT5061 | nyi mof syp vo | Vitis heymonae Roem. & Schult. | Vitaceae | 12 | EBT5062 | syp ddat sut | Taxillus kaempferi (DC.) Danzer | Loranthaceae | QTP | 12 | EBT5063 |
| a jii bbu zza | Morus australis Poir. | Moraceae | 11 | EBT5064 | ap zzi | Allium wallichii Karw. | Amaryllidae | QTP | 11 | EBT5065 |
| jiu zy li | Ipomoea caurica (L.) Sweet | Convolvula | QTP | 11 | EBT5066 | mge vut | Ilicium wardii A. C. Sm. | Schisandraceae | QTP | 11 | EBT5067 |
| pat qii | Rumex acetosa L. | Polygonaceae | QTP | 10 | EBT5068 | syp ba | Schneid. | Rosaceae | 10 | EBT5069 | a mat nyu vut | Cynoglossum amabile Stapf & J.R. | Boraginaceae | QTP | 9 | EBT5070 |
| bbu shy ddut zza | Arisaema erubescens (Wall.) Schott | Aroideae | 9 | EBT5071 | jy sy | Coptis nepalensis Wall. | Coriariaceae | QTP | 9 | EBT5072 | vap ga | Borreria indica (L.) Hiern | Brassicaceae | QTP | 9 | EBT5073 |
| Code | Plant Name                      | Family      | Code | Plant Name                      | Family     |
|------|---------------------------------|-------------|------|---------------------------------|------------|
| חר | *Brassica rapa* L.              | Brassicaceae| 9    | QTP-                            |            |
| סחי | *Begonia grandis* Dryand.       | Begoniaceae | QTP- |                                 |            |
| סחי | *Pyrethrum angustifolia* (Franch.) | C.K.    | 8    | EBT5075                         |            |
| סחי | *Schneid.*                      | Rosaceae   | 8    | EBT5076                         |            |
| סחי | *Iris xerographica* Maxim.      | Iridaceae | 8    | EBT5077                         |            |
| סחי | *Fragaria vesca* L.             | Rosaceae   | 8    | EBT5078                         |            |
| סחי | *Leontopodium calocephalum* (Franch.) |         | QTP- |                                 |            |
| סחי | *Reynoutria multiflora* (Thunb.) | Polygonace | 8    | EBT5079                         |            |
| סחי | *Moldenke*                      | Polygonace | QTP- |                                 |            |
| סחי | *Cistus ladanifer* Petr. & Hand. |           | 8    | EBT5080                         |            |
| סחי | *Mazz.*                         | Composite | 8    | EBT5081                         |            |
| סחי | *Incarvillea diffusa* Royle     | Bignoniace | QTP- |                                 |            |
| סחי | *Euphorbiace*                   | Euphorbiace| 8    | EBT5082                         |            |
| סחי | *Ricinus communis* L.           | eae        | 7    | EBT5083                         |            |
| סחי | *Ranunculace*                   | QTP-       |      |                                 |            |
| סחי | *Anemone rivularis* Buch. -Harms. ex DC. |     | 7    | EBT5084                         |            |
| סחי | *Zea mays*                      | Poaceae    | 7    | EBT5085                         |            |
| סחי | *Caprifoliace*                  | QTP-       |      |                                 |            |
| סחי | *Lenicera trichosantha* Bureau & Franch. |     | 7    | EBT5086                         |            |
| סחי | *Polygonace*                     | QTP-       |      |                                 |            |
| סחי | *Fagopyrum esculentum* Moench |           | 7    | EBT5087                         |            |
| סחי | *Prunus salicina* Lindl.        | Rosaceae   | 7    | EBT5088                         |            |
| סחי | *Caprifoliace*                  | QTP-       |      |                                 |            |
| סחי | *Leycesteria formosa* Wall.    | Rosaceae   | 7    | EBT5089                         |            |
| סחי | *Hypericum perforatum*         | Rosaceae   | 6    | EBT5090                         |            |
| סחי | *Caryophyllaceae*               | QTP-       |      |                                 |            |
| סחי | *Psammosilene tunicoides* W.C.Wu & C.Y.Wu |       | 6    | EBT5092                         |            |
| סחי | *Caryophyllaceae*               | QTP-       |      |                                 |            |
| סחי | *Saponaria officinalis* L.      | Rosaceae   | 6    | EBT5093                         |            |
| Code  | Name          | Scientific Name                          | Family   | Code  | Name          | Scientific Name                          | Family   |
|-------|---------------|-----------------------------------------|----------|-------|---------------|-----------------------------------------|----------|
|       | nyie lyt     | *Ligusticum sinense* Oliv.             | Apiaceae |       |               |                                         |          |
|       |               | *Fagopyrum acutatum* (Lehm.) Mau. ex   | Polygonace|       |               |                                         |          |
|       |               | K. Hammer                               |          | 6      |               |                                         |          |
|       |               | *Solanum tuberosum* L.                 | Solanaceae| 6     |               |                                         |          |
|       |               | *Notopterygium incisum* K.C. Ting ex   |          |       |               |                                         |          |
|       |               | H.T. Chang                              | Apiaceae | 5     |               |                                         |          |
|       |               | *Datura stramonium* L.                 | Solanaceae| 5     |               |                                         |          |
|       |               | *Bupleurum marginatum* Wall. ex DC.    | Apiaceae |       |               |                                         |          |
|       |               | *Bidens pilosa* L.                     | Compositae| 5     |               |                                         |          |
|       |               | *Viburnum cylindricum* Buch. -Ham. ex  |          |       |               |                                         |          |
|       |               | D. Don                                  | Adoxaceae | 5     |               |                                         |          |
|       |               | *Davallia trichomanoides* Blume         | Pteridaceae|       |               |                                         |          |
|       |               | *Phytolacca acinosa* Roxb.             | Verbenaceae| 5    |               |                                         |          |
|       |               | *Capsella bursa-pastoris* (L.) Medic.  | Brassicaceae|       |               |                                         |          |
|       |               |                                         |          |       |               |                                         |          |
|       |               | *Zanthoxylum bungeanum* Maxim.         | Rutaceae | 5     |               |                                         |          |
|       |               |                                         | Verbenaceae|       |               |                                         |          |
|       |               | *Verbena officinalis* L.               | Compositae| 5     |               |                                         |          |
|       |               |                                         | Jergandace|       |               |                                         |          |
|       |               |                                         |          |       |               |                                         |          |
|       |               | *Elaeagnus umbellata* Thunb.           |           | 5     |               |                                         |          |
|       |               |                                         | Verbenaceae|       |               |                                         |          |
|       |               | *Cirsium shansiense* Petr.             |           | 5     |               |                                         |          |
|       |               |                                         | Compositae|       |               |                                         |          |
|       |               |                                         | Juglandace|       |               |                                         |          |
|       |               |                                         |          |       |               |                                         |          |
|       |               | *Prunus persica* (L.) Batsch            | Rosaceae | 5     |               |                                         |          |
|       |               |                                         | Caryophyll|       |               |                                         |          |
|       |               | *Stellaria vestita* Kurz.              |           | 4     |               |                                         |          |
|       |               |                                         | Caryophyll|       |               |                                         |          |
|       |               |                                         |          |       |               |                                         |          |
|       |               |                                         |          |       |               |                                         |          |
|       |               | *Duchesnea indica* (Jacks.) Focke      | Rosaceae | 4     |               |                                         |          |
|       |               |                                         | Hypericace|       |               |                                         |          |
|       |               | *Hypericum acmosepalum* N. Robson      |           | 4     |               |                                         |          |
|       |               |                                         | Hypericace|       |               |                                         |          |
|       |               | *Hypericum monogynum* L.               |           | 4     |               |                                         |          |
|       |               |                                         | Hypericace|       |               |                                         |          |
|       |               | *Clematis armandii* Frasch.            |           | 4     |               |                                         |          |
|       |               |                                         | Ranunculace|      |               |                                         |          |
Table 2 (continued)

