Access and Benefit-Sharing in the Context of Ethnobotanical Research

Is the Creation of a Medicinal Plant Garden an Appropriate Means?

A Field Study from Shaxi, Northwest Yunnan, China



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Front cover (from left to right): *Drosera peltata*, a local medicinal plant species; visitors at the opening ceremony of the Shaxi Medicinal Plant Garden; scene from the weekly market in Shaxi.

Table of contents

Abstract

The Convention on Biological Diversity (CBD) demands the sustainable use of natural resources as well as the fair and equitable sharing of benefits derived from their utilization. This is of particular importance to developing nations and local and indigenous communities, which are economically poor but rich in natural resources. While the Bonn Guidelines and the Nagoya Protocol provided some clarity on access and benefit-sharing (ABS) issues, specific recommendations for the implementation of the ABS provisions are still limited. This is particularly the case for ethnobotanical research, where natural resources and the associated traditional knowledge are used, but the researchers do not obtain direct financial benefits from the utilization. The aim of this thesis was to investigate whether the creation of a medicinal plant garden can be considered an appropriate means of implementing ABS in the context of ethnobotanical research, particularly under the specific conditions of the research area in Shaxi, Northwest Yunnan, China. Previous ethnobotanical research had been conducted in the area and showed the desire of some local people for such a garden. Through interviews with a total of 159 interviewees, the opinions of a broader local public and of tourists on such a project were examined and data required for the planning and implementation of the project gathered. Background information was collected on common local ailments and herbal remedies used, on medicinal plants locally used, on local ways of classifying soils and vegetation types, and on local concepts related to gardening. Further, local preference rankings for the garden's location and the plants for cultivation were compiled, through paired comparison and pile sorting tasks.

The results showed that the idea of a medicinal plant garden, for the combined purpose of medicinal plant usage, leisure, and learning, is popular with both local people and tourists. A total of 288 locally known medicinal plant species were recorded, 45 of which are also traded on the local market. Seven species are also commercially cultivated in Shaxi and particularly *Erigeron breviscapus* and *Paris polyphylla* have potential to become established as crops. This could also help preserving the wild populations of these plants.

Using the obtained information, the medicinal plant garden was designed and created, incorporating local ideas, such as water features decorated with rocks and the use of leaf litter as slow release fertilizer. A local caretaker was found, based on criteria considered important by the local public, and his ideas and advises were incorporated throughout the project. A total of 122 species of medicinal plants are cultivated and signs throughout the garden provide detailed information for visitors. The garden was imbedded in the local community through introducing the garden and the ideas behind it to both individuals and institutions. Through a focus on school children the awareness for the variety and value of the botanical heritage is hoped to increase, particularly in the younger generation. Connections of the garden to tourism were established, as the monetary contributions from tourists were seen as a way of making the garden financially self-sustainable.

Comparisons with similar projects showed that achieving sustainability is a key issue difficult to solve. Therefore, the people planning and implementing such a garden should be well aware of the local circumstances and conditions. Respecting local customs and including the local community from the beginning can be regarded essential for such a project. Further, adequate provisions for the upkeep of the garden need to be made. If properly implemented, the creation of an ethnobotanical garden can be a good means of benefit-sharing for ethnobotanical projects, as it makes the traditional knowledge available to a broader public in a lively fashion. Through an increased awareness and utilization of such traditional knowledge, an ethnobotanical garden can further contribute to poverty eradication and environmental sustainability.

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1. Introduction

1.1. The Convention on Biological Diversity (CBD) and access and benefit-sharing (ABS)

The Convention on Biological Diversity (CBD) had the fair sharing of benefits arising from the utilization of genetic resources as one of its main goals. This idea, however, proved difficult to implement. Thus, the Bonn Guidelines and the Nagoya Protocol were formulated in order to facilitate this implementation process. However, there remains a considerable amount of open questions and issues. The following pages give an overview of the CBD's content and the subsequent two treaties on access and benefit-sharing (ABS), with a focus on the aspects relevant for ethnobotanical research. Further, an overview of possibilities for implementing access and benefit-sharing in the context of ethnobotany is given.

1.1.1. The Convention on Biological Diversity

The CBD was formulated in 1992 at the United Nations Conference on Environment and Development in Rio de Janeiro ("The Rio Earth Summit"), as a legally binding document for the signing parties (CBD, 2002). Its main objectives are:

1. The conservation of biological diversity.
2. The sustainable use of the world's natural resources.
3. The fair and equitable sharing of benefits deriving from the utilization of genetic resources. (Literally taken from UN, 1992: 3)

Besides recognizing the importance of the world's biodiversity, the CBD also established that biological resources – just like mineral resources – belong to the country in which they occur. Thus it recognizes "each state's sovereign rights over their own biological resources" (UN, 1992: 1). The following articles of the CBD deal with ABS and/or contain content relevant for research in ethnobotany.
In Article 15 (Access to genetic resources), the treaty establishes that access to biological resources should be facilitated, as long as the reasons for demanding access are in accordance with the objectives of the convention. It provides that all access granted shall be on mutually agreed terms (MAT) and subject to prior informed consent (PIC) of the providers of genetic resources. It further requests the establishment of measures for the sharing of the results of research and the benefits arising from the utilization of genetic resources with the providers of such resources.
In Article 8 (j) (Traditional knowledge) it is specified, that the rules of the convention do not only apply to genetic resources themselves, but also to the associated traditional knowledge held by indigenous and local communities. And that such knowledge should be respected, preserved and maintained (if relevant to the conservation and sustainable use of biological resources). This article also demands the adequate sharing of benefits arising from the utilization of such knowledge with the legal owners of such intellectual property.
Article 17 (Exchange of knowledge) requests the repatriation of the results of scientific research, including on traditional knowledge.
Article 19 (Handling of biotechnology and distribution of its benefits) requires that priority access to the results and benefits of biotechnological research is given to the legal owners of the genetic material upon which the research was based.
The CBD represents the first legally binding international treaty addressing these aspects. However, considering the open formulation of many points, it remained difficult for stakeholders to make legal claims. Subsequently working groups on important aspects,

including ABS, were established in order to clarify unsolved issues. In regard to ABS the results were first the voluntary Bonn Guidelines and later the legally binding Nagoya Protocol, both of which are described in the following.

1.1.2. The Bonn Guidelines (BGLs)

The Bonn Guidelines on Access to Genetic Resources and Fair and Equitable Sharing of Benefits Arising out of their Utilization were adopted by the Conference of Parties (COP) to the Convention on Biological Diversity at its sixth meeting in 2002. The BGLs provide a "transparent framework to facilitate access to genetic resources and ensure fair and equitable sharing of benefits" (CBD, 2002: 3). Non-commercial benefits from biological resources and associated traditional knowledge are specifically included in the guidelines scope (ibid.).
The BGLs mainly focus on contractual agreements; the establishment of national authorities and strategies; the compliance to requirements regarding PIC and MAT; as well as capacity-building, particularly in developing countries and among indigenous and local communities, to ensure the understanding and implementation of the access and benefit-sharing regime.
Regarding the mechanisms for benefit sharing, the BGLs state, that such mechanisms need to be flexible and adjusted on case-to-case basis depending on "the type of benefits, the specific conditions in the country, and the stakeholders involved"(CBD, 2002: 15).
Benefits should be adequately shared among all the stakeholders involved, including academic institutions and local communities, and should be "directed in such a way as to promote conservation and sustainable use of biological diversity"(CBD, 2002: 14). A list of possible non-monetary benefits is given and includes several points, which may be applicable to scientific research projects:

- Sharing of results of research on biological resources and associated traditional knowledge. And providing access to scientific information related to the conservation and sustainable use of biodiversity, including biological inventories and taxonomic studies.
- Contributions to education and training in the research area.
- Contributions to the local economy.
- Research directed towards priority needs, such as health and food security, of the local communities in the research area, with a focus on domestic uses of genetic resources. (from CBD, 2002; slightly modified)

The BGLs represent a good step in the evolutionary process of identifying appropriate means for implementing the ideas and requirements formulated in the CBD. However, their voluntary nature meant that legal certainty was still lacking for the relevant stakeholders.

1.1.3. The Nagoya Protocol

Building upon the Bonn Guidelines and experience with these, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization was formulated and, in 2010, adopted at the tenth meeting of the COP. Many points of the BGLs are reaffirmed; a key difference is that the Nagoya Protocol is legally binding for its parties.
The protocol recognizes the "interrelationship between genetic resources and traditional knowledge" (CBD, 2011: 3) as well as the importance of such knowledge for the objectives of the CBD. It thus aims at strengthening the ability of local communities to benefit from the

utilization[1] of their knowledge on biological resources. Increasing the public awareness of the economic value of biodiversity and the equitable sharing of this value with local communities are seen as key incentives for the conservation of biodiversity and the sustainable use of biological resources. Through these means ABS is also considered to have great potential for poverty eradication and ensuring environmental sustainability.
The protocol requires that implementations of the ABS regime be in accordance to "local communities' customary law, community protocols and procedures, as applicable" (CBD, 2011: 9). It further calls for measures for raising the awareness of the importance of biodiversity and related ABS issues, particularly through the involvement of indigenous and local communities in the implementation of ABS provisions (ibid.).
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1.1.4. ABS implementations

Despite providing a good framework, the Bonn Guidelines' and the Nagoya Protocol's advises for the adequate implementation of ABS provisions remain vaguely formulated. This is particularly the case, for the implementation in the context of basic ethnobotanical research, where no direct financial benefit is gained from the biological resources or associated traditional knowledge present in the research area. However, considering that ethnobotany explores the dynamic interactions between people and plants (Martin, 2004: xx) and the importance that traditional knowledge (TK) plays for this scientific discipline (Clément, 1998), the ABS regime seems particularly relevant for ethnobotanical studies. So far, the majority of implementations have been limited to states stacking their claims on the biological resources of their country and bilateral and multilateral agreements (a comprehensive overview is given by Lesser (1998)). These agreements usually simply settle, under what conditions scientists and companies may access the respective countries' biological resources and what sort of provisions they need to be made. Specific recommendations on how the benefit-sharing provisions of the CBD could be implemented in practical projects are generally lacking. This is particularly so, for cases in which not a state but local or indigenous communities are the legal owners of biological resources and in which traditional knowledge plays a key role in the conducted research. For bioprospecting undertakings, in which a direct financial benefit is gained, Huft (2002) provides a good description of different options for financially compensating the legal owners of the genetic resources, such as setting up contracts and legal entities to provide certainty for all the stakeholders involved. Stephenson (2002) suggests investments into the local infrastructure, health care system, educational system, or the creation of medicinal plant nurseries for endangered or over-harvested species as possibilities for compensating local communities. However, this as well as the majority of other literature on the topic focuses on benefit-sharing in the context of bioprospecting. In regard to ethnoscientific research, conservation, and community development, Martin summarized the various goals of benefit-sharing projects:

- Return of the research results to host communities;
- Strengthening traditional systems of agricultural production;
- Encouraging rational use of plants in health care; and
- Promoting traditional ecological knowledge. (Literally taken from Martin, 2004: 224)

He further provides an overview of how these goals can be achieved and thus the benefit-sharing ideas of the CBD implemented. These include:

[1] It is specifically stated in the Nagoya Protocol that for this protocol utilization includes conducting research on genetic material and associated traditional knowledge.

- Help to set up strategies for the conservation of endangered plants through encouraging their traditional utilization. And further support the development of sustainable marketing strategies of traditional products.
- The *ex-situ* conservation of endangered plants with the ultimate goal of their re-introduction to natural habitats.
- The establishment of community herbaria in order to preserve the local knowledge *in-situ*, help increasing the awareness for such traditional knowledge, and support local initiatives for education in ecology.
- Publishing the results from ethnobotanical research in ways accessible to the host communities, for example through booklets on plant resources, popular newsletters, exhibits of locally used plants, indigenous theater presentations, or community botanical gardens.
- Support initiatives for ecotourism, ideally in a sustainable community based form.
- Support traditional ways of healing and make local people aware, that a continued access to local medical material is dependent on the conservation of natural habitats.
- Support educational programs for the local youth, where they can learn about the traditional ecological knowledge of their community.
- The construction of regional botanical gardens with a focus on useful local plants and education on the value of the associated traditional knowledge. (from Martin, 2004: 224-39; slightly modified)

He also provides an example of such an ethnobotanical garden, in the *Sibundoy Valley* of Colombia. It was established in 1988 to preserve plants used by the local *Kamsa* people as well as their knowledge on these plants. It serves as a place for educating *Kamsa* youth on traditional knowledge and practices of horticulture (ibid.: 230). Another example of how the construction of an ethnobotanical garden can "act as a tool to preserve and promote the knowledge of plants", is given by Innerhofer and Bernhardt (2011). They constructed an ethnobotanical garden on an area of 1.5 ha in the Ecuadorian Amazon, with the goal of providing a platform for the transmission of knowledge particularly on medicinal plants. The planting plan and design of the garden was based on the information gathered from local informants through interviews. The most important aspect considered was the local importance of the respective plants, measured by the results of freelist tasks performed with local informants (Innerhofer and Bernhardt, 2011). Lima et al. (2002) on the other hand constructed medicinal plant gardens as "living pharmacies" in Brazil, with the goal of the actual utilization of the cultivated plant material. They combined the construction with training courses for the local people in order to achieve an increased efficiency of the cultivation and enable the local community to financially benefit from the sale of the medicinal products. While access and benefit-sharing is not specifically mentioned in the context of the described projects, the aims were quite the same as those of the CBD. Most likely, similar projects exist also in other parts of the world, where ethnobotanical research is being conducted; however, little is published about such projects and the lessons learned through the implementation.