|    |   |                                                                 |    |    |
|----|---|------------------------------------------------------------------|----|----|
|    |   | Toxicodendron succedaneum (L.)                                  | Azacardiac eae                      | QTP-EBT5116 |
|    |   | Kuntze                                                           |    |    |
|    |   | Angelica sinensis (Oliv.) Diels                                  | Apiaceae eae                        | QTP-EBT5117 |
|    |   | Angelica likiangensis H. Wolff                                   | Apiaceae eae                        | QTP-EBT5118 |
|    |   | shop shot mop a                                                  |    |    |
|    |   | Rhus nivea Thunb.                                                | Rosaceae eae                        | QTP-EBT5119 |
|    |   | Rhododendron delavayi Franch.                                    | Ericaceae eae                       | QTP-EBT5120 |
|    |   | Lithocarpus cleistocarpus (Seemen)                               | Fagaceae eae                        | QTP-EBT5121 |
|    |   | Hedera nepalensis K. Koch                                        | Araliaceae eae                      | QTP-EBT5122 |
|    |   | Arctium lappa L.                                                 | Compositae eae                      | QTP-EBT5123 |
|    |   | Heracleum hemsleyanum Diels                                      | Apiaceae eae                        | QTP-EBT5124 |
|    |   | Pimpinella candeliana Wight & Arn.                               | Apiaceae Loranthace                 | QTP-EBT5125 |
|    |   | Taxillia tomentosa Tiegh.                                        | Asparagaceae eae                    | QTP-EBT5126 |
|    |   | Asparagus filicinus Buch. -Ham. ex D.                            | Asparagaceae eae                    | QTP-EBT5127 |
|    |   | Don                                                               |    |    |
|    |   | Fragraea gracilis Lessink.                                       | Rosaceae eae                        | QTP-EBT5128 |
|    |   | Cornus intermedia Hieron.                                        | Pteridaceae eae                     | QTP-EBT5129 |
|    |   | Hylotelephium spectabile (Boreau) H.                             | Crassulaceae eae                    | QTP-EBT5130 |
|    |   | Ohba                                                              | Gentianaceae ae                     | QTP-EBT5131 |
|    |   | Helenium elliptica D. Don                                        |    |    |
|    |   | Aloes nepalensis D. Don                                          | Behulaceae eae                      | QTP-EBT5132 |
|    |   | Quercus faginea Thunb.                                           | Fagaceae eae                        | QTP-EBT5133 |
|    |   | Incarvillea mairei (H. Lév.) Grierson                            | Bignoniaceae eae                    | QTP-EBT5134 |
|    |   | Eucommia ulmoides Oliv.                                          |    |    |
|    |   | Vicia amoena Fisch.                                              | Leguminosae eae                     | QTP-EBT5135 |
|    |   | Phyllotachys sulphurea (Carrière)                                 |    |    |
|    |   | Rivière & C. Rivière                                             | Poaceae eae                         | QTP-EBT5136 |
| Table 2 (continued) |
|---------------------|
| **F†i**   | nhie cy | Iris wattii Baker ex Hook.f. | Iridaceae | 3 | EBT5138 |
| **H‡i**   | pat qi | Rumex yungningensis Sam. | Polygonaceae | ae | 3 | EBT5139 |
| **H‡E**   | shox shot | Rubus pileatus Focke | Rosaceae | 3 | EBT5140 |
| **H‡E**   | rhododendron trassiliatum Forrest & | QTP- |
| **I‡E‡‡** | shuo ma hni | W.W. Sm. | Ericaceae | 3 | EBT5141 |
| **I‡‡‡**  | te shy jix | Stellera chamaejasme L. | Compositae | eae | 3 | EBT5142 |
| **I‡‡‡**  | vie ap shy | Pseudogalphalium chrysocophalum | QTP- |
| **X**     | vap | Hilliard & B. L. Burtt | Compositae | 3 | EBT5143 |
| **#‡**    | yiep co | Galinsoga parviflora Cav. | Compositae | 3 | EBT5145 |
| **fl ‡**  | a bxa | Arisaema sasatule Buchet | Araceae | 2 | EBT5146 |
| **fl ‡**  | B chevia yun nan neis Franch. | Smilacaceae | QTP- |
| **fl ‡**  | a mat lat chu | milax ferox Wall. ex Kunth | Asparagaceae | QTP- |