1.2. State of research in Northwest Yunnan

This thesis focuses on access and benefit-sharing in the context of ethnobotanical research in Northwest Yunnan. Various ethnobotanical articles on this region have been published (e.g.: Huang et al. (2004) on medicinal plant knowledge of the *Lisu* people in *Nujiang* Prefecture; Pei et al. (1996) on medicinal plants sold on markets in Northwest Yunnan). However, little is known about ABS in the context of these projects. An exception is the *Ludian* Project, which

aims at combining basic with applied research, thus implementing the ABS provisions of the CBD. In the township of *Ludian* (*Lijiang* Prefecture, Northwest Yunnan), an association of local Naxi doctors and political authorities has been closely working together with an ethnobotanical research team from the Kunming Institute of Botany to conserve the local botanical heritage in combination with providing opportunities for sustainable economic development. The project focused on local medicinal plants, as the local people have a heightened interest in these plants, based on their importance for healthcare, financial income and cultural identity. This interest was considered important, as it could provide for a "motivational foundation for conservation" (Pei et al., 2010: 1) among the local population. Besides the documentation of the variety of local medicinal plants, the project at *Ludian* includes several measures for the conservation of medicinal plants and for creating economic opportunities:

- The development of herbal gardens as educational centers and as sources of herbs for local treatments as well as of planting material for cultivation.
- The building of awareness of the botanical heritage through workshops on local medical knowledge and the sustainable collecting of medicinal plants.
- The establishment of Medicinal Plants Conservation Areas (MPCAs), where only specific households are allowed to collect medicinal plants and these only for non-commercial purposes.
- The improvement of marketing opportunities for local medicinal plants, through increasing the access of the local community to market information. Besides holding a workshop on marketing, a computer was provided and two farmers were trained on the use of the internet for receiving the required information. (from Pei et al., 2010; slightly modified)

The *Ludian* Project is unique for China, as it is the first to establish community based protected areas for medicinal plants and a community group, dealing with the conservation of medicinal plants (Pei et al., 2010).
The project described in this thesis took place in Shaxi (*Dali* Prefecture, Northwest Yunnan), where several ethnobotanical studies have been conducted recently. Ineichen (2007) and Weckerle et al. (2009) have focused on the medicinal plant knowledge of the Bai in Shaxi. In the course of these two studies, 190 medicinal plant species, known by the people of Shaxi, were documented. Weckerle et al. (2009) observed a strong influence of mainstream TCM on the local knowledge on herbal medicine. Ineichen (2007) saw a large potential for medicinal plant cultivation in Shaxi. Additionally, Huber et al. (2010) investigated various aspects of locally important non-wood forest products (NWFPs), documenting the particular importance of mushroom collection for the local economy. He concluded that mushroom collection, even at high rates, seems sustainable, in contrast to intense harvesting of wild medicinal plants. Hess (2010) investigated, how Chinese and Western medicine are combined in small clinics in Shaxi. She showed that cold and rheumatism are among the most common reasons for consulting a doctor and that many patients preferred treatment through injections and intravenous drip to decoctions of herbal medicine. Staub (2011) documented 24 plant species, used by the Bai people in Shaxi for ritual purposes, and chemically characterized the volatile smoke compounds of eleven such species, used as incense.

1.3. Research goals

The main goal of this thesis was to investigate whether – and under what circumstances – the creation of a medicinal plant garden can be regarded as an appropriate means of implementing the ABS requirements in the context of ethnobotanical research in Shaxi, Northwest Yunnan. In order to answer this question, the following objectives were pursued:

1. Investigating the feasibility of constructing a medicinal plant garden in Shaxi; including the identification of potential benefits for the local people.
2. Gathering background information related to the project.
3. Designing and constructing a medicinal plant garden.
4. Preliminary evaluation of the project; including an analysis of the approach used.

2. Research area

The practical part of the research for this thesis was conducted in the Shaxi valley in Southwest China. In the following, a description of the local environment, the local people, and their culture and economy is given in order to provide the reader with a context for the rest of this thesis.

2.1. Environment

2.1.1. Geography, geology and climate

The Shaxi valley politically belongs to the *Jianchuan* County, part of the *Dali Bai Autonomous Prefecture* in northwestern Yunnan (fig.1 and fig.2).

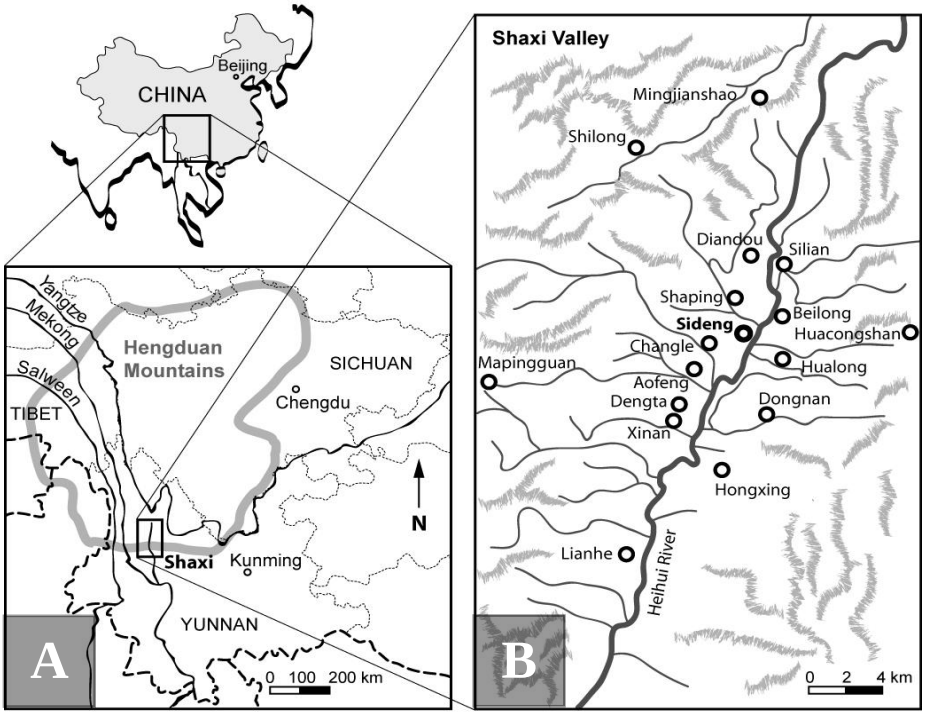

Fig. 1: (A) Map of the location of research area at the Southern edge of the *Hengduan* Mountains in Southwest China. **(B)** Map of the Shaxi Township, showing the main villages. Source: Huber et al. (2010).

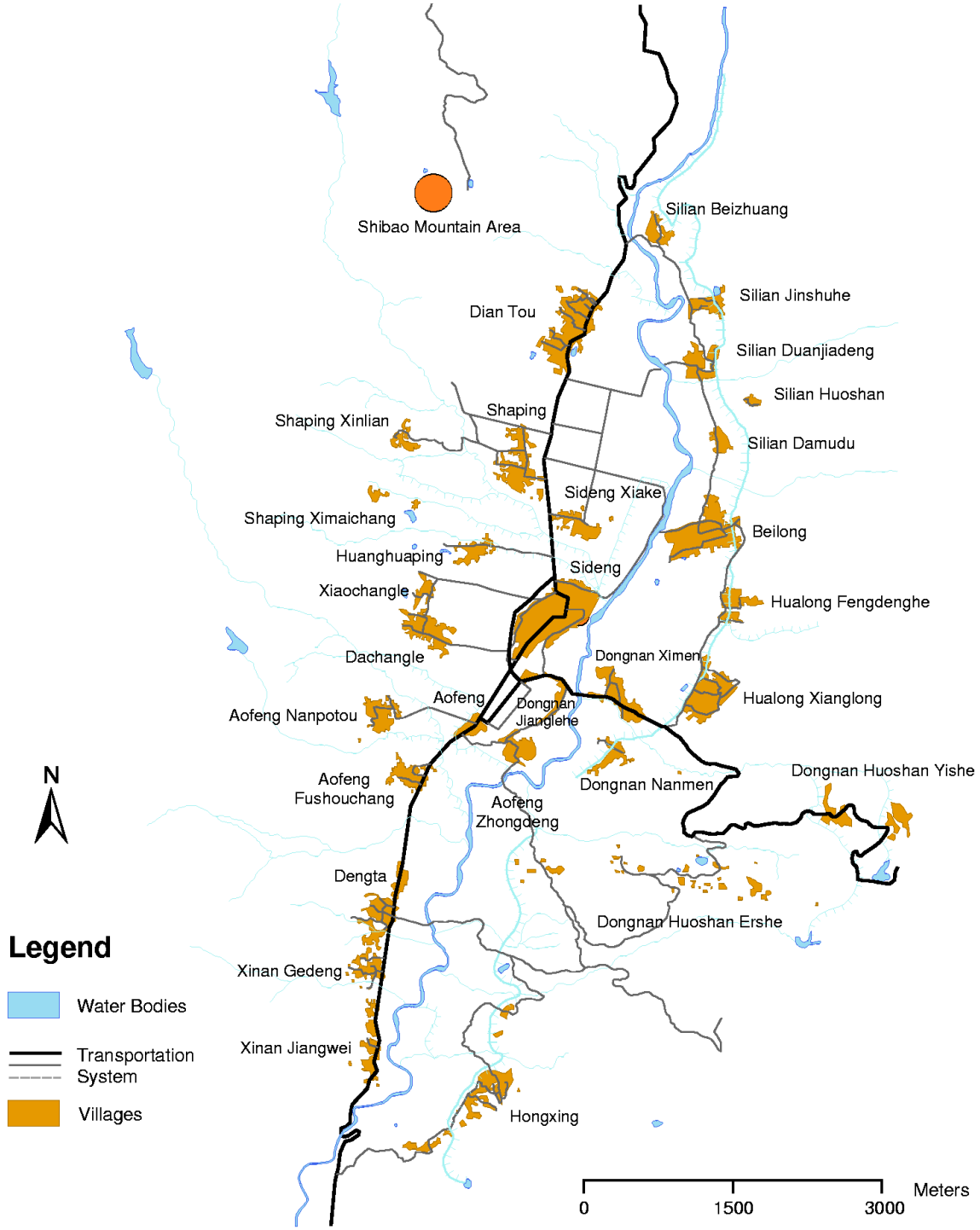

Fig. 2: Detailed map of the Shaxi Valley, showing most of the individual hamlets of the administrative villages. *Sideng* is the capital of the Shaxi Township; *Shibao* Mountain Area is a scenic spot.Source: Bertschi and Junker.

Located at around 26° North and 99.5° East, Shaxi lies at the southern edge of the *Hengduan* Mountains, which – mainly due to its richness in plant species and high degree of endemism – is recognized as one of the world's biodiversity hotspots (Myers et al. 2000). The valley bottom lies at about 2'100 m a.s.l., bordered to the East and West by mountain ranges reaching up to about 3'000 m a.s.l. The *Heihui* river, a tributary of the Mekong, flows through the valley roughly in North-South direction and carries with it large amounts of sandy sediments[2]. The bedrock in the area is mainly sandstone. There are however several locations where calciferous rocks dominate. Thus, soil development can be either on an acidic or alkaline basis, resulting in quite a variety of soil types. The most common soil in the valley bottom is the paddy-soil (an Anthrosol) [3] of the rice fields, which cover almost all available ground. Among natural soils, yellowish-brownish sandy soil (an Alfisol) with few organic particles dominates the slopes of the hills as well as the hilltops. Above calciferous rock, red lateritic clay soil (a Ferallisol) dominates, often intermixed with yellow soil, which has been washed in by erosion. In places where there are sufficient broad-leaved trees and shrubs, humus-rich topsoil is present. This layer is particularly thick in the ravines running down the hills. In places, where the calciferous bedrock gets directly eroded, patches of white limestone soils (a Primarosol) come to the surface. Close to standing bodies of water, bog soils (an Aqueous soil), rich in organic matter, have formed.
Both red and yellow soils are particularly prone to erosion, consequently deep scars in the earth are omnipresent, small landslides common, and the water channels are often blocked by accumulating sediments.
Despite its location in the subtropics, Shaxi's climate is – due to its altitude – temperate with a distinctive monsoon season. The rainy season lasts roughly from June to September, with an annual precipitation of 740-790 mm (Morel and Forster, 2002). The average annual temperature is 12.2°C. While it is fairly mild all year round, night frosts are not uncommon in mid winter and may occur as early as mid October and as late as mid April (ibid.). Snowfalls are very uncommon due to the strong seasonality of the precipitation – the winter month account for less than 5% of the annual precipitation (Vogel et al., 1995). A late start of the rainy season and resulting spring droughts pose a considerable problem for agriculture in the region (ibid.). Similarly, a late end of the monsoon poses equally large problems, as it leads to difficulties related to the rice harvest in October.

2.1.2. Vegetation

The potential natural vegetation of the area is *Pinus yunnanensis* forest (Ni, 2001; fig. 3A)[4]. Indeed this kind of forest is dominant on the dry slopes of the hills, on both yellow and red soil. Probably depending on soil moisture, the pine forest is to varying degrees intermixed with, or replaced by, sclerophyllous forest or scrub, dominated by *Quercus* spp. (fig. 3C). The undergrowth in both kinds of forest is rather sparse. In places where the soil gets too shallow and dry, xeromorphic grasses (particularly *Cymbopogon* cf. *distans*) and "resurrection plants" (*Selaginella pulvinata*) become dominant (fig. 3B). Towards the foot of the hills there is a continuous transition to warm temperate scrub, dominated by sclerophyllous shrubs, such as

[2] The name Shaxi literally means sandy stream.
[3] The classification of soils follows the Genetic Soil Classification of China as in Shi et al. (2002); see Shi et al. (2004) for a discussion of this and a comparison with other classification systems.
[4] The classification of vegetation types loosely follows Li and Walker (1986) and Ni (2001); where considered appropriate, modifications are made.

Ligustrum sempervirens (Franchet) Lingelsheim, *Rhododendron* spp., and *Vaccinium fragile* (fig. 3F).
In the ravines running down the hills, subtropical evergreen broad-leaved forests grow (SEBLFs; fig. 3E), made up of laurophyllous trees and mainly Rhododendrons and *Gaultheria fragrantissima* in the undergrowth. Remnants of these can also be found close to temples and sacred sites[5]. Here, however, hardly any undergrowth is present, indicating that these remnants are probably no longer self-renewing. At an altitude of around 2700 m a.s.l., the SEBLFs are replaced by deciduous broad-leaved forest, where *Populus* spp., *Betula* spp., and deciduous *Quercus* spp. dominate (fig. 3D). This forest is also interspersed with *Pinus yunnanensis*; several species of Rhododendrons are common in the undergrowth. On the hilltops a kind of subalpine grassland dominates between patches of pine forest. The high grazing pressure on these meadows as well as the frequency of cuttings observed in the forests indicates that these are, at least partially, of anthropogenic nature. Along the *Heihui* River, stands of poplars (*Populus* spp.) and willows (*Salix* spp.) predominate. Among the fields a variety of habitats can be found: aquatic environments of the irrigation channels; herbaceous vegetation with a high degree of physical stress on the ridges between the rice fields and on roadsides; and habitats for little shrubs, their undergrowth and climbers among the hedges. In the villages, plants are either found in gardens or on roadsides and on wasteland. Eucalypts (*Eucalyptus* spp.) and cypresses *(Cupressus* spp.) are commonly planted along roads. Pools of standing water and wastewater ditches also offer aquatic habitats.
All of the described habitats show clear signs of anthropogenic influences: grazing of livestock; logging for firewood and construction material; digging of soil for construction material; paths for transportation and mushroom collecting etc. Particularly logging and grazing activities clearly increase the erosion of the already fragile soil (SRP, 2009).

[5] According to Tang (2010) this is often the case in Yunnan.

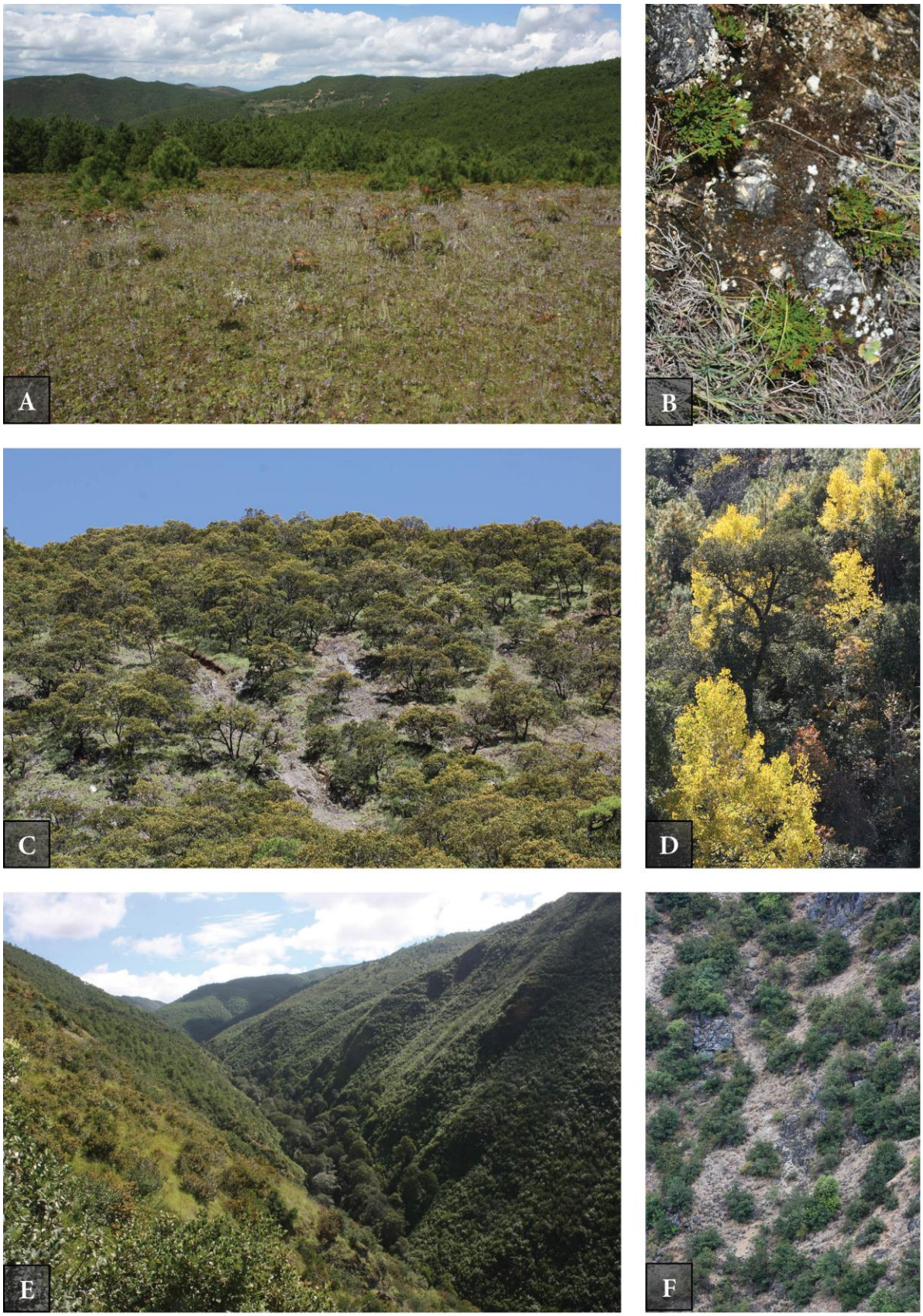

Fig. 3: Vegetation. **(A)** Subalpine meadow in the foreground and *Pinus yunnanesis* forest in the background **(B)** Resurrection plants and xeromorphic grasses on shallow soil **(C)** Evergreen oak forest **(D)** Deciduous broad-leaved forest **(E)** Evergreen broad-leaved forest in the bottom of a ravine **(F)** Sclerophyllous scrub at the foot of the hills

2.2. People

The province of Yunnan is home to 26 different ethnic groups (following the official definitions and numbers of the People's Republic of China). Members of seven of these currently live in the Shaxi valley. Additionally, Shaxi had been part of an interregional trade route for a long time. This combination of cultural diversity and intercultural exchange together with a high biological diversity, may partly explain the rich traditional knowledge on medicinal plants observed in the Shaxi valley. Nowadays, Shaxi is a rather remote mountain valley, with its inhabitants mainly relying on subsistence farming. In the following, an introduction to the valley's history, its ethnic groups and their religious beliefs and traditions, as well as its economy and medical system is given.

2.2.1. Ethnic groups

The Shaxi valley comprises 14 administrative villages (most of which consist of several hamlets) with a total of about 22'900 inhabitants. Of these, 85% are ethnic Bai, 11% Han, 2.5% Yi, and 1.5% Lisu (Huber et al., 2010). Further, a few Hui, Naxi and Tibetans live in the valley. Below, a short description of the members of the Bai, Han, Lisu and Yi nationalities is given, while the rest of this thesis mainly focuses on the Bai as the local majority.

The Bai

Around 1.6 million people are officially recognized as being ethnic Bai (Xiao, 2003). The majority of these live in the *Dali Bai Autonomous Prefecture*, but around 20% reside in neighboring prefectures of the Yunnan Province and in the adjacent provinces of Sichuan and Guizhou (Ma, 1989: 249). In principle, there are three defining characters of the Bai nationality: the Bai language, the *Benzhu* Cult (see below), and the fact that the Bai people eat raw pork (Schmitt, 2007); this latter point was, however, never observed in Shaxi. The Bai language is something rather special itself. While Fitzgerald (1941: 14) distinguished three different kinds of linguistic elements: non-Sinitic polysyllabic elements, words resembling ancient Chinese, and loan words from modern Yunnanese Mandarin; the origin of the language remains highly debated among linguists today. Thurgood (2003) considers it an unclassified Sino-Tibetan language due to its similarities and links to both the Sinitic and the Tibeto-Burman subgroups. While this makes linguistic and ethnic classification difficult, it bears strong evidence for a long tradition of contacts between other cultures and the Bai people as well as of cultural exchange (ibid.). This cultural exchange is further exemplified by the fact that some people in Shaxi, despite considering themselves Bai, are aware and proud of having Han ancestors. They claimed that their ancestors migrated from the Southeast Chinese Province Jiangsu in the early Ming Dynasty (1368-1744 CE)[6]. This immigration most likely had influences on the local language as well. Further, the lack of a Bai script may explain the presence of a large number of loan words from Chinese. In addition, the success Bai people had at the official exams at the Chinese Imperial court[7] shows a long history of learning in Han Chinese. Wiersma (2003) distinguishes between two branches of the Bai language: the *Dali Bai*, and the *Jianchuan Bai*, the latter of which she considers to be the more original of the two dialects. This differentiation is also made by many Bai people

[6] Fitzgerald (1941: 68) and Schmitt (2007) confirm that in the early Ming Dynasty, large-scale migrations of Southeast Chinese soldiers into the *Dali* area occurred and had lasting effects on the local culture and administration.

[7] Evidenced by historical documents (Wiersma, 2003) and the large number of so called *Kuixingge*, special towers that a village was allowed to construct after a member of their community had passed the Imperial exams, in Shaxi (fig. 4B).

themselves; both in the *Dali* and in the *Jianchuan* area, people often claimed to have difficulties understanding people from the respective other area and in addition claimed cultural differences. Besides these two groups, some people in the region saw the "Mountain Bai" (*Shanbai*) as a third group, not so much because of linguistic but rather because of cultural differences. They live at the margins of the Bai territory and, in contrast to the majority of the Bai people in the *Dali Bai Autonomous Prefecture*, they do not inhabit the fertile valley floors, where wet-rice cultivation is possible. They rather reside in the hills and consequently grow potatoes, and other crops less sensitive to colder temperatures, as the valley bottom is inhabited by the locally dominant ethnic groups, mainly the Naxi to the North. Further, the *Shanbai* often lack the financial resources to construct their houses in the style considered typical for the Bai people. Such houses usually have a large courtyard, surrounded on three sides by rooms (*fangzi*) and on one side by a large screen wall (*zhaobi*)[8]; hence the name for this kind of a house: *sanfangyizhaobi* (lit.: three rooms one screen wall; fig. 4A). The walls, especially the screen wall, are richly decorated with paintings and poems. Traditionally, the Bai distinguished themselves from other groups through their costume, which, besides being unique to the Bai, also features specific adornments showing the membership to a particular community (Schmitt, 2007). In modern Shaxi, mostly elderly women wear their indigo-blue costume and a black scarf as a headdress (fig. 4D), whereas the younger women usually dress in clothes not peculiar to the Bai. Men were generally not observed wearing any specific Bai costumes.
In Shaxi, the Bai are the dominant ethnicity, not only demographically, but also culturally and economically. With the exception of one village[9], they only live in the flat and fertile valley bottom, where the center of commerce is situated. Recently their economic dominance is threatened by the immigration of comparably rich Han Chinese, who buy land and rent houses to create hotels and restaurants catering for the increasing number of tourists. A certain uneasiness regarding this situation was felt among the local population during the time of research.

The Han

The Han are the ethnic majority of China and makeup the majority even in the *Dali Bai Autonomous Prefecture* (Schmitt, 2007). While in Shaxi the proportion of Han Chinese is rather low, almost all aspects of life and culture show Han influences. This may be partly explained by the length of time Shaxi has been part of the Chinese empire. Basically there have been three waves of migration of Han Chinese into the Shaxi area. At the beginning of the Ming Dynasty (after 1368 CE), troops from Southeast China had been stationed in the area (ibid.). These have intermarried with local families and culturally adapted to a degree, that they now consider themselves – and are considered by other Bai people – Bai. They also speak Bai rather than Han at home and see that as the main reason for being Bai.
Due to rapid increases in population in the Chinese heartland, the administration of the Qing Dynasty urged Han Chinese to settle at the periphery of the empire in the 18th century (ibid.). This was most likely the time when the Han Chinese living in the hills surrounding the Shaxi valley immigrated. Most of them claim Sichuanese descent, and claim to have lived in Shaxi for over ten generations. The largest Han communities are the villages of *Hongxing* and *Huoshan*, located about halfway up the hills. Additionally, there are some small Han settlements on the high plains. Due to the higher altitude, rice is only seldom grown in the Han villages, the main crops being corn and tobacco. The houses' architecture is very similar

[8] Ideally this screen wall is on the Eastern side of the house, so the light and warmth of the afternoon sun is reflected into the courtyard.
[9] The village *Mapingguan*, which had become comparably rich due to the trade with locally mined salt, is inhabited by Bai people despite its location high up in the Western hills.

to that in the Bai villages, however, lacking the rich decorations and the screen walls. While much of the culture seems quite similar to the Bai in the valley bottom, *Benzhu* temples (see below) are absent, the festivals *Huobajie* and *Taizihui* (see below) are not celebrated, and the women do not wear the blue dress of the Bai.
The third wave of Han Chinese migrating to Shaxi is a very recent one. With the beginning of the *Shaxi Rehabilitation Project*, more and more tourists have found their way into the valley. Attracted by the financial opportunities and the tranquil life, an increasing amount of people from large Chinese cities has come to Shaxi to invest into tourism and other businesses. Virtually all of these live in Shaxi's capital *Sideng*. Their influence on the local culture has yet to show.

The Lisu

Around 575'000 Lisu live in the provinces Yunnan and Sichuan; the majority of these in the *Nujiang Lisu Autonomous Prefecture* to the West of Shaxi (Xiao, 2003). The Lisu language belongs to the Yi (Lolo) branch of the Tibeto-Burman language family (Thurgood, 2003). The orthographies for the Lisu language, developed in the 20th century, are hardly used by the Lisu people themselves (Bradley, 2003). The Lisu in Shaxi live in scattered settlements on the hills, yet not on the wide plains on the hilltops. They cultivate mostly corn and potatoes; have a limited amount of livestock and usually large orchards. They lack a strong connection to the land they live on and do not consider this their real home. Most families have lived in Shaxi for several generations yet would immediately move on if attractive financial opportunities would open up elsewhere. Temples of any sort are lacking in Lisu villages and the questioned villagers do not consider themselves religious. In Shaxi, neither the men nor the women wear any traditional costumes. A Lisu dancing group from *Shilong*, commonly performs traditional dances, their dresses were however sponsored for this purpose by the local government and are not worn by the women, besides for these performances.

The Yi

The Yi are the largest minority group in Southwest China, its 6'578'500 members being spread over the provinces Guangxi, Guizhou, Sichuan and Yunnan (Ma, 1989: 233). The people officially considered to be Yi form an extremely heterogeneous group of different ethnicities with several different languages (Thurgood, 2003). Some older Yi in Shaxi are still able to write a Yi script, this is, however, not taught in the schools. The Yi in Shaxi live on the grasslands on top of the hills to the East and West of the valley. They cultivate mainly potatoes and usually have quite extensive herds of livestock, mainly goats and sheep but also cows. Their villages lack any traditional architecture and temples. Some local Bai people claim, that there are Shamans in the Yi villages; however, no evidence for this was observed. The Yi women have a colorful traditional costume (fig. 4F), which is also worn by younger women. The Yi are known for celebrating *Huobajie* in a particularly lively way, different from the Bai, not in a village, but on a mountain. Just like the Lisu, the Yi have been in Shaxi for several generations and are not sure when exactly their ancestors have immigrated and from where.