| **fl ‡**  | a zhat xy si | Polygonatum cirrhifolium (Wall.) Royle | Acanthaceae | ae | 2 | EBT5149 |
| **‡‡‡‡**  | bbop ddu | Aconitum carmichaelii Debeaux | Compositae | 3 | EBT5150 |
| **‡‡‡‡**  | bbut jiy yy | Prunella vulgaris L. | Lamiaceae | 2 | EBT5151 |
| **‡‡‡‡**  | campylotropis bistrella (Franch.) | Leguminosae | QTP- |
| **‡‡‡‡**  | bbut tip xu ge | Schindl. | 2 | EBT5152 |
| **‡‡‡‡**  | hxie ggas vat zuu | Clocasia esculenta (L.) Schott. | Araceae | 2 | EBT5153 |
| **‡‡‡‡**  | lo ggur ap jji | Cotoneaster pannosus Franch. | Rosaceae | 2 | EBT5154 |
| **‡‡‡‡**  | mgap hmiep | Prunus yunnanensis Franch. | Rosaceae | 2 | EBT5155 |
| **‡‡‡‡**  | mu jjiip | Acorus calamus L. | Acoraceae | 2 | EBT5156 |
| **‡‡‡‡**  | ry zot | Equisetum diffusum D. Don | Equisetaceae | QTP- |
| **‡‡‡‡**  | shuo ma a ge | Rhododendron decorum Franch. | Ericaceae | 2 | EBT5158 |
| **‡‡‡‡**  | Rhododendron trassiliatum Forrest & | QTP- |
| **‡‡‡‡**  | shuo ma ma ge | W.W. Sm. | Ericaceae | 2 | EBT5159 |
| Si | 3ix | *Pinus armandii* Franch. | Pinaceae | 2 | EBT5160 |
| - | - | - | - | - | QTP- |
| Ssup loj uo | *Ketelotzia evelyniana* Mast. | Pinaceae | 2 | EBT5161 |
| 3sup shuttle | *Tsuga dumosa* (D. Don) Eichler | Pinaceae | 2 | EBT5162 |
| Sy yi | *Praunus mume* (Siebold) Siebold & Zucc. | Rosaceae | 2 | EBT5163 |
| Va vu gop | *Elsholtzia blanda* (Benth.) Benth | Lamianae | 2 | EBT5164 |
| Vai duy | *Prunus sativum* L. | ae | 2 | EBT5165 |
| Vop qip shop shot | *Rubus sachalinensis* H. Léveillé | Rosaceae | 2 | EBT5166 |
| Vot laxit | *Oxystigma digyna* (L.) Hill. | ae | 2 | EBT5167 |
| Vot lay | *Debreggenia longifolia* (Burm. F.) | Urticaceae | 2 | EBT5168 |
| Ry ddu o rno | *Arundinella hookeri* Muro ex Keng | Poaceae | 2 | EBT5169 |
| A bha | *Dioscorea polystachya* Turcz. | dsaceae | 1 | EBT5170 |
| A ble va ry | *Gahnia ancistrophylla* Benth. | Cyperaceae | 1 | EBT5171 |
| A jii jie ddut | *Bashina brachycarpa* Benth. | ae | 1 | EBT5172 |
| A nyj gop | *Hand.-Mazz. | Eriaceae | 1 | EBT5173 |
| A nyie bhoyp sy | *Juniperus* | aceae | 1 | EBT5174 |
| A nyje sip sit | *Rosa helena* Rehder & E.H. Wilson | Rosaceae | 1 | EBT5175 |
| A nyat syur | *Corylus yunnanensis* (Franch.) A. | ae | 1 | EBT5176 |
| A zhat sy si | *Polygonatum kingianum* Collett & | Asparagaceae | 1 | EBT5177 |
| Ba lat | *Populus yunnanensis* Dode | Salicaceae | 1 | EBT5178 |
| Ba ry | *Tenaxa cuminii* (Hook.f.) N.P. | Salicaceae | 1 | EBT5179 |
| Bba juo | *Exelate laxiolarum* (Franch.) Cheesman | Musacceae | 1 | EBT5180 |
| Bbit syp | *Impatiens delavayi* Franch. | eae | 1 | EBT5181 |
| Code | Scientific Name | English Name | Family | Code |
|------|----------------|--------------|--------|------|
|     | Commelina communis L. | Commelina | ceae | 1 | EBT5182 |
|     | Lycopus japonicus Thunb. | Lycopodiaceae | ceae | 1 | EBT5183 |
|     | Ageratina adenophora (Spreng.) | Ageratina | ceae | 1 | EBT5184 |
|     | Mentha longifolia var. asiatica (Bertss.) | Mentha | ceae | 1 | EBT5185 |
|     | Decaisnea insignis (Griff.) Hook.f. & Thomson | Decaisnea | ceae | 1 | EBT5186 |
|     | Pieris formosa (Wall.) D. Don | Pieris | ceae | 1 | EBT5187 |
|     | Taxus wallichiana Zucc. | Taxus | ceae | 1 | EBT5188 |
|     | Perilla frutescens (L.) Britton | Perilla | ceae | 1 | EBT5189 |
|     | Elsholtzia ciliata (Thunb.) Hyl. | Elsholtzia | ceae | 1 | EBT5190 |
|     | Schima argentea E. Pritzel | Theaceae | ceae | 1 | EBT5191 |
|     | Ternstroemia gymnanthera (Wight & Arn.) Sprague | Pentaphylaceae | ceae | 1 | EBT5192 |
|     | Coriaria terminalis Hemsll. | Coriariaceae | ceae | 1 | EBT5193 |
|     | Holboellia latifolia Wall. | Rhamnaceae | ceae | 1 | EBT5194 |
|     | Rhamnus virgata Roxb. | Rhamnaceae | ceae | 1 | EBT5195 |
|     | Galium spurium L. | Rubiaceae | ceae | 1 | EBT5196 |
|     | Oxyria sinensis Hemsll. | Polygamoaceae | ceae | 1 | EBT5197 |
|     | Celastrus stylatus Wall. | Celastraceae | ceae | 1 | EBT5198 |
|     | Ligularia caulosantha (Diels) Hand. | Compositae | ae | 1 | EBT5199 |
|     | Juncus effusus L. | Juncaceae | ae | 1 | EBT5200 |
|     | Uncus alloidies Franch. | Juncaceae | ae | 1 | EBT5201 |
|     | Curcuma longa L. | Zingiberaceae | ae | 1 | EBT5202 |
|     | Quercus guayavifolia H. Lév. | Fagaceae | ae | 1 | EBT5203 |
Table 2 (continued)