Fig. 4: Culture and economy **(A)** A traditional screen wall (*zhaobi*) at the eastern side of a courtyard **(B)** A *Kuixingge* in the village *Silian*; now used as a guesthouse for tourists **(C)** *The* three main crops: tobacco in the foreground, corn in the center and rice fields in the background **(D)** Bai woman in a traditional costume **(E)** Elderly woman bringing out manure on the field **(F)** Yi woman in traditional costume

2.2.2. History

The earliest traces of human presence in Shaxi have been dated back to 1240-1060 BCE (SRP, 2009). Among these are bronze artifacts from northeastern Yunnan, as well as seashells. These findings indicate the existence of trade connections going through Shaxi as early as 3'000 years ago. By 100 BCE or earlier, a trade route running through this part of Yunnan connected central China to India, which most likely had quite an impact on the cultural development, also of the Shaxi valley (Feola, 2007; SRP, 2009).
Around the sixth century CE, a flourishing trade of tea from southern Yunnan and horses from the Tibetan plateau developed along an extensive network of trade routes. This "Tea and Horse Caravan Trail" connected the tea growing regions of *Xishuangbanna* with the Tibetan capital Lhasa about 3'500 km away. Due to its extension into central China, India and Southeast Asia, these trade routes are also referred to as the "Southern Silk Road"[10] (SRP, 2009).
By the time the independent *Nanzhao* kingdom was established in the *Erhai* region in 738 CE – arguably by the ancestors of the present-day Bai people (Schmitt, 2007) –, Shaxi was already an important stop on this trade route (Feola, 2007). Besides providing a sheltered stopover for the caravans, Shaxi was also the source of an important trade commodity: salt. This highly priced good was mined in several locations in the area and Shaxi was the place, where the miners could sell it to the tradesmen (SRP, 2009).
Along with the material trade came influences from far-off cultures. The most obvious of these was religion, mainly in the form of Buddhism, which eventually became the state religion of the *Nanzhao* kingdom (Feola, 2007). The role of Buddhism was so strong that a unique esoteric sect, known as *Azhali*[11] Buddhism, formed during these times. The bodhisattva *Avalokiteshvara*, in China often referred to as the goddess of mercy, *Guanyin*, rose to particular importance in this sect and soon became the principal object of Buddhist veneration in the *Nanzhao* kingdom[12] (Schmitt, 2007). The stone carvings of *Shibaoshan*[13] spectacularly demonstrate the importance of Buddhism as well as Shaxi's economic and cultural prosperity during that time.
After Mongol forces conquered the area in 1253 CE and later included it into the Yuan Dynasty (1271-1368 CE), Shaxi remained part of the Chinese empire until its fall in 1911. During the Ming (1368-1744 CE) and Qing (1644-1912 CE) Dynasties, Shaxi continued to prosper, both economically and culturally. *Sideng* became the main town of the valley and its official market place. A large theater was built to entertain the local people as well as the travelling merchants. The *Xingjiao* temple was constructed to fulfill their spiritual needs. Local guesthouses flourished and local entrepreneurs established themselves as regional merchants (Feola, 2007; Katzen, 2002).
The construction of motor roads throughout Yunnan diminished Shaxi's importance as a stopover and marketplace along a no longer existent trade route. From then on, it was a remote mountain valley, with few opportunities for economic development. During the course

[10] There are several ancient trade routes referred to as "Southern Silk Road", thus the term "Tea and Horse Caravan Trail" is used in this thesis to avoid misunderstandings.
[11] *Azhali* Buddhism is a form of *tantrism*, that, although in many ways related to Tibetan *Vajrayana* Buddhism (Feola, 2007), represents a unique sect, different from other esoteric sects in Asia mainly because of the existence of married ritual specialists (*Azhalis*), who passed their religious expertise down from father to son (McRae, 1995).
[12] This prominence of *Guanyin* is, however, widespread throughout most of central China.
[13] *Shibaoshan* (lit.: stone-treasure-mountain) is an important culture-historical monument, located halfway between *Jianchuan* and *Sideng*. It is a mountainous area, comprising several large temple compounds as well as a number of very well preserved religious stone carvings, originating from the era of the *Nanzhao* and subsequent *Dali* kingdoms.

of the *Cultural Revolution*, much of Shaxi's rich cultural and architectural heritage was destroyed (Katzen, 2002). Due to the stagnant economy, much of what was left fell into dismay.
This lead to the World Monument Fund's decision to place the *Sideng* market square on the *List of the World's 100 Most Endangered Sites* in 2001. Inspired by this decision, the *Shaxi Rehabilitation Project* (SRP) was founded by experts from the ETH Zurich together with the local government and with the help of the *Swiss Agency for Develoment and Cooperation*. The project was initiated with the aims of preserving Shaxi's cultural and architectural heritage as well as supporting the valley's sustainable development. It comprises six main components:

1. Shaxi historic marketplace restoration
2. *Sideng* historical village preservation and development
3. Sustainable development of the Shaxi valley
4. Ecological sanitation and waste management
5. Poverty alleviation and local culture preservation
6. Dissemination of lessons learned (literally taken from SRP, 2009: 2)

Since the start of the project, increasing numbers of tourists have found their way to Shaxi. This and other outcomes of the project could be beneficial to the local economy and improve the quality of life of the local people. Katzen (2002) did however point out, that the project could also have considerable negative impacts in the future, particularly the degradation of the local culture.

2.2.3. Economy

The majority (90%) of families in Shaxi rely on agriculture for their primary income. Considering however, that most of the farming is for subsistence, the actual income (around 1'000 CNY[14] per capita and year) is low even for Chinese standards (SRP, 2009). Morel and Forster (2002) showed that the income from farming alone would not even be enough to provide for basic costs of living. Therefore, almost all families have a source of auxiliary income. Thus the annual household income for people living in the valley bottom ranges from 4'000 to 55'000 CNY. For the inhabitants of the villages on the hilltops side jobs are more difficult to find, thus the annual household income is significantly lower (2'500-15'000 CNY; Huber et al. 2010). Particularly for these poorer families, the collection of non-wood forest products (mainly mushrooms but also herbal medicine and wild food plants) plays a considerable role as an additional source of income (ibid.). While in *Sideng* 15% of the working poulation work in the second and third sector each (Morel and Forster, 2002) non-agricultural jobs are very rare in the other villages and usually limited to seasonal construction work. Therefore, almost all men between 20 and 40 years find work outside of Shaxi (SRP, 2009). Given however, that these external workers need to pay for their living elsewhere and are usually not very well paid, the contribution of these to Shaxi's economy remains low (ibid.). *Sideng*, the political and economic capital of the Shaxi valley, is virtually the only place where any commercial enterprises can be found. Here, a food processing plant[15], a

[14] Exchange rate at the time of research (15.11.2010): 1 CNY=0.15 USD.
[15] Here the rhizomes of the commercially cultivated plant *Lycopus lucidus* are dried, seasoned and packaged for sale on the local market (mainly to tourists) or for export. The owner is a local entrepreneur from *Aofeng*, who opened the factory without financial support from the local government. Upon inquiry he stated, that he considered modifying the machinery in order to process medicinal products an option, if enough farmers could supply the raw products.

mushroom processing plant, a blacksmith, and a woodcarving workshop can be found, as well as over 50 retail shops (Morel and Forster, 2002), and basically all the hotels and restaurants of the Shaxi valley. Further, the middle school, the hospital and health center, as well as the various offices of the local government provide for a certain amount of employment in the third sector of economy. In the other villages, there are usually just one or two small shops selling basic goods, a primary school and a small clinic. In the villages on the hilltops, not even these can be found[16].
The *Regional Economic Development Strategy* of the SRP sees great economic potential for the cultivation of specialty crops, including special food products as well as herbal medicine, the processing of these specialty crops and mushrooms, and tourism; particularly if these different branches of the local economy are adequately linked (SRP, 2009). Below a more detailed introduction to local agriculture and the tourism industry is given.

Agriculture

An overview of common crops cultivated in Shxi is given in table 1. The majority of the fields in the valley bottom are under wet-rice cultivation (fig. 4C). Due to the altitude, only a single rice harvest per year is possible. The yields (500 kg/*mu*[17]) are above the average for southern China (430 kg/*mu*; Morel and Forster, 2002). During the winter months the fields either lie fallow or are cultivated with barley, broad beans, rapeseed, or wheat. The soil in these paddy fields is among the richest in Shaxi; large efforts are made for adding fertilizer and guaranteeing adequate water supply (fig. 4E). At the foot of the hills the soil quality as well as the water supply decreases. Here, corn and tobacco are grown. Corn as well as winter wheat and barley are mainly used as animal fodder or for distilling alcohol. Tobacco can be regarded as the main cash crop in the valley. Its cultivation is very popular, the total area for the cultivation of tobacco is, however, strictly limited and regulated by the local government in order to ensure that sufficient rice is grown to feed the local population. In between the fields, in home gardens and sometimes on small fields by itself, carrots, chilies, garlic, leak, onions, soybeans, and sunflowers are grown.
In the hills, the climate is too cold for rice cultivation (ibid.); thus, potatoes are the main crop. Potatoes do form the staple for many Lisu and Yi farmers and a surplus is bartered against rice or sold on the weekly market in *Sideng*. Other crops commonly grown on the hilltops include various beans, buckwheat, corn, oat, and rapeseed. Further, the keeping of livestock (goats, pigs and sheep) is more common and the herds larger than in the valley bottom. Cows, however, are more common in the villages in the valley bottom.
Both in the hills and in the valley bottom various specialty crops are cultivated on different scales ranging from several plants in home gardens to large commercial fields. The most important of these are *Colocasia esculenta*, of which both the corms (taro) and the inflorescences are eaten; *Lilium davidii*, of which both the bulbs and the tepals are eaten; *Lycopus lucidus*, the rhizomes of which are eaten locally and processed for export; and *Sagittaria trifolia*, the tuber of which is used as a vegetable. Other specialty crops, such as lotus and Sichuan pepper, are only grown on small scale and sold seasonally.
Additionally, most people have a small to medium sized vegetable garden, in which common vegetables and kitchen herbs are grown.

[16] A partial exception to this is the Yi village *Huacongshan*, which, while belonging to the administrative village *Hualong*, has its own primary school.
[17] A *mu* is a commonly used surface measure in China; 1 *mu* = 1/15 ha.

Table 1: Selection of crops grown in Shaxi.

Cultivated in fields	Cultivated in gardens	Cultivated in orchards
Summer crops	Common vegetables	Apple (*Malus domestica* Borkh.)
Beans (Fabaceae)[2]	Aubergine (*Solanum melongena* L.)	Chestnut (*Castanea mollissima* Blume)
Buckwheat (*Fagopyrum dibotrys*)[2]	Beans (Fabaceae)	Chinese plum (*Prunus mume* Siebold & Zucc.)
Carrot (*Daucus carota* L.)[1]	Broccoli, cabbage, cauliflower (*Brassica oleracea* L. cvv.)	Kaki (*Diospyros kaki* Thunb)
Chili (*Capsicum* spp.)[1]	Cucumber (*Cucumis sativus* L.)	Lotus plum (*D*iospyros *lotus* L)
Corn (*Zea mays* L.)	Pumpkin and squash (*Cucurbita* spp.)	Peach (P*runus persica* (L.) Batsch)
Garlic, leak, and onion (*Allium* spp.)[1]	Radish (*Raphanus sativus* L.)	Pear (*Pyrus* spp.)
Oat (*Avena sativa* L.)[2]	Tomato (*Solanum lycopersicum* L.)	Pomegranate (*Punica granatum*)
Potato (*Solanum tuberosum* L.)[2]	Specialty crops	Walnut (*Juglans regia* L.)
Rice (*Oryza sativa* L.)	*Amorphophallus rivieri*	
Soybean (*Glycine max* (L.) Merr)[1]	*Houttuynia cordata*	
Sunflower (*Helianthus annuus* L.)[1]	Lotus (*Nelumbo nucifera* Gaertn.)	
Winter crops	*Ottelia acuminata* (Gagnep.) Dandy	
Barley (*Hordeum vulgare* L.)	*Pueraria lobata*	
Broad bean (*Vicia faba* L.)	*Sechium edule*	
Rapeseed (*Brassica napus* L.)	Sichuan pepper (*Zanthoxylum* spp.)	
Wheat (*Triticum aestivum* L.)	*Smallanthus sonchifolius*	
Specialty crops	*Stachys sieboldii*	
Colocasia esculenta	Yam (*Dioscorea* sp.)	
Lilium davidii	Kitchen herbs	
Lycopus lucidus	Chinese basil (*Perilla frutescens*)	
Sagittaria trifolia	Coriander (*Coriandrum sativum*)	
Cash crops	Mint (*Mentha* spp.)	
Tobacco (*Nicotiana tabacum* L.)		

[1]Grown in between fields, in home gardens or in small fields by itself. [2]Grown mainly in the hills. The species for which no author is given are further described in following parts of this thesis or in Appendix 1.1.

In home gardens as well as in orchards in the hills various fruit trees are grown. All over the valley, large trees of kakis and lotus plums can be found, the fruits of which are dried, and eaten and sold throughout the winter as a specialty. Due to the sloping land conversion

program of the federal government[18], increasing amounts of chestnut and walnut trees are grown in the hills, which on the one hand protects the hills from erosion and, on the other hand, provides the farmers with a means of gaining an auxiliary income. Recently, the commercial cultivation of medicinal plants plays an increasing role in the Shaxi valley; this is described in detail in the results and discussion part of this thesis.
Due to the fields' small size, limited accessibility, and their location on slopes, as well as limited funds of the farmers, the majority of the agricultural work is manual labor. The strenuous tasks of preparing and fertilizing the soil, sowing, weeding etc. are usually left to the women of the households. Only for transplanting the rice seedlings and harvesting, two tasks, which need to be done as fast as possible once the weather is suitable, the men usually join and even return home if they work outside of Shaxi. Almost all farmers use human feces as well as animal manure as fertilizer for their crops. The manure is usually mixed with straw or pine needles and left for several months before bringing it out on the fields. Nonetheless, considerable amounts of synthetic fertilizer, herbicides and pesticides are used; the means of application observed often do not seem safe for the personal health of the farmers.

Tourism

Due to its cultural heritage, its idyllic farming villages, its tranquil atmosphere and its natural beauty, the Shaxi valley has a large potential for tourism. By 2011, tourist lodging was available in *Sideng* (17 guesthouses and hotels), *Silian* (one guesthouse), *Shaping* (one hotel) and two dormitories in temples of the *Shibaoshan* area. In 2007 a total of 20'000 tourists visited Shaxi; yet, 14'000 of these visited the valley on a daytrip only (SRP, 2009). So far, the majority of tourists visit the following events and locations:

- The old town of *Sideng*, surrounding the market square, including the *Xingjiao* temple and the theater stage, where a museum introduces some basic facts about the local culture.
- The *Shibaoshan* area, particularly the ancient stone carvings in the *Shizhongsi* (lit.: stone bell temple).
- The lively Friday market in *Sideng*, where a large variety of local goods are offered for sale and colorfully dressed Yi women come from the mountains to do their shopping.
- The tranquil environments of *Bailongtan* (lit.: white dragon pool), a small sacred lake with crystal clear water and an adjacent temple dedicated to the dragon king (*longwang*).
- The two local festivals, most strongly enrooted in the local culture: the *taizihui* and *huobajie.*

This does by no means imply that Shaxi's potentials for tourism are fully realized. Additional sites of interest and possible activities, as well as a short analyzes of what would be necessary for realizing theses potentials in a sustainable way is given in Appendix 5.4. If the tourism in Shaxi is better linked to other branches of the local economy, it could become a key engine for the growth of other economic sectors. However, so far a major problem of the tourism in Shaxi is that little of the incoming money actually benefits the local people (SRP, 2009).

[18] This program encourages farmers to abandon land steeper than 25° for agriculture and instead plant trees (Huber et al, 2010). Due to this program the local government in Shaxi supplies farmers with seedlings of chestnut and walnut trees for the symbolic prize of one CNY per seedling.

2.2.4. Medical system

Shaxi's primary health care can be considered relatively good and financially achievable. Besides the public hospital in *Sideng*, there are small clinics in all larger villages. Up to 30% of the medical expenditures are reimbursed, if treatment is sought in such a public clinic or hospital (Hess, 2010). Additionally, most villages in the valley bottom have at least one private doctor or barefoot doctor. Yet, for the inhabitants of the villages situated in the surrounding hills – mostly members of the local ethnic minority groups Lisu and Yi – the situation proofs more difficult. For some there is a distance of around 20 km to the next clinic, which in many cases can only be covered on foot or horseback. Many of these villages do not have a resident doctor either. Also, the local hospital is not well enough equipped to treat complicated cases, for which patients need to be transferred to the prefecture capital *Xiaguan*, a bumpy four hours drive away.