| Code | Description          | Scientific Name | Family       | Country | Code |
|------|----------------------|-----------------|--------------|---------|------|
| E    | rat shy              | Quercus aquifolios f. Rehder & E.H. Wilson | Fagaceae    | 1       | EBT5204 |
| QTP- |                      |                 |              |         |      |
| E    | ryp ddu uo mao       | Arundinella hookeri Munro ex Keng | Poaceae    | 1       | EBT5205 |
| QTP- |                      |                 |              |         |      |
| E    | shuo ma              | Rhododendron simos Planch. | Ericaceae | 1       | EBT5266 |
| QTP- |                      |                 |              |         |      |
| E    | shuo ma              | Rhododendron adenogynum Diels | Ericaceae | 1       | EBT5270 |
| QTP- |                      |                 |              |         |      |
| E    | shuo ma              | Rhododendron azaphyllum Ball. f. & Esm. | Ericaceae | 1       | EBT5208 |
| QTP- |                      |                 |              |         |      |
| E    | shuo ma mgep         | Rhododendron impeditum Ball. f. & Esm. | Ericaceae | 1       | EBT5209 |
| QTP- |                      |                 |              |         |      |
| E    | zzyk                 | W.W. Sm.         | Cupressace   | 1       | EBT5209 |
| QTP- |                      |                 |              |         |      |
| E    | shut bbo             | Juniperus rigida Siebold & Zucc. | Cupressace | 1       | EBT5210 |
| QTP- |                      |                 |              |         |      |
| E    | shut bbo             | Juniperus formosana Hayata | Cupressace | 1       | EBT5211 |
| QTP- |                      |                 |              |         |      |
| Y    | sy a jjie            | Acer pinnata Maxim. | e            | 1       | EBT5212 |
| QTP- |                      |                 |              |         |      |
| Y    | sy bu a go           | Chamaemesa cathayensis (Hemsl.) C.K. Schneid. | Rosaceae | 1       | EBT5223 |
| QTP- |                      |                 |              |         |      |
| Y    | sy bu ssut           | Taxillus szechuanensis (Lecomte) | Loranthaceae | 1       | EBT5214 |
| QTP- |                      |                 |              |         |      |
| Y    | sy nda               | Pyrus pyrifolia (Burm. F.) Nakai | Rosaceae | 1       | EBT5215 |
| QTP- |                      |                 |              |         |      |
| Y    | sy ve ssut           | axilus kaempferi (DC.) Desner | Rosaceae | 1       | EBT5216 |
| QTP- |                      |                 |              |         |      |
| W    | va bu syt pup        | Rosa sericea Wall. ex Lindl. | Rosaceae | 1       | EBT5217 |
| QTP- |                      |                 |              |         |      |
| W    | va bu syt pup        | Rosa swongonowii Koehne | Rosaceae | 1       | EBT5218 |
| QTP- |                      |                 |              |         |      |
| W    | va bu syt pup        | Parthenocissus semicordata (Wall.) | Vitaceae | 1       | EBT5219 |
| QTP- |                      |                 |              |         |      |
| W    | vat ba sy lyr        | Planch. | Vitaceae | 1       | EBT5220 |
| QTP- |                      |                 |              |         |      |
| W    | vot mop zy lyr       | Solanum americanum Mill. | Solanaceae | 1       | EBT5221 |
| QTP- |                      |                 |              |         |      |
| Y    | yip syt              | Coriandrum sativum L. | Apiaceae | 1       | EBT5222 |
| QTP- |                      |                 |              |         |      |
| Y    | yy sy ka py          | Polygonum nepalensis (Meiicot.) Miyabe | Polygonace | 1       | EBT5223 |
| QTP- |                      |                 |              |         |      |
| Y    | yy sy ka py          | Polygonum tortuosum D. Don | Polygonace | 1       | EBT5224 |
| QTP- |                      |                 |              |         |      |
| W    | szit lyr             | Pistacia terebinthifolia J. Poiss. | Anacardiac | 1       | EBT5225 |
| QTP- |                      |                 |              |         |      |
| B    | ma ke                | Fagara spathacea Franch. | Poscaceae | 1       | EBT5226 |
| QTP- |                      |                 |              |         |      |
| B    | cep blo a tu         | Fragaria nilgerrens Schdl. ex J. Gay | Rosaceae | 1       | EBT5227 |
| QTP- |                      |                 |              |         |      |
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" [42] and then stored at the Herbarium of the Kunming Institute of Botany, Chinese Academy of Sciences.