2.2.5. Religion and traditions

Religion and spirituality is omnipresent in Shaxi. Whether it is elderly women, gathering in the temples or burning incense at home; countless shrines at bridges and among the fields; century-old temples hidden in the forests behind the villages or little offerings next to wells and springs. Although members of the younger generation tend to care less about these matters and neglect many beliefs as superstition, they nonetheless actively participate in many traditional festivals. In the following an overview of the common religious beliefs, associated practices, and traditional festivals is given.

<u>The Three Religions</u>

Religious affiliation in China is generally looser than in many other countries. People seldom consider themselves Buddhist or Daoist do, however, nonetheless worship in temples dedicated to these religions, often without making a distinction between "gods" from different belief systems (Fitzgerald, 1941: 89). Thus, the term "China's Three Great Religions" is commonly used to refer conclusively to Buddhism, Confucianism and Daoism[19] and many temples throughout China are dedicated to all three religions. In Shaxi too, one commonly observes statues depicting Confucius or Daoist gods or immortals in principally Buddhist temples or the other way around. As these religions and the associated rituals observed are by no means peculiar to Shaxi, they are not further discussed in this thesis[20].
Ancestor worship, too, is practiced throughout rural China and is loosely associated with both Daoism and Confucianism. In the early 20th century, ancestor worship was practiced daily by the Bai people of *Dali* (Fitzgerald, 1941: 94) and the importance these practices had also in Shaxi are evidenced by the fact, that almost every household owns a shrine reserved for the worship of family ancestors. These are however often in a miserable state of repair and very rarely used today.

<u>*Benzhu* Cult</u>

The *Benzhu* Cult is often considered the religion of the Bai people and used as a defining character of this ethnic group. It is often referred to as "patron god worship", as many of the deities have a connection to local history and each village has its own *Benzhu*, responsible for the village's safety (Schmitt, 2007). In Shaxi, like in other areas inhabited by Bai people (ibid.), every Bai village – and usually even every hamlet – has its own *Benzhu* temple, while

[19] Whether or not religion is the proper term for these is debatable, will however not be discussed in more detail in this thesis.
[20] A detailed description of China's three religions is given by Soothill (1913).

these temples are missing in villages predominantly inhabited by members of a different ethnic group. Each temple has one main deity: the village's *Benzhu*. The *Benzhu* is usually accompanied by other statues, sometimes these are the mythical figures' relatives, sometimes no connection between the different objects of worship is known to the local people – the same is also described by Schmitt (2007) for the *Dali* area. While the villagers do consider their *Benzhus* as protectors of the village, none of the questioned people was aware of links of the patron gods with Shaxi's history[21]. It is noteworthy, that many of the *Benzhus* of the Shaxi valley, have their origin in other religions (e.g.: *daheitianshen*, a deity in several *Benzhu* temples in Shaxi, is the Buddhist *Mahakala* (ibid.); the *Benzhu* of *Sideng* and *Beilong Lijingtianwang* is a known Daoist deity (Stevens, 2001:11); this continuity of *Benzhus* with Buddhist and Daoist deities was also observed by Schmitt (2007). This is also admitted by the worshippers, without them seeing anything strange in this mixing of religions. Another interesting observation is related to the *Chenghuangmiao* (lit.: "Citygod" temple) in *Aofeng*. This temple is visited by people from all of Shaxi's villages and the *Chenghuang* used to preside over all of the valley's *Benzhus*. The original temple however, was converted to a granary in the *Cultural Revolution* and the statue of the main deity was destroyed (Katzen, 2002). The temple is now situated in a much more humble location and the statue was not replaced. Nonetheless, the figure in the central niche, which is generally the most important in Chinese temples (Schmitt, 2007), is still considered to be the highest *Benzhu* of the valley and the temple is still visited for special occasions (e.g.: for the *Spring Festival* and before funerals) by members of all of Shaxi's communities. Remarkably, however, no one questioned on the matter (n=12), not even the couple acting as the temple's custodians, was able – or willing – to provide the deity's name or history.

The rules regarding worship of the villages' *Benzhus* seem far from fixed. On the one hand, in *Hualong* each day a member of a specific family – the schedule for this being fixed by the village government – is required to burn incense, bring offerings and say prayers in the village's *Benzhu* temple, in order to provide for the village's safety and prosperous development. In *Changle*, on the other hand, the *Benzhu* temple is always locked, besides on festival days. Generally, the various *Benzhus* of the Shaxi valley are not worshipped on specific days – as was observed by Schmitt (2007) in the *Dali* area –, but rather in special moments of life to ask for good luck (e.g. before marriage, after childbirth, before the construction of a new house, before harvesting). Every year, one of the valley's *Benzhus* "invites" all other villages for a day[22] of worship and celebration. Usually the *Mamahuis* (a lay religious society, see below) of all the villages in Shaxi, and some from outside the valley, follow this invitation, carrying with them a small statue or plaque, representing the *Benzhu* of their respective village.

Mainly because of the continuities with other religions and the lack of a word for *Benzhu* in the Bai language, Schmitt (2007) comes to the conclusion that the *Benzhu* Cult does not represent a unique religious tradition of the Bai people. Interestingly, this was confirmed by some people in Shaxi, who explained that before the annexation of the area to the Chinese empire, the local Bai people had their own religion. According to these informants this was a sort of animism in which Shamans, similar to the *Dongba* of the Naxi, living to the North of Shaxi, played an important role. The informants do also agree that there was a main god, who was also worshipped in temples. However, no one was able to recall a name of this deity. These informants further stated that when the Chinese Ming Dynasty replaced the Mongol Yuan Dynasty, the Chinese started a massive program for the acculturation of the ethnic

[21] A single exception to this is the *Benzhu* of *Damenduo*, which is *Baijie Wangfu*, the widow of a historic regional king.

[22] Not on a fixed date.

minorities in the empire[23]. As a part of this program, the Chinese elites forced the Bai farmers to abandon their former beliefs and to build temples and statues for the Chinese deities. The informants assumed that the local people began to worship these statues while secretly praying to their own god. Yet, over time they became confused and started worshipping the deities represented by the statues and the ancient beliefs slowly became forgotten. In the course of such conversations, some people also mentioned, that there once was a written form of the Bai language, which was however only used in ritual contexts and practiced by the Shamans and thus became forgotten when the old religion was abandoned[24].

Folk religion

Although the distinctions between different religions in Shaxi are generally blurred, there are still quite a few deities locally worshipped, that no one considers part of the Daoist or Buddhist pantheon, nor are they part of any other institutionalized religion[25]. Shrines dedicated to these are omnipresent in the valley bottom as well as on the lower parts of the hills, in areas inhabited by Bai as well as Han, not however in Lisu or Yi villages. The most common of these deities are *Tudigong* (土地公, the "Earthgod"), *Shanshen* (山神, the "Mountaingod") and *Longwang* (龙王, the "Dragonking")[26]. A figure of at least one of them is present in virtually all the shrines among the fields, at bridges or at the edge of villages. All of these three are responsible for different aspects of the villagers' lives.
Tudigong shrines are usually among the fields or at the edge of a village, as he is worshipped on matters related to agriculture. He is often accompanied by his wife *Tudipo* (土地婆).
Shanshen is worshipped before venturing into the hills (*pashan*; lit.: climbing mountains). Thus, his altars are usually situated at the foot of or halfway up the hills.
Longwang protects people from floods or other water related issues. Therefore shrines dedicated to him are usually found in the vicinity of some body of water. A large statue of him does however also reside in *Sideng*'s *Benzhu* temple. This notwithstanding, none of the questioned villagers considered these gods to be part of the *Benzhu* pantheon.
In some places all three of these share one shrine, in other cases figures of other deities accompany one of them. The makeup of a particular shrine does not seem to follow any fixed rules. In addition to these shrines, other deities are worshipped at home; for example the "Kitchengod" (*Caojun*) or the "Gategods" (*Menshen*).

Lay religious associations

There are three kinds of lay religious associations in Shaxi: *Mamahuis*, *Nianfuhuis* and a *Dongjinghui*. Although, the rules and songs of these have a Buddhist background, none of them have a strict affiliation to any religion, but are rather responsible for focusing and directing worship in general, particular on festival days.

[23] Both Fitzgerald (1941: 68) and Schmitt (2007) found evidence for large-scale migration of Han Chinese military from Southeast China into the region. Fitzgerald (1941: 68) further states, that the change in government from the Mongol Yuan to the Han Ming Dynasty brought a massive decrease in local autonomy for the people inhabiting the *Dali* area.
[24] How much truth is behind these claims, is extremely difficult to establish. Given however, that six informants from four villages agreed on the key points described here, certain credibility must be admitted.
[25] Some Western scientists use the terms "Popular religion" or "Folk religion" to distinguish between such diffused forms of religious practice and the "institutional form of the so-called Great Traditions of Buddhism, Confucianism and Daoism" (Schmitt, 2007: 33).
[26] All of these as well as the "Kitchengod", the "Doorgods" and the "Citygod", are described in detail by Stevens (2001).

Mamahuis (fig. 5A) are most commonly observed. They meet regularly, to worship together, discuss important matters and practice their songs. On festival days, they usually prepare decorations, objects for offerings, and meals for the guests. Often, one *Mamahui* visits another for a certain festival, to pay respect and to exchange ideas and experiences. Every Bai hamlet in Shaxi has its own *Mamahui* and all of them together have one fixed set of songs and *sutras*, which are sung in the Bai language but written in Chinese characters. While in the *Dali* area the *Lianchihui* of each hamlet has at least one unique song, usually dedicated to the respective *Benzhu* (Schmitt, 2007), no such thing seems to exist in Shaxi. All members need to be elderly women and should be vegetarians – although some members consider a vegetarian diet on the first and 15th day of each lunar month and before important festivals to be sufficient. Also, no sexual intercourse is permitted before ceremonies and festivals. There is usually one leader of the association, who is selected by all members. The characteristics underlying this decision are not clear. While some people mentioned that the leader should be a particularly religious woman, others said it should always be the oldest or the one with the most free time.

Nianfuhuis are very similar to *Mamahuis*. They do however sing different *sutras* and generally take things more seriously. Thus the rules for their members are a lot stricter. Only few villages in Shaxi have a *Nianfuhui* and their members meet only infrequently, usually not in the village's temple but for a pilgrimage to *Shibaoshan* or another regional sacred site (fig. 5D).

The *Dongjinghui* is a group of male musicians playing religious songs (fig. 5C). They are often invited for larger funerals and weddings and play at the larger festivals. The religious background of this association seems to be the least intense, as its members do not have to adhere to any special rules and they also play at non-religious festivals. Nonetheless the music played is of Buddhist background and its members do consider it to be a religious association. In earlier days there used to be a *Dongjinghui* in each village. Now however, too few people are able to play the traditional instruments.

These associations are very similar to what Schmitt (2007) describes for the *Dali* area. Some details however are more similar to what he describes for the Naxi of *Lijiang*. This mixing of cultures may be explained by Shaxi's geographic location in between the centers of these two cultural spheres.

Besides these religious associations, there are also several non-religious associations in Shaxi (e.g.: elderly people associations, poet association), these often cooperate with each other and help the *Mamahuis* with the organization of festivals.

Important festivals

There are quite a number of festivals celebrated in Shaxi. Not all of these are of religious nature, yet generally at least one member of most households uses these special days to worship in a temple. Some of these festivals (such as the Spring and the Mid Autumn Festivals) are rather celebrated with the family, while others (e.g. *huobajie* and *taizihui*) are celebrated outdoors with the whole community. A calendar of important festivals was composed following the information provided by local villagers (n=10; shown in Appendix 5.2). Many of the festivals described are commonly celebrated throughout China. Also, the practices on these festivals and the reasons for celebrating are quite the same as in Han dominated China. Only two events, *huobajie* and *taizihui*, are not known from other parts of China and could thus represent unique regional traditions. On the Torch Festival, *huobajie*, a legend related to the founding of the *Nanzhao* kingdom is commemorated. On the festival day, men of all Bai villages erect a decorated wooden pole in the center of the respective village; the pole is then set on fire after sunset. Boys and young men walk around town in the evening carrying little torches. Additionally, they carry a bag with powder, made of rotten pine tree stumps. A handful of this powder is thrown into the torches, held towards the legs of

other festival participants, producing darting flames. This is supposed to bring good luck to the "burned" person. All of the Yi people in Shaxi come together on a high mountain plain for this festival. Here they light a large fire, traditional dances are performed (fig. 5E), and social contacts renewed. The Prince Festival, *taizihui*, is apparently unique to certain Bai communities, particularly in the counties of *Eryuan* and *Jianchuan*. To commemorate, the *Shakyamuni* Buddha (*Prince Siddharta Gautama*), wandering through his father's land, a Buddha statue is carried through the villages of *Changle* and *Sideng*. None of the questioned villagers was able to give any details on the origin of this festival. Incense made of various plant species is burned on all the festivals in the Shaxi valley (fig. 5F; compare Staub, 2011). Besides the usage for incense, few plants play any special roles in important festivals. During the two weeks before the Ghost Festival, *Guijie*, basically all families place sticks of *Prinsepia utilis* Royle next to openings to the courtyard to ward off evil ghosts, as during this period, the ghosts are released from the underworld to roam the world of the living. On the Tomb Sweeping Day, fresh willow branches are placed on the graves of the ancestors.

Fig. 5: Religion and traditions **(A)** *Mamahui* performing a traditional dance on the festival *liuyueliu* **(B)** Statue of the *Benzhu Daheitianshen* **(C)** *Dongjinghui* playing traditional music **(D)** *Nianfuhui* in *Shibaoshan* **(E)** Yi people performing a traditional dance for *huobajie* **(F)** Censer filled with incense

3. Methodology

The fieldwork for this thesis took place in Shaxi for a total of seven months from June to December 2010 and March to April 2011. During this time, interviews and other analytical tasks were performed to document local knowledge, gather background information required for the implementation of this project and to preliminarily evaluate its outcome. The information obtained through interviews was supplemented and in some cases verified by personal observations. Further, establishing rapport and becoming accepted by the local community was seen as an essential part of the project.

3.1. Interviews

Informal conversation, semi-structured and structured interviews were conducted, as described in Bernard (2006: 210-317), with the help of an interpreter in Chinese. The interview partners were chosen by snowball, purposive and/or convenience sampling (described in Bernard, 2006: 146-68). In order to avoid misunderstandings, both structured and semi-structured interviews were translated into Chinese by the interpreter, Chen Yulin, and re-translated into English by the professional translator Shirley Huo, resident in Shaxi. These interviews were pre-tested, with at least two people from Shaxi, and accordingly modified. Further, their structure and content had to be modified during the course of the interviews, due to varying amounts of time, interest in and knowledge about the respective topics by the interviewees. Attempts were made to achieve an equal gender distribution among the interviewees. However, this proofed impossible, mainly because many women immediately called for a male member of the household to take part in the interview. This may be partly explained by the fact that both interviewer and interpreter were male. Interviews on different topics related to the medicinal plant garden were conducted with a total of 159 persons. Depending on the interviews' topics, different interview partners were chosen. People were re-interviewed, if the informants' knowledge appeared suitable for the respective topics. This greatly reduced the effort of introduction and gaining trust. As a sign of gratitude to the interviewed people, a small gift (mostly tea and sugar) was given to all the households visited. Often more than one person was present during the course of an interview in a given household. In such cases, one person was chosen as the principal interviewee, although sometimes family members or friends provided some of the answers. Below, details on the various groups of interviews are given.