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.

Results

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.

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 (Fig. 3): 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.

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, (Yi language phonetic name: 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 (Yi language phonetic name: bbut o jjie), which means "pitchforked-head grass"; and Anemone vitifolia Buch. -Ham. ex DC., which is also known as wild cotton,
### Table 3  
Plant names based on animals in the Yi language

| Animal | Latin name | Yi name (Phono) | Yi language phonetic name | Interpretation | Voucher number |
|--------|------------|----------------|----------------------------|----------------|----------------|
| Fox    | Notoperyxum incisum K.C. Ting ex H.T. Chang | _sfek_ | a ddu bha jio | $\forall$: “fox” | QTP-EBT5002 |
| Fox    | Pinnopella candolleana Wight & Am. | _sfek es | a ddu bha jio it zy $\forall$: “fox” | | QTP-EBT5003 |
| Fox    | Anemone vestita Buch. -Ham. ex DC. | _sfek | a ddu sha bbo $\forall$: “fox” | | QTP-EBT5004 |
| Rabbit | Cryptococcus E.G.  Camus | _88#8#_ | a bie va ry $\forall$: “rabbit” | | QTP-EBT5005 |
| Crow   | Diprurus asper Wall. ex C.B. Clarke | _88#8_ | a jii bap mep $\forall$: “crow” | | QTP-EBT5006 |
| Crow   | Morus australis Poe. | _88#8_ | a jii bbo zaa $\forall$: “crow” | | QTP-EBT5008 |
| Crow   | Banonia britchvarya Benth. | _88#8_ | a jii jie ddat $\forall$: “crow” | | QTP-EBT5009 |
| Crow   | Berchemia yunnanensis Franch. | _88#8_ | a jii loo gaa $\forall$: “crow” | | QTP-EBT5010 |
| Cat    | Chilostoma dentata (Forssk.) Brownsey & Irmey | _88#8_ | a nyie hpy zy $\forall$: “cat” | | QTP-EBT5015 |
| Cat    | Steallia vestita Kurz. | _88#8_ | a nyie hui xy $\forall$: “cat” | | QTP-EBT5016 |
| Cat    | Rosa rugosa Rehd. & E.H. Wilson | _88#8_ | a nyie sip sit $\forall$: “cat” | | QTP-EBT5017 |
| Monkey | Corylus yunnanensis (Franch.) A. Camus | _88#8_ | a nyat sy lur $\forall$: “monkey” | | QTP-EBT5018 |
| Magpie | Regenia grandis Dryand. | _88#8_ | a shat vep ji $\forall$: “maggie” | | QTP-EBT5019 |
| Magpie | Polygonatum koechlinii Collett & Hertel. | _88#8_ | a shat sy si $\forall$: “maggie” | | QTP-EBT5020 |
| Magpie | Polygonatum cirrhosum (Wall.) Royle | _88#8_ | a shat sy si $\forall$: “maggie” | | QTP-EBT5021 |
| Snake  | Dacnessa indica (Jack.) Foëx | _88#8_ | bhu shy ddat zaa $\forall$: “snake” | | QTP-EBT5037 |
| Snake  | Eryxona erubescens (Wall.) Schott | _88#8_ | bhu shy ddat zaa $\forall$: “snake” | | QTP-EBT5038 |
| Gout   | Decaisnea insignis ( Griff.) Hook.f. & Thomsen | _88#8_ | bhu shy ddat zaa $\forall$: “snake” | | QTP-EBT5038 |
| Pig    | Colacasia esculenta (L.) Schott. | _88#8_ | bhu gga gut zaa $\forall$: “pig” | | QTP-EBT5005 |
| Pig    | Phytolacca acmosa Roxb. | _88#8_ | bhu gga gut zaa $\forall$: “pig” | | QTP-EBT5006 |
| Bird   | Capsella bursa-pastoris (L.) Medik. | _88#8_ | bhu gga gut zaa $\forall$: “bird” | | QTP-EBT5007 |
| Castle | Paeonia delavayi Franch. | _88#8_ | bhu gga gut zaa $\forall$: “castle” | | QTP-EBT5010 |
| Fowl   | Clinopodium articulatum (Bland.) C.Y. Wu & S.J. Huam ex H.W. Li | _88#8_ | mup gue hku goe $\forall$: “fowl” | | QTP-EBT5127 |
| Cock   | Adenophora stricta Miq. | _88#8_ | mup gue hku goe $\forall$: “fowl” | | QTP-EBT5186 |
| Cock   | Rosa sericina Wall. ex Lindl. | _88#8_ | mup gue hku goe $\forall$: “fowl” | | QTP-EBT5187 |
| Chicken | Berberis pusilla Franch. | _88#8_ | mup gue hku goe $\forall$: “fowl” | | QTP-EBT5190 |
| Chicken | Potentilla sinuata Trevir. | _88#8_ | mup gue hku goe $\forall$: “fowl” | | QTP-EBT5194 |
| Sow    | Plantago depressa Willd. | _88#8_ | mup gue hku goe $\forall$: “fowl” | | QTP-EBT5206 |
| Sow    | Codonopsis pilosula (Franch.) Natsuf. | _88#8_ | mup gue hku goe $\forall$: “fowl” | | QTP-EBT5207 |
| Sow    | Arctium lappa L. | _88#8_ | mup gue hku goe $\forall$: “fowl” | | QTP-EBT5208 |
| Sow    | Solanum americanum Mill. | _88#8_ | mup gue hku goe $\forall$: “fowl” | | QTP-EBT5209 |
| Sow    | Taraxacum dasydatum Soott | _88#8_ | mup gue hku goe $\forall$: “fowl” | | QTP-EBT5210 |

Animal-related words in the Yi language and the Yi language phonetic name are shown in bold.
is named \( \text{a ddu sha bbu} \), 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 Collett & Hemsley and Polygonatum cirrhifolium (Wall.) Royle, which belong to the Polygonatum genus, are rolled downwards like a bird's claw, and these are named \( \text{a zhat xy si} \), 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 (Franch.) Hilliard & B.L.Burtt is \( \text{vie ap shy} \), which means "yellow flower".