3.1.1. Appraisal of feasibility

Local people's opinions and ideas on creating a medicinal plant garden

In order to assess the opinion of the local community on the creation of a medicinal plant garden in Shaxi, semi-structured interviews were conducted in 30 households in seven villages (*Aofeng* (3), *Beilong* (4), *Changle* (5), *Dongnan* (3), *Hualong* (3), *Shaping* (2), *Sideng* (6) and *Silian*(4)) chosen by convenience and snowball sampling. All of the principal interviewees were Bai, 13 of them female. The average age of the female informants was 49.2 (±18.1) years, that of the male informants 56.9 (±20.9) years. All educational levels from primary school to university degree holders were represented, with graduation from middle school being the highest educational achievement for 50% of informants. The interviews followed an interview guide, which is shown in Appendix 2.1.

Tourists' opinions and ideas on creating a medicinal plant garden

As tourism plays an increasing role in Shaxi, semi-structured interviews were conducted with both Chinese (23 individuals) and non-Chinese (29) tourists. To achieve an overview, tourist

groups (29 individuals) as well as independent travelers (20) were chosen by convenience and purposive sampling. Further, an e-mail survey was conducted with US American exchange students, studying TCM and public health in Kunming[27].
The tourist groups were interviewed in group-discussions with all the groups' members. Two domestic groups (with six and nine members respectively) and three international groups (with three, five, and six members respectively) were questioned. The tour guides were interviewed separately through informal conversations. The average age of the questioned group tourists was 46.0 (±13.6) years.
Of the individual travelers, eight were domestic and twelve international tourists. Their average age was 28.7 (±17.9). Of the three exchange students who replied to the survey, two were 21 and one was 23 years old.
Thus, in total 52 tourists from ten nations and eleven Chinese provinces were interviewed. The interview guide (which was also used for the e-mail survey) is shown in Appendix 2.1.

3.1.2. Background information related to the project

Common ailments and herbal remedies

In order to obtain information on common ailments and remedies among the population of Shaxi, semi-structured interviews were conducted in 25 households (in the six villages: *Aofeng* (4), *Beilong* (5), *Changle* (6), *Shaping* (3), *Sideng* (5), and *Silian* (2)) chosen by convenience and snowball sampling. All of the principal interviewees were Bai; eight of them female; twelve had been interviewed before. The average age of the female informants was 52. 3 (±17.8) years; that of the male informants was 56.4 (±22.3) years. All educational levels from primary school to university degree holders were represented, with graduation from middle school being the highest educational achievement for 56% of informants.
Further, six people, who were mentioned as experts on medical topics by members of their community, were interviewed more generally about the ailments of and remedies used by the local population. These specialists, too, were all Bai; one was female (38 years old); their age ranged from 38 to 74 years, with an average of 59.7 (±12.6) years. Two of them held college degrees, one had been to high school, two to middle school, and one was taken out of school after three years of primary school education. These experts include the three main informants on local medicinal plants, who played a key role in the establishment of a local medicinal plant database. Due to their importance to this thesis they are described in more detail:

- One (M, 72, Bai, *Beilong*) of them had received college education in orthopedics, which had been abruptly terminated with the beginning of the *Cultural Revolution*. As a child, he was frequently taken along on excursions for collecting medicinal plants by his father and grandfather, both of whom had been semi-professional healers in his village. He had later strongly supplemented the knowledge gained from his relatives by studying medicinal plant books. He commonly diagnosed "patients" in the market and sold them the ingredients of his own prescriptions.
- The second (M, 62, Bai, *Changle*) had been taken out of school after three years of primary school education. As a farmer he had commonly fallen ill and injured himself. Mistrusting doctors and unwilling to pay large medical bills, he had decided to learn about medicine by self-studying. Thus, he read medicinal plant books, searched for these plants in his surroundings and tried the respective plant parts; documenting their taste, temperature characteristics, and effects on his mind and body. He then compared what he felt to what was written in his books. He further had the most extensive

[27] A group of around 20 of these students visits Shaxi every six month; however, only three of these responded to the survey.

collection of herbal medicine observed in any of Shaxi's home gardens. He provided the plants he collected or grew without fee to villagers who sought his help.

- The third main informant (M, 43, Bai, *Changle*, middle school) did not own any medicinal plant books whatsoever. He claimed to have obtained all his knowledge from relatives and the elders of his village. Yet, the local doctor was a close friend of his and was commonly observed sitting in his house, drinking tea and discussing medical topics. Also, he sold the material he collected to patients coming from the doctor's clinic, which is not allowed to deal with herbal medicine.

Additionally, there was a retired barefoot doctor from *Shaping*, who knew a lot about medicine and local ailments yet very little on local medicinal plants; a private doctor from *Silian* of whom many people said, he was the most knowledgeable person on herbal medicine in all of Shaxi; and one of the two doctors working at the public clinic in *Silian*, who was very well trained and informed yet mainly on Western medicine.
All interviews followed interview guides, which are shown in Appendix 2.1.
Additionally, one private doctor from *Sideng* and the head of the local hospital were questioned through informal conversation.

Local medicinal plant database

A medicinal plant database was compiled based on the data available from previous ethnobotanical studies conducted in Shaxi[28] and on the information obtained through interviews, informal conversations and personal observations. Additionally, excursions to the surrounding hills were conducted with the three main informants (see above). They were asked to point out all the medicinal plants they knew together with the species' local names and information on the plants' usages. Attempts were made to cover all the different habitats with all three informants.
Local Han Chinese names were recorded in Chinese characters and pinyin (official Romanization for Chinese). Pinyin was also used as the standard to transcribe words of the Bai, Lisu and Yi languages.
No matter where the information about medicinal plants was obtained, it was always crosschecked with one of two local doctors. Thus at least three local people verified the names and utilization provided in this thesis. In rare cases, however, three people did agree that a given plant was medicinal, could, however, not remember its name or usage. In these cases the information was taken from at least one of the informants' medicinal plant books.

Data on cultivated and merchandised medicinal plants

As a means of identifying locally important medicinal plants, people buying or selling medicinal plants on Shaxi's weekly market were questioned in informal conversations. Whenever possible, the information obtained through these informal conversations was crosschecked by asking others.
Farmers, who were observed to grow medicinal plants, were asked to provide information on the cultivation. In the cases of *Erigeron breviscapus* and *Paris polyphylla*, which are particularly popular, cultivators were purposely sought out to obtain detailed information. Overall, 15 male farmers from six villages (three Han, twelve Bai; no data on age or education) were informally questioned on growing *P. polyphylla* and in the village *Beilong* twelve households (all Bai, no additional data) were asked about the cultivation of *E. breviscapus* in 2010.

[28] Ineichen (2007) and Weckerele et al. (2009).

To supplement these data, unstructured interviews were conducted with the head of the agricultural department of the *Jianchuan* County People's government, the head of the agricultural department of the Shaxi Township People's government and with three representatives of *Beilong*'s village government.
A newly formed cooperative for the cultivation of medicinal plants in *Hongxing* was visited and the three members collectively interviewed on details of the undertaking.
Further, to investigate the potentials of commercial herbal medicine cultivation, the well-established medicinal plant cooperative in *Huadianba* (*Xizhou* Township, *Dali* County) was visited and four workers were collectively interviewed in an informal way.

Local classification of soil and vegetation types

In order to gain insights into the local way of classifying soils and the surrounding vegetation and to be able to use these for the design and construction of the medicinal plant garden, 13 informants (all Bai male, average age 67.5 (±5.2) years) from four different villages (*Beilong* (4), *Changle* (5), *Sideng* (2) and *Silian* (2)) were questioned on their personal classification of soil and vegetation types. Eight of these had been previously interviewed on another topic. All informants were mentioned as specialists on the subject by other villagers. This notwithstanding, their educational background was quite varied (23% primary school, 23% middle school, 15% high school, 39% college). The interviews followed a rough guideline, which had to be strongly adjusted during the course of the interviews as misunderstandings commonly occurred, especially regarding the questions on vegetation types.

Insights into local gardening practices and concepts

In seven villages (*Aofeng* (3), *Beilong* (5), *Changle* (4), *Dongnan* (4), *Hualong* (1), *Sideng* (5) and *Silian* (3)) members of 25 households were questioned about their ideas and beliefs in regard to gardens and gardening, 16 of these had been previously interviewed. These people can be considered local experts on the subject, as the interviewed households were chosen by asking for the most beautiful garden of the village or the most knowledgeable people in regard to gardening. All of the principal interviewees were Bai and six of them were female. The average age of the female informants was 49.6 (±19.3) years, that of the male informants 58.1 (±20.3) years. The interviews followed an interview guide, which is shown in Appendix 2.1.

3.1.3 Selection of plants and a location for the garden

It was considered to be essential for the project, to base the decisions, which plants to cultivate, and where to construct the garden on the concepts and opinions of the local people. The semi-structured interviews yielded a rather limited amount of information on these topics. In the case of a selection of medicinal plants this is quite likely due to the fact, that there is such a large number of these, making a spontaneous choice difficult for the informants. Regarding location, many people spontaneously offered their own land, which made inquiries considering an alternative location basically impossible. Other suggestions on a suitable location remained rather vague. Therefore additional analytical tools, varieties of pile-sorting and paired comparison tasks, were chosen to gain a deeper understanding into local preferences.
For both topics, the same 30 randomly chosen households, in seven different villages (*Aofeng* (4), *Beilong* (4), *Changle* (5), *Hualong* (4), *Shaping* (4), *Sideng* (5), and *Silian* (4)) were visited. The randomization was achieved by stopping at every seventh door; if an interview in the thus chosen household was impossible, the next one was visited. Of the 30 principal informants, two were Han, one was Naxi and the rest ethnic Bai; 13 were female (43%). The average age of the female informants was 44.8 (±20.6) years, that of the male informants 40.9

(±22.5) years. Due to time limitations of one informant (M, 36, Bai, Changle), the paired comparison of locations was only conducted in 29 households.
Before the informants were asked to perform these tasks, a detailed description about the goals of and the ideas behind the project was given.

Choice of a location for the garden

Using the information obtained in previous interviews, conversations and through personal observation, possible locations and respective purposes of the garden were selected. Using the resulting six alternatives, paired comparison tasks were performed following the description in Martin (2004: 129-32). According to the answers of each informant, a ranking was composed where each alternative received a score from one to six (one being the best six the worst location). All scores of any given option were than added up and divided by the number of informants (n=29), resulting in an average score for each location. Additionally, the informants were asked to explain their choices, particularly when their answers were somewhat inconsistent. This further helped to understand the reasoning behind the choices made and the opinions the informants had of the various locations.

Choice of herbal medicine to be planted

In order to gain insights into which plants the local people preferred to be cultivated in the garden, and into the criteria underlying these decisions, the informants were asked to perform a grouping task similar to pile sorting (described e.g. in Martin (2004: 132-5) and Bernard (2006: 494-95)).

Pre-selection of species

Out of the 176 locally used medicinal plants recorded by Weckerle et al. (2009), 100 were chosen for potential cultivation in the garden. This choice was based mainly on the times the plants were mentioned by different informants (and thus on reliability of the data) and on the recorded ailments they are used for (favoring plants used for locally important diseases). Further criteria were availability and aesthetic aspects. These 100 species made up the first two sets.
After the first two series, a third set of 53 species was compiled. This one consisted of 31 species that had already been ranked in this way, but had had a score close to 0.5. Thus, by letting another ten informants judge these plants, an attempt was made to achieve clearer results. Another 22 species were included, which had not been previously documented in Shaxi, yet appeared interesting either from a landscaping or from a pharmaceutical perspective. As the selection of plants for the garden was carried out early in the fieldwork period no other newly documented species were included.

Procedure

Sets of reference specimens and/or pictures from medicinal plant books were compiled; each set containing 50 different species (which were randomly mixed prior to each interview). Per set, members of ten households were asked to sort the plants into these three piles:

- Plants that they did not know.
- Plants they knew, and thought should be planted in the garden.
- Plants they knew, yet thought should not be planted in the garden.

Additionally, the informants were questioned about there reasoning for the choices made, giving insights into the ideas underlying the preferences of the local people.

Analysis of data

The data was analyzed by crediting points to the different medicinal plants depending on the informants' answers. Plants considered suitable for cultivation were credited with two points, unknown plants with one point[29], and unwanted plants with zero points. By dividing the total number of points per species by the number of informants questioned, each species received a score from zero to one, effectively resulting in a preference ranking of the 123 plants.
All species with a score of 0.6 or higher (58 species) were chosen for cultivation. However, a few of these had to be excluded for practical reasons. Others were, in the process of collecting plant material, chosen for planting out of other reasons, such as landscaping preferences or recommendations by local medicinal plants experts. Further, medicinal plants already growing on the designated site for the garden were also included into the planting plan.
The local preferences were further analyzed by dividing the plants, used in the grouping tasks, into categories of natural habitats or, in the case of cultivated plants, reasons for cultivation. By calculating the average score the members of these categories obtained, conclusions could be drawn, as to what sort of plants were preferred for cultivation.
Additionally, the species used in the grouping tasks were analyzed according to their use categories[30] (ailments they are used for), in order to see whether, plants used against common diseases were ranked higher than those used for locally less important afflictions.

3.1.4. Preliminary evaluation of the project

After the construction of the garden was completed, several local people, who had more or less direct connections with the project, were informally questioned on their opinion of the garden's potential impact and were asked to point out mistakes and suggest possible improvements.

3.2. Voucher specimens and collection of ecological data

3.2.1. Identification and deposition of specimens

Voucher specimens of all documented species were collected. They were identified at the herbarium of the Kunming Institute of Botany, Chinese Academy of Sciences (KUN), following the nomenclature of the *Flora of China* (1994 to present). The classification into families follows the Angiosperm Phylogeny Group (APG III). One set of specimens was deposited at KUN, another was sent to the herbarium of the Institute of Systematic Botany of the University of Zurich (Z).

3.2.2. Collecting ecological data

For the plants selected for cultivation in the garden, more detailed data on their habitat were collected. The soil was described in detail using a combination of local and scientific classification. The moisture regime was estimated from proximity to a stream or standing water and from the habitat's relief and soil permeability. Finally the plants' light requirements were measured, using a *Horizontoscope* (*Institut für Tageslichttechnik*, Stuttgart; described e.g. by Schütz and Brang (1995)) to obtain the amount of direct sunlight in June for a

[29] These points were credited, as four of the six local experts had mentioned that it would be good to show herbal medicines few local people knew.
[30] These categories were created by the author, they were: bites, circulatory system disorders, cold, cough, digestive system disorders, eye disorders, fever, flu, genito-urinary disorders, haemostatic, inflammations, injuries, internal cold, internal heat, muscular-skeletal disorders, nerval system disorders, pain, parasites, respiratory system disorders (excl. cough), rheumatism, skin disorders, tonic, toxins, veterinary uses, and women's ailments.

representative plant. These data were used to create artificial habitats, as suiting as possible, for the respective species.

3.3. Policies and permits

3.3.1. CBD and ABS

Research was conducted according to the guidelines formulated in the Convention on Biological Diversity, including the Bonn Guidelines and the Nagoya Protocol on Access and Benefit Sharing.

3.3.2. PIC

Prior informed consent was obtained from all interview partners and local people photographed.

3.3.3. Coding of interview partners

To respect the right for privacy of the local informants, their names are not published in this thesis. Instead every informant is described by a code based on the interview partner's attributes. Thus, "M, 36, Bai, *Changle*, middle school" represents a 36 years old male informant, who is ethnic Bai, resided in *Changle* and whose highest educational achievement had been the graduation from middle school.

3.3.4. Permits

The necessary permits were organized by the Kunming Institute of Botany, Chinese Academy of Sciences. Permission to conduct research and construct a garden was obtained from all relevant branches of the local government.

4. Results and discussion

4.1. Feasibility of creating a medicinal plant garden in Shaxi

During a previous ethnobotanical study in the Shaxi valley, the idea of creating a medicinal plant garden was brought up by some local specialists on herbal medicine. Consequently, the first step of this project was to evaluate the opinions of a broader range of people in regard to such an undertaking. Besides local people, tourists, too, were interviewed, as tourism plays an increasingly important role in Shaxi. Below, the results of these interviews are presented and discussed.

4.1.1. Local opinions and ideas on creating a medicinal plant garden

An overview of the main opinions and ideas expressed by local people in regard to the benefits the garden could provide, the purpose it should fulfill, and where it should be constructed are given in Table 2. Below they are discussed in detail. For the exact questions asked, refer to Appendix 2.1.

Table 2: Overview of the main ideas expressed by local people in regard to the construction of a medicinal plant garden in Shaxi.

Questions	**Main opinions**	**Informants** (%), n=30
Benefits	Increased knowledge and usage of medicinal plants	53
	Improved possibilities for sale of medicinal plants	17
	Protection of endangered plants	13
	Attraction of tourists	10
Purpose	Cultivation of medicinal plants for utilization, leisure and learning	80
	Medicinal products not free for usage	60
Visitors	Open for all	37
	Tourists would not be interested	30
	Local people would not be interested	17
Location	On informant's own land	43
	Elevated site	30
	Consider water supply and quality of soil	23
Admission	Donation based	87
	Ticket (with reduced price for local people)	7 (3)
	Completely free	7
	Additional sale of dried medicinal products or snack food[1]	20

[1]Mentioned without having been inquired.

Potential benefits of the garden

The idea of creating a medicinal plant garden was welcomed by all people interviewed (n=30), although for different reasons.
In total 16 interviewees said the garden might allow local people to use more local medicinal plants and increase their knowledge about them. Particularly, it might help people to recognize the plants in the wild, as many only knew the dried products. This would enable them to save money for medical care, by collecting medical products themselves rather than being dependent on the pharmacies and doctors. This latter point was considered important by five informants, as they claimed a continuous increase in prizes for medicinal products. Another five informants stated that such a garden could make it easier to sell medicinal plants locally, as it would increase the people's awareness for these and might thus create an increased demand for local medicinal products. Further, one informant pointed out that merchants or representatives of pharmaceutical companies could be lead to the garden and thus be given an overview of Shaxi's medicinal plants. However, three people mentioned that contacts to merchants were difficult to establish and the prizes of commercially traded medicinal plants were strongly fluctuating. Therefore, they also considered selling on the local market more feasible. Similar reservations were observed by Huber et al. (2010) associated with the cultivation of medicinal plants in Shaxi[31]. Some of these fears could possibly be overcome by target-oriented education, particularly on the marketing of medicinal plants, or by setting up contacts to pharmaceutical companies, which could offer fixed contracts with guaranteed prizes[32].
It was mentioned by four people, that such a garden could help protecting locally endangered plants, either by creating a local seed bank[33] or by promoting local cultivation of medicinal

[31] They showed that the majority of the questioned farmers in Shaxi are interested in cultivating medicinal plants, required, however, fixed supply contracts, free distribution of propagation material, or introductory courses to the respective techniques and technologies.
[32] Huber et al. (2010) further suggested a local micro credit scheme to support farmers attempting to grow novel crops. An additional solution may be a processing plant for herbal medicine in Shaxi. This would not only increase the local part of the value chain, but also give the farmers a local person to deal with, thus increasing their trust in such undertakings.
[33] Two times mentioned

plants[34]. The reason for the perceived decrease in abundance of medicinal plants, also documented by Huber et al. (2010), may be both habitat destruction and over-collection, which is particularly problematic, as usually the whole plants or subterranean parts are collected. Not only in these interviews, but also in informal conversations, many people expressed concern about the over-harvesting of medicinal plants in Shaxi[35]. These signs of awareness for environmental changes and degradation indicate willingness among the local population to participate in and support conservation measures. Personal experience does however show that economic needs have the clear priority[36].
Another three people perceived an increased global interest in Chinese medicine and therefore thought the garden would attract tourists, giving local villagers novel financial opportunities. Not only through the sale of food and souvenirs, but also by providing them with accommodation or selling dried medicinal plants from the garden.
Finally, two informants uttered that such a garden would match the development plan for the Shaxi valley[37]. The local leader of the Shaxi Rehabilitation Project (SRP) was also convinced that such a garden would fit very well into the framework for local development. He further stressed the importance of linking the garden to other potential attractions for tourists.
None of the questioned persons could think of anyone who could be opposed to or offended by the creation of a medicinal plant garden. Neither did anyone consider it necessary to specifically inform the local community of the ongoing project, as this news would spread automatically.

Purpose of the garden and potential visitors

The majority of interviewees agreed that the purpose of the garden should be both the cultivation of medicinal plants for usage and the provision of a place for visiting and learning about local herbal medicine. However, many people emphasized that the local people should not be allowed to freely collect plants in the garden; these should rather be sold, distributed by local specialists or given to the local hospital.
While some interviewees said the garden should mainly be built for the local people, as tourists would not be interested, others stated the opposite. This notwithstanding, eleven people agreed that the garden should be open for both tourists and local people, as both would be interested. Some informants mentioned, that, in addition to living plants, pressed plant specimens, tools for processing medicinal plants, or objects specific to Bai culture[38] could be exhibited in order to increase the attractiveness of the garden.

[34] One time mentioned
[35] Huber et al. (2010) even reported that, due too drastic decreases in abundance, many collectors abandoned the collection of medicinal plants in recent years.
[36] Taking medicinal plant collection as an example: Many collectors express the fear that their activities might lead to the plants' local extinction. As they are, however, financially relying on the sale, they nonetheless collect as many plants as possible. Discussions with some of them showed that they would be willing to leave some plants or a sufficient portion of the subterranean parts behind, to give the populations a chance for recovery. Yet, they do not do so, as they have no guarantee that they would benefit from this practice, because other collectors might harvest the "leftovers".
[37] This plan, while giving poverty alleviation and economic development the priority, also incorporates the need for environmental sustainability and preserving the natural and cultural richness of the Shaxi valley (SRP, 2009).
[38] Unfortunately no one was able to give any examples of what such items could be.

Suitable locations of the garden

Regarding the suitability of a site for the garden, water and soil was regarded as the most important aspects to consider by four and three interviewees, respectively. On which soil characteristics were suitable, the opinions did however not conform. While some claimed the soil needed to be particularly nutritious, others said that this might be disadvantageous.
Nine people agreed that the garden should be build on an elevated location. Five of them explained that many valuable plants require a relatively high elevation to develop properly, while the other four said that also a small elevation would suffice as it was rather of symbolic importance[39].
As many interviewees directly offered a part of their own land to construct the garden, more detailed questions were often impossible to ask without offending the informants, as inquiries considering alternate locations would have been understood as turning down the informants' offers and thus looking down on the offered land. Additionally, many more detailed inquiries – particularly regarding location but also on other topics – were often responded with: "you need to decide that yourself".

Plants for cultivation and information presented in the garden

Several interviewees wanted as many different species as possible to be planted in the garden. Ideal would be 100 or more, as *baiyaoyuan* (百药园, lit.: one hundred medicine garden) is a popular name for medicinal plant gardens in China[40]. A few informants suggested specific plants for the cultivation and some stated that particularly remedies against cold (*ganmao*) – as it is the most common ailment locally–, rare plants or plants not commonly known to the local people should be grown. Asked about potential risks of planting poisonous plants, no one considered this to be problematic. Some did however suggest putting up warning signs.
Other information presented in the garden should be kept simple and limited to the plants' names, usages and habitats. According to four of the interviewed experts (n=6), this information should mainly be based on books rather than on data from interviews with local people, as these had a tendency of being false or misleading.

Maintenance of the garden

Most people considered finding a reliable caretaker a matter of outmost importance. Seven informants expressed a preference for elderly people, as they were perceived as being more patient and careful. Also, a profound knowledge of medicinal plants and plants in general was considered an important criterion for the selection of a caretaker. Many emphasized the importance of properly reimbursing a designated caretaker for his efforts. The fact that many people offered their own land for the construction consequently made further inquiries regarding a potential caretaker impossible.
Regarding admission and funding the costs of upkeep, the majority of interviewees preferred a donation box to an entrance fee. Two informants each thought the entrance should be completely free or there should be a fixed price for an admission ticket. The latter should,

[39] The informants did not further explain this symbolism. Yet, in the course of conversations several local people mentioned that medicinal plants from mountains are more effective than the same species from within a valley. Whether or not this is believed to be due to an actual difference in the content of pharmaceutically active compounds was not further clarified. However, the fact that several people considered a symbolic elevation sufficient indicates biological factors may not be the only aspect considered here.
[40] This is related to the legend of the "divine farmer" (神农; *shennong*), a mythical emperor, who is credited with discovering the "one hundred medicines" by self-experiments (Liu et al., 2003: 1).

according to one man from *Sideng*, be reduced for local visitors. Six informants spontaneously came up with the ideas of selling the surplus of medicinal plants produced in the garden or snack food for collecting money to maintain the garden.

4.1.2. Tourists' opinions and ideas on creating a medicinal plant garden

As tourism is an important aspect of modern Shaxi and because they, too, were seen as potential visitors, tourists were questioned on their interest in such a garden, on their willingness to financially contribute to its upkeep, and on their requirements and wishes in regard to the garden's location and design. An overview of their ideas is given in Table 3. No major differences were detected in the answers given by domestic or international tourists or by tourists with different modes of traveling. All of the interviewed tourists (n=52) showed interest in visiting a medicinal plant garden in Shaxi. Below, the answers and suggestions given are described in more detail.

Table 3: Overview of the main ideas expressed by tourists in regard to the creation of a medicinal plant garden in Shaxi.

Question	**Main opinions**	**Informants** (%), n=52[1]
Location	Walking distance from Shaxi's main town *Sideng*	100
	Accessible by vehicles[2]	21
	Detailed directions necessary[2]	13
Design	Aesthetic aspects more important	19
	Informative aspects more important	17
	Both equally important	64
	Specific suggestion on the information provided in the garden	83
Financial contributions	Donation based	64
	Admission fee	15
	Through buying local medicinal products[2]	83
	Through buying postcards[2]	31
	Through buying seeds of the exhibited plants[2]	19

[1]As more than answer was possible per question and informant, the sum of percentages per question may be above 100. [2]Mentioned without having been inquired.

Suitable location of the garden

All of the interviewed tourists expressed willingness to walk a certain distance (around 45 minutes on average) of Shaxi's main town *Sideng*. Thus the creation of the garden in one of the surrounding villages was not considered to be problematic. Eleven persons mentioned it would be good if the location would be accessible by bicycle[41] or by means of transport for elderly people[42]. Some also stressed the importance of providing detailed directions, as they had gotten lost on previous walks or bike rides in Shaxi.

[41] Mentioned by seven people.
[42] Mentioned by four people.

Design of the garden and information presented within

In regard to the design, ten tourists considered aesthetic aspects more important than informative aspects, while 33 found both equally important. Besides the names and usages of the plants, the interviewed tourists asked for a variety of other information to be presented in the garden; e.g. (in order of frequency mentioned): information on local food plants; local culture; ecology of the plants; reasons for building the garden; Chinese medicine in contrast to Western medicine; history of traditional Chinese medicine; horticultural details; scientific proof for the efficacy of herbal medicine. Further, many of the interviewees said it would be nice, if there were some refreshments, tea or snack food (ideally made with special local food plants) for sale and if some of the plants in the garden could be tasted. Additional suggestions included combining the garden with some sort of workshops, with guides to show the plants in their natural habitat, or with village home stays.

Financial contributions

With the exception of one tourist, who preferred buying local products, all of them would be willing to contribute a certain amount of money (between five and 30 CNY, mean: 15.4 (±9.4) CNY) to the upkeep of the garden, preferably as a donation rather than a fixed fee. Also, most of the interviewed tourists would be interested in buying local medicinal products, although several of them made some restrictions; e.g.: only if needed, only if scientific proof for the effectiveness was available, only if there was some sort of quality guarantee, only if the offered products were local specialties not elsewhere available. Further some of these tourists spontaneously expressed interest in buying seeds of the exhibited plants. All of them stated they would like to see illustrations of the medicinal plants exhibited and 16 interviewees mentioned, without this being inquired upon, they would like to buy postcards of such illustrations.

4.1.3. Conclusions from background interviews with local people and tourists

These first interviews with members of the local community and visiting tourists showed a great interest in a medicinal plant garden of both groups of interviewees. The results suggest that a design that combines aesthetic and informative aspects and allows visitors to learn about local medicinal plants in a beautiful setting would be most feasible. The interviewed tourists expressed willingness to financially contribute to the garden's upkeep. Therefore, they were subsequently regarded as important potential visitors, as their contributions were identified as a key factor for making the garden financially self-sustainable. While various valuable suggestions and insights were obtained, it also became clear that additional information was required.

4.2. Background information required for the creation of a medicinal plant garden in Shaxi

In order to gain a deeper understanding for the local circumstances related to the creation of a medicinal plant garden, data was collected on locally used, cultivated and traded medicinal plants; on local classification systems for soil and vegetation; and on local gardening practices and concepts. Further, the local preferences for a location and for plants to be cultivated were analyzed in detail. Together with the general ideas of the local people and tourists, these data were used for the subsequent design and construction of the garden as well as for imbedding the garden in the local community.

4.2.1. Common ailments and herbal remedies

Medicinal plants seem to be commonly used at home for the treatment of minor ailments; out of 25 questioned informants only three said they don't use herbal medicine themselves, 15 stated they sometimes use medicinal plants and seven claimed to frequently use them at home (fig. 6)[43]. Also, four of the experts (n=6) agreed that the local people relied on herbal medicine for their own healthcare and one stated that medicinal plants had an economic importance for some local people.