In addition, the names of nine species relate to the plant's taste. For example, Prunella vulgaris L. is named \( \text{bbut jjy yy} \), 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 Dryand. is \( \text{a zhat vop ji} \), 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 (Spreng.) R.M. King & H. Rob. is named \( \text{bbut chy ni} \), which means "stinky grass", because the whole plant has a distinctly unpleasant odour.

**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 \( \text{ap} \), which means "wild") are often used in the plant's name. For example, the Yi name for Cotoneaster pannosus Franch. is \( \text{a ddu ap jyt} \), which means "firethorn that grows in the wild". This word distinguishes it from Pyracantha angustifolia (Franch.) C.K. Schneid., which is commonly planted around local dwellings. The Yi name for Hedera nepalensis K.Koch is \( \text{a zhat x vop ji} \), in which \( \text{vop ji} \) means "water" and \( \text{x vop ji} \) 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 \( \text{vi} \), which means "swamp"; for example, Persicaria nepalensis (Meisn.) Miyabe is named \( \text{vi vi x x} \) in the Yi language and the willow tree is called \( \text{vi x x} \).
### Table 5 Chinese loanwords in the folk plant names of the Yi community in Xiaoliangshan

| Yi language name | Yi phonetic name | Chinese name (common name) | Chinese phonetic name | Latin name | Voucher number |
|------------------|------------------|---------------------------|-----------------------|------------|---------------|
| ᴬᴺ  gb | bba jao      | 地涌金莲 (戏称)                       | dì yǒng jīn lián (bì jiǎo)           | Ensete lasiocarpum (Franch.) Cheesman | QTP-          |
| ᴴᴺ  gb  | bbut cha fu  | 竹叶柴胡 (柴胡)                         | zhú yè chái hú (chái hú)                       | Bupleurum marginatum Wall. ex DC.       | EBT5039       |
| ᴴᴺ  gb  | bbut che ji |  |                       |                       | QTP-          |
| ᴵᴺ     | cy  | 石松 (仙鹤草)                           | shí sōng (xiān hè cǎo)                      | Lycopodium japonicum Thunb.         | EBT5040       |
| ᴵᴺ  gb  | bbut sip xu | 毛柄子棉 (钩血)                         | máo gěng zǐ mián (gōu xuè)                    |                       | QTP-          |
| ᵸᴺ  gb | ge   |  |                       |                       | QTP-          |
| ᴵᴺ  gb  | bbut xí hò |  |                       |                       | QTP-          |
| ᴨᴺ  gb | cy  | 黄龙尾 (仙鹤草)                         | huáng lóng wěi (xiān hè cǎo)                        | Agrimonia pilosa Ledeb.            | EBT5046       |
| ᴸᴺ  gb | bing bu  |  |                       |                       | QTP-          |
| ᴶᴺ  gb | bbei mar |  |                       |                       | QTP-          |
| ᴹᴺ  gb | bo bopp  | 假蒲公                     | jiǎ bù gōng                           | Rhus communis L.                  | EBT5048       |
| ᴹᴺ  gb | bai fu zha |  |                       |                       | QTP-          |
| ᴹᴺ  gb | cy  | 草乌梅 (虎掌草)                         | cǎo yú méi (hǔ zhǎng cǎo)                      | Anemone rivularis Buch. -Ham. ex D. Don | EBT5050       |
| Ṯᴺ  gb | dui lap  |  |                       |                       | QTP-          |
| Ṭᴺ  gb | guan sup bu |  |                       |                       | QTP-          |
| Ȯanol  | ho sha vu |  |                       |                       | QTP-          |
| Ȯanol  | it map  |  |                       |                       | QTP-          |
| Ȯanol  | lap sup  |  |                       |                       | QTP-          |
| Ȯanol  | lap shen map |  |                       |                       | QTP-          |
| ᴮᴺ  gb | ma bie cy | 马鞭草 (玉米)                         | mǎ biān cǎo (yù mǐ)                          | Verbena officinalis L.           | EBT5017       |
| ᴮᴺ  gb | vat dat  |  |                       |                       | QTP-          |
| ᴮᴺ  gb | yis yep co | 牛旁菊 (羊菊)                         | niú páng jú (yáng jú)                          | Galinsoga parviflora Cav.        | EBT5217       |
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  and  , 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 *Ensete lasiocarpum* (Franch.) Cheesman is 茭（zhāo），which is romanised as “bba juo” which sounds like its Chinese name “ba jiao”. Lycopods are called 紫罗兰（zīluán），which is romanised as “bbut che ji cy”；this is a transliteration of the plant’s common Chinese name “chou jin cao” with the prefix added to indicate a herbaceous plant.

**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 for strain-injury medication for humans and cattle, is named 草乌头（cǎo wū tóu），which means "strain injury medicine for cattle". Similarly, *Iris wattii* Baker ex Hook.f. is often used by the locals to treat pneumonia, and its Yi name is 番红花（fān hóng huā）, which means "pneumonia medicine". *Rubus sachalinensis* H. Léveillé is locally called 圆叶草莓（yuán yè bāo méi）, which means "planting turnips"; therefore, the plant’s name directly reflects its indicator function.

**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 (Fig. 4). 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* (Spreng.) R.M. King & H. Rob.

Yi name: 花草（huā cǎo） (core word) + 茂盛（mào shèng）(modifier).

**Example 2** Latin name: *Rhododendron decorum* Franch.

Yi name: 茉莉花（mò lì huā）(core word) + 丁香（dīng xiāng）(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, 紫花地丁（Zanthoxylum bungeanum Maxim.）, 玫瑰（Allium wallischi Kunth）and 芹菜（Asparagus filicinus Buch.-Ham. ex D.Don）.

**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 (Fig. 5). 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 胡桃（hú táo）(a jji bbu zza) corresponds only to *Morus australis* Poir., 草乌头（cǎo wū tóu）(bbu shy ddut zza) corresponds only to *Arisaema erubescent*
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: (hnit nra a hni) and (hnit nra a tu). Similarly, *Rhododendron trilatinum* Forrest & W.W. Sm. has two corresponding Yi names: (li bbi syp ddu) and (shuo ma a tu). Similarly, *Rhododendron* has two corresponding Yi names: (li bbi syp ddu) and (shuo ma a tu). Similarly, *Rhododendron* has two corresponding Yi names: (li bbi syp ddu) and (shuo ma a tu). Similarly, *Rhododendron* has two corresponding Yi names: (li bbi syp ddu) and (shuo ma a tu).

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 (chyt jy): *Hypericum acmosepalum* N. Robson, *Hypericum monogynum* L., *Hypericum forrestii* (Chitt.) N. Robson, and *Hypericum patulum* Thunb.; two different species correspond to the Yi name (y sy): *Coriaria nepalensis* Wall.; and two different species correspond to the Yi name (shut bbo): *Juniperus rigida* Siebold & Zucc. and *Juniperus formosana* Hayata.

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 (Fig. 6) 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 (Fig. 6A), 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, (shuo ma ma ge). 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 (shuo ma ma ge) 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 addition, the Yi name (shut bbo) represents three different species of the *Artemisia* genus: *Artemisia annua* L. and another species of wormwood in the Daliangshan, and *Artemisia argyi* H. Lév. & Vaniot in Xiaoliangshan. In the Daliangshan, the Yi name (shut bbo) represents *Crataegus pinnatifida* Bunge and *Crataegus scabrifolia* Franch., whereas in Xiaoliangshan it refers to *Docynia delavayi* (Franch.) Schneid. Similarly, in the Daliangshan, the Yi word (mu ku), refers to *Populus* sp. L., whereas in Xiaoliangshan, it refers to *Ehretia corylifolia* C.H. Wright.
Analysis of “key plants” in folk botanical nomenclature of the Yi nationality in Xiaoliangshan

Different plants play different role in the daily life of the Yi people in Xiaoliangshan, and their importance is also different. Through interviews, we summarized many important plants in the daily lives of the Yi people in Xiaoliangshan. These plants often have the following characteristics:

1. Plants with monosyllabic non-binomial structured names. A total of 13 species of plants of this type were recorded. For example, *Juniperus rigida* Siebold & Zucc., *Rubia alata* Wall., *Toxicodendron succedaneum* (L.) Kuntze, etc.

2. Plants with “**(ch)***” in the name. In the Yi language, “**(ch)***” means “tree”. The Yi people in Xiaoliangshan often use the word “**(ch)***” as the name suffix for woody plants. In this study, 21 species of plants of this type were recorded. The life forms of these plants are often tall woody plants such as *Cornus capitata* Wall., *Docynia delavayi* (Franch.) C.K. Schneid., *Lithocarpus cleistocarpus* (Seemen) Rehder & E.H. Wilson, etc.

3. The plants used in Yi nationality’s traditional folk customs including weddings, funerals, sacrifices, the new year of Yi ethnic group, and the torch festivals are also important in Yi nationality’s daily life. This type of traditional folk plant culture is widespread in the life of the Yi people in Xiaoliangshan. A total of 38 species of these types of plants have been recorded in this study. For example, *Fargesia yunnanensis* Hsueh & T.P. Yi, *Pinus yunnanensis* Franch., *Rhododendron decorum* Franch., etc.

The above-mentioned plants are mostly “sacred” plants recognized by the Yi people in Xiaoliangshan as indispensable in daily life of the Yi people. The Yi people also pay special attention to their protection and utilization.

Discussion

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, 43, 44]. 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, 45–47]. The frequent use of animal names for plants can be explained by the traditional livelihood of the Yi people, which involves various animals.
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 [24]. 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 [25]. 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 [26]. However, turnips are formed approximately three months after flowering [55, 56], 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 [57], 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, 58]. 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 [59–61], and the ancient Yi names of these plants have a monosyllabic 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 [62].

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 [46]. 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 (red and yellow), even though *Chenopodium album* L. is a plant that is widely distributed and has many morphological variations [63]. Another example is that four different species of *Hypericum* are all named ㄏ in the Yi language. These species are primarily found in southwestern China [57], 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.

The influence of national cultural similarities and differences on plant naming

Cultural differences are an important factor that underlies various people's conventions for plant naming. For example: (1) Differences in languages of different nationalities will lead to differences in plant naming. In this study, the Xiaoliangshan Yi people have many proper nouns for plant names, most of which are phonetic shells with no specific meaning, which are also common in the folk plant names of other ethnic groups [12]. This proper noun inherited by members of the cultural group representing the biological organism itself. The proper noun itself has no specific meaning. It belongs to the cultural characteristics of a specific nationality. (2) The differences in the use of plants by different ethnic groups lead to differences in plant naming. For the same
plant, local people with different cultural backgrounds use plants differently. Consequently, leading to differences when naming such plants. For example, in Xiaoliangshan, the root decoction of *Malva verticillata* L. can be used as a medicine for oxytocin, but the Yi name "fag" is a noun passed by word of mouth and has no specific meaning. Therefore, the meaning of this proper noun is not related to the function of the plant. In contrast, the Mongolians named it "taur nogo", which means "Peach vegetable" [12]. The name comes from the fact that the tender leaves of this plant are often eaten as vegetables by Mongolians. In addition, traditional cultures such as different religious beliefs and livelihoods may affect people's naming of plants. The traditional culture of Yi people's religious beliefs means of livelihood and language deeply influence the naming of plants by Yi people. It is mainly reflected in the worship thought contained in plant names, many animal names, and a wealth of proper nouns.

However, for the same cultural groups living in different geographic environments.