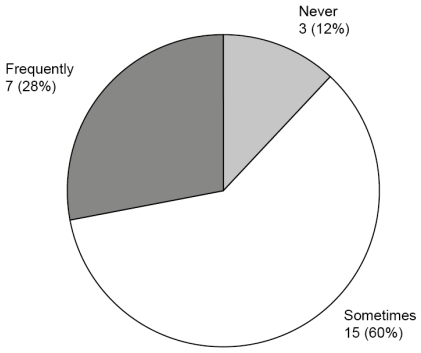

Fig. 6: Frequency of home usage of herbal medicine among villagers in Shaxi. Total numbers and percentages of informants (n=25) using medicinal plants at least every three month (frequently), not more than twice a year (sometimes), or never.

When asked which ailments they usually treated at home using herbal medicine, the most common replies were: cold (*ganmao*), traumatic injuries, gastro-intestinal diseases, cough, and throat ache. These data conform well to the information obtained from experts questioned on the most common diseases among the local population. All of these agreed that *ganmao* is the most common ailment, followed by traumatic injuries, gastro-intestinal diseases, cough, and rheumatic pain (fig. 7).

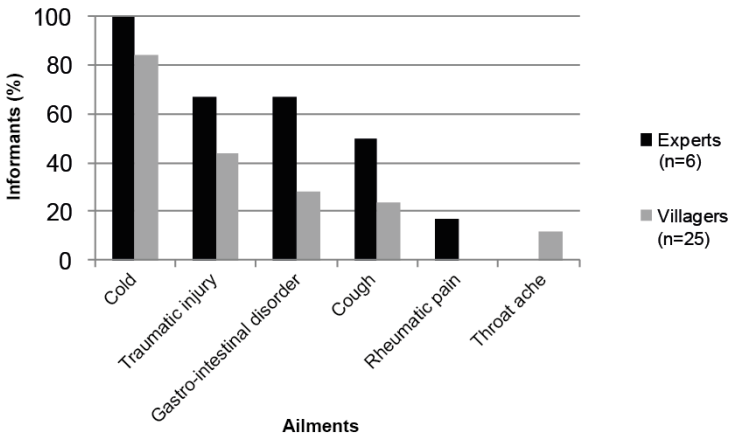

Fig. 7: Common ailments according to villagers (n=25) and medical experts (n=6).

The predominance of minor illnesses like cold, cough and throat ache, can be explained by the facts that hardly any houses in Shaxi have facilities for heating, other than metal bowls in which small fires are kept burning in the winter, producing large amount of smoke. And that

[43] On the other hand, interviews with the head of the hospital and a local doctor revealed that the majority of patients (70% and 60% respectively) came to receive treatment in Western rather than Chinese medicine. Although it needs to be said that both informants in this case included ready made pharmaceutical products from Chinese medicinal material in the category "Western medicine". Additionally, the afflictions treated in a hospital or clinic are quite likely not the same as those treated by the villagers at home.

most people are doing hard work outside, with little protection from rain and cold. Traumatic injury usually refers to work accidents, which are common as the majority of people make a living through physical labor, without adequate safety equipment. The combination of these factors explains why many elderly people suffer from rheumatic pain. Gastro-intestinal disorders are common, due to the rather poor hygiene conditions in the farming villages and partly polluted drinking water (Morel and Forster, 2002).
Many informants found it difficult to remember which species they mostly used. Plants that were mentioned more than once are: *chaihu* (*Bupleurum* spp.), *mugua* (*Chaenomeles speciosa*), *chuanxiong* (*Ligusticum sinense* cv. *chuanxiong*), *danggui* (*Angelica sinensis*), *yimucao* (*Leonurus japonica*), *xuduan* (*Dipsacus asper*), *bianfen* (*Nicandra physalodes*), *jingjie* (*Schizonepeta tenuifolia*), *pugongyin* (*Taraxacum* spp.) and *cangerzi* (*Xanthium sibiricum*) (fig. 8). Only one of the experts mentioned specific plants commonly used as herbal remedies among the local population; they were (in the order mentioned): *chaihu* (*Bupleurum* spp.), *fangfeng* (several genera and species of Apiaceae), *danggui* (*Angelica sinensis*), *wuweizi* (*Schisandra* spp.), *baiji* (*Bletilla* spp.) and *cangerzi* (*Xanthium sibiricum*). Since *baiji*, *fangfeng*, and *wuweizi* are more commonly used in complex prescriptions provided by doctors, they may not have been mentioned by laymen treating themselves.

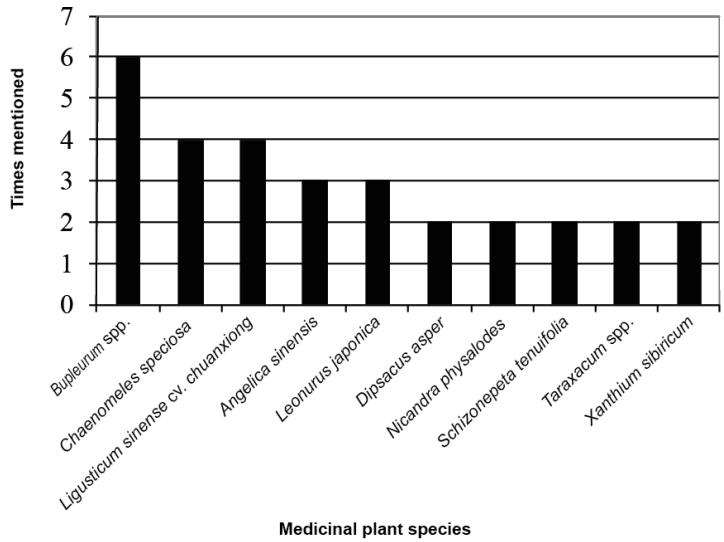

Fig. 8: Herbal remedies commonly used at home, as mentioned by local villagers (n=25).

While all of the experts agreed that there were no actual differences between the medicine of the Bai people and the Han, three of these specialists mentioned that there is a general difference between Chinese folk and school medicine. Namely, that practitioners of folk medicine tended to use single plants to treat a specific ailment, while professionals would use complex prescriptions to treat the cause of an ailment more holistically.
In addition to usage for their own health, six interviewees (24%) spontaneously stated that they frequently use plants to treat their livestock (fig. 9). In this context *pugongyin* (*Taraxacum* spp.), *yimucao* (*Leonurus japonica*), *fanbaiye* (*Potentilla fulgens*), *shuiyangmei* (*Geum aleppicum*) and *luoboye* (*Senecio* spp.[44]) were mentioned. The informants stated that for animals the same plants could be used for the same indications as for humans; only the dosage needed to be adjusted[45]. Some of the plants mentioned in the interviews were also observed in other houses, laid out for drying, often in large amounts. When members of these households were asked what the plants were and if they had any other medicinal plants at home, they commonly explained, that they hesitated to use herbal medicine for themselves, do

[44] Most likely only *S. chrysanthemoides* is used for veterinary purposes, as it is the only species locally referred to as *luoboye* growing at the valley bottom.
[45] A doctor from a clinic in *Sideng* later confirmed this upon inquiry.

however consider medicinal plants highly effective for veterinary purposes. Some mentioned they simply mixed the plants together with the fodder to strengthen the animals; others only gave certain plants in case of disease. It was particularly often mentioned that *Leonurus japonica* should be given to cows after they have given birth to expel the placenta and increase the milk flow.

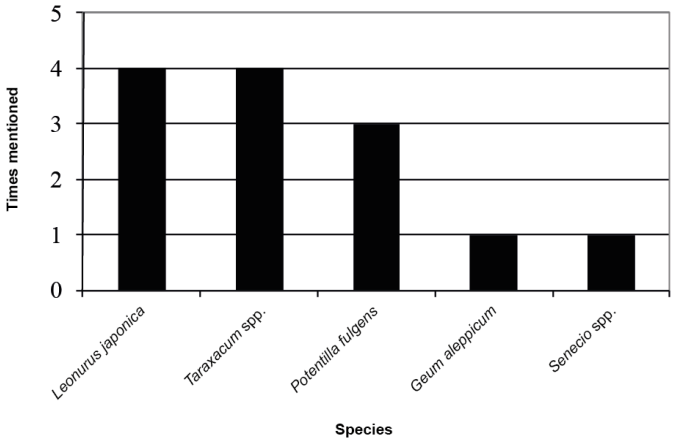

Fig. 9: Herbal remedies used to treat livestock, as spontaneously mentioned by local villagers (n=6).

4.2.2. Local medicinal plant database

A total of 288 taxa of medicinal plants were documented mainly based on the information provided by the three main informants. For a full list of these and the corresponding local names and usages please refer to Appendix 1.1.
In 245 cases (85.1%) the same species was described in at least one of three medicinal plant book series[46], which are locally available and used by at least one informant. For another 36 medicinal plants (12.5%) the same genus was described in at least one of these *materia medica*. In one case the plant collected was only identified to family level, members of the respective family are described in all of the given books. For another four species (1.4%) internet sources were found describing the corresponding medicinal properties. *Pentapanax tomentellus* (*wujiapi*) and *Anthogonium gracile* (*shuibaiji*), however, are apparently not known as medicinal plants in other parts of China. The Chinese names and their usages, however, do correspond to commonly known medicinal plants[47].
Of the 288 recorded plants, 190 were only observed in natural habitats whereas 97 were cultivated in gardens or fields (fig. 10). This is not to say, that the "wild" plants are native to the area and the cultivated plants represent introduced species. Among the plants only observed in natural habitats are introduced species such as *Nicandra physalodes.* Among the cultivated species, on the other hand, are natives like *Colocasia esculenta* and *Pinus yunnanensis.* Thus, of the cultivated plants, 40 were also observed in natural habitats, whereas the remaining 57 apparently only occur in cultivation and are therefore quite likely truly not native in Shaxi.

[46] The medicinal plant series used as reference were: Yunnan Chuban She (1992-1995), Yunnan Instititue of Materia Medica (2004-2009), and Yunnan Renmin Chubanshe (1971).
[47] *Wujia* is the Chinese name for the family Araliaceae and *baiji* is the name for the genus *Bletilla*, which shows certain morphological similarities with *Anthogonium gracile.* While both of these species were only mentioned by a single informant, the information provided was confirmed by two experts.

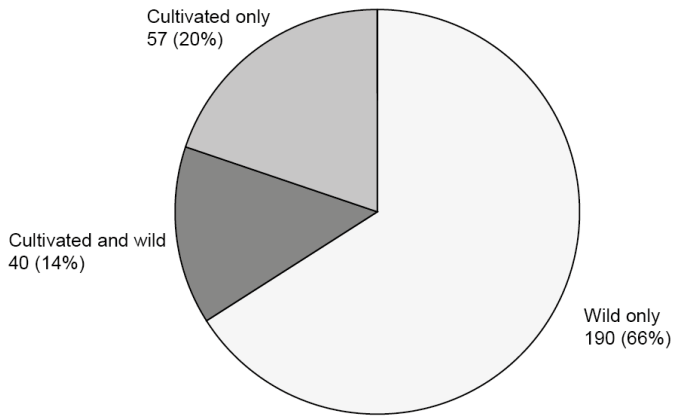

Fig. 10: Occurrence of medicinal plants (n=287) in Shaxi. Total number and percentages of species occurring only in natural habitats, only in cultivation, or both.

Of the cultivated plants, 68 are grown as ornamentals in gardens or along roads; 21 as food plants in gardens or fields; 20 are grown for harvesting medicinal products, with the exception of a few (see 3.2.3) only on a small scale in private gardens; two are related to ritual purposes such as producing incense; and *Kochia scoparia* is grown for making brooms (fig. 11).

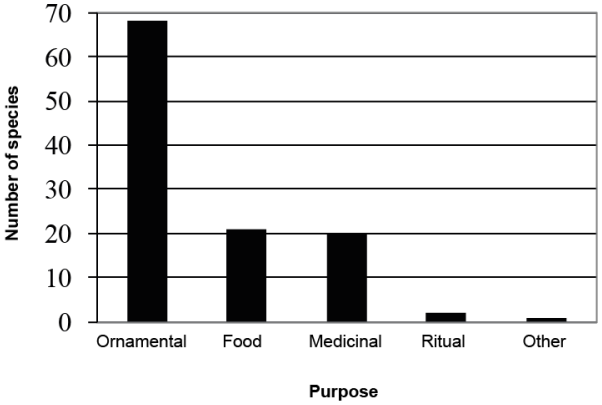

Fig. 11: Purpose of cultivation of plants with medicinal properties (n=97).

Of the 230 wild or semi wild plants, 92 grow in the *Quercus-Pinus* forests on the dry ridges of the hills on red or yellow soil; 77 grow in or among fields, mainly at roadsides, in water ditches or in and below hedges); 66 grow in villages or their direct vicinity, i.e. mainly in wasteland habitats; 61 grow in the subtropical broad-leaved evergreen forests of the ravines running down the hills, 49 grow in the scrub on the foot of the hills dominated by sclerophyllous shrubs and interspersed with many paths; and 26 grow in the subalpine meadows dominating the hilltops, where grazing pressure from livestock is usually quite high (fig. 12)[48].

[48] These data are based on personal observation and information gathered in interviews, it is of course quite likely that some of the plants have additional habitats. For the majority of the plants more than one habitat was recorded. *Bulbophyllum* sp. was collected on the market and its habitat is unknown.

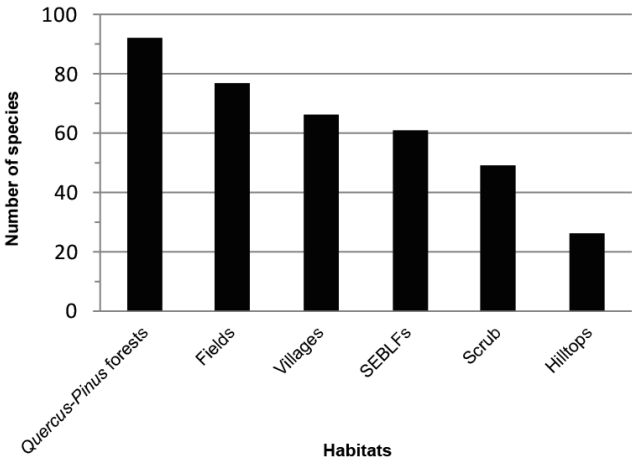

Fig. 12: Natural habitats of medicinal plants occurring in the wild (n=230). SEBLFs refers to the subtropical evergreen broad-leaved forests.

Local plant names and origin of knowledge

The names for medicinal plants provided by local Bai informants are listed in Appendix 1.1. There are basically three categories of plant names locally used among the Bai population.

1. Han Chinese names, with no or only minor differences in pronunciation. The majority of these are also published as official or alternate names in Chinese *materia medica*. Examples are *Aconitum carmichaelii* (附子 *fuzi*, 乌头 *wutou*) and *Erigeron