The factors affecting plant naming may not only be caused by cultural characteristics. 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 [64]. Therefore, analyzing the folk plant names of the same cultural group living in different environments can reveal the influence of external factors other than culture on plant naming. The Yi people in Xiaoliangshan and those in the Daliangshan belong to the same ethnic group, but their living environments differ. In this study, the plants referred to by similar plant names in two places were analyzed. The reason for this result may not only be related to culture, because the cultural origin of the Yi people in the two places is the same. This also explains why there are many the same words in the names of plants in these two places.

The Yi people of Xiaoliangshan immigrated from Daliangshan about 200 years ago [28, 29, 31]. Elderly people of Yi nationality in Xiaoliangshan will trace their family tree back to Daliangshan, and some families of Yi people in Xiaoliangshan still maintain marriage relations with Yi people in Daliangshan. Therefore, in this large-scale family migration and intermarriage, the Xiaoliangshan Yi people retain many of the original living habits of their parents. In the end, this traditional plant name was passed down through generations. However, the differences in geographical environment and the influence of other cultures may also cause some changes in plant names by their exploitation of the local flora for living.

The relationship between folk nomenclature of plant species in Yi communities and biodiversity conservation

Hengduan Mountains is a global diversity hotspot [65]. But accelerated urbanisation progress has resulted in a severe loss of biodiversity within this region [66]. 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 [67]. 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 [68]. Therefore, as an important part of ethnic and cultural diversity, folk botanical nomenclature is extremely relevant in biodiversity conservation practices [69]. 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 [70]. 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 [71]. For example, studies have shown that biodiversity and cultural diversity overlap in their geographical distribution [72, 73].

For the Yi people in Xiaoliangshan, folk botanical nomenclature 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.

First, the Yi people often use monosyllable names with non-binomial structures to name plants that are essential in their daily lives. Moreover, the Yi people often worship and protect plants with such names. For example, bamboo is often used to make ancestral spirit bamboo cards in the life of Yi people in Xiaoliangshan. It is the physical substance worshipped by the ancestors of the Yi people in Xiaoliangshan, and it is often given a sacred meaning. For example, bamboo
is worshipped in daily life and cannot be destroyed at will. (pine trees) and (fir trees) are also very important plants in the life of the Yi people. The Yi people often live at high mountains with lush fir trees when choosing residential areas. They often gather on the edge of fir forests and regard the dense fir forests as a place where gods live. If people break into the fir forest at will and disturb the gods, they will be punished by the gods. Therefore, fir represents the homeland of the gods believed by the Yi people and has a sacred meaning. Interestingly, when an old man from the Yi ethnic group in Xiaoliangshan said that he was about to die, he would say: "I am waiting for a tree", which means "I am a dying person, and I just want to find a tree to cremate myself". The Yi people often choose fir trees and pine trees for cremation. These plants with monosyllable names are generally sacred in the life of the Yi people in Xiaoliangshan and cannot be destroyed.

Second, the plant names of the Yi people in Xiaoliangshan also directly reflect the worship of plants. The Yi people in Xiaoliangshan often believe that many plants have the attributes of "god" and are gifts given to patients by "god". If someone collects such plants as commodities for sale, or collects too much, the collector will be punished by the "god". The typical characteristics of these plants are the names that often have "deterrence", such as *Lonicera calcarata* Hemsl., *Lithocarpus cleistocarpus* (Seem.) Rehder & E.H. Wilson) and *Pinus yunnanensis* Franch.). Their meanings are "The Queen of the Tree", "The Alpine Tree King", and "The Spiritual Grass" respectively.

In addition, the Xiaoliangshan Yi people usually protect and reasonably use some plants with "y" in their names. Such plants are usually tall trees, these plants are easy to distinguish in the folk botanical nomenclature. The main source of fuel needed by the Yi people in Xiaoliangshan is firewood, and every household has a firepit. The daily cooking, sacrifices, weddings, and other important activities of the Yi people all revolve around the fire pond. The fuelwood is an indispensable and important source of fuel supply for firepits. Therefore, the Yi people often collect plants such as *Lithocarpus cleistocarpus* (Seem.) Rehder & E.H. Wilson) and *Pinus yunnanensis* Franch.) as fuelwood.

When collecting firewood, the Yi people collect the branches of plants and will not cut down the entire tree under normal circumstances. However, during cremation ceremonies, building houses, etc., they will have to cut down the entire tree. At this time, the Yi people usually take off some branches of the felled trees and graft them on the stakes of the felled trees. In addition, they will use soil and moss to cover the "wounds" of the stumps.

In general, the folk botanical nomenclature of the Yi people in Xiaoliangshan contains an appreciation of nature and plant biodiversity, which greatly promotes the local Yi people's awareness of the rational use and protection of biodiversity.

From the perspective of cultural heritage, 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 [74] 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 [75]. Furthermore, under the recent Poverty Alleviation Resettlement policy, many Yi ethnic group members have been relocated from the mountains to urban areas [76]. 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 [77]. 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 [78] 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 ethno-botanical 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 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 [79]. 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.

Conclusions
This study used ethnobotany research methods to document the indigenous plant nomenclature of 226 locally used plant species belonging to 178 genera and 107 families. 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 nomenclature used by the Yi people in Xiaoliangshan usually uses binomial or non-binomial structure names to name the most important plants in their daily lives. At the same time, the plants with “y” in the name and “divine attributes” must be rationally used in the daily life of the Yi people and cannot be destroyed arbitrarily. 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.

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Authors’ contributions
Y.-H.W. organized the study team and provided technical support and guidance. Y.-H.W., Y.Z., and Y.-W.A.D. designed and executed the research plan. Y.-W.A.D. recorded and organized the data and wrote the manuscript. Y.-W.A.D., X.-Y.D., and C.-A.G. 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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Availability of data and materials
Please contact author for data requests.

Declarations

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.

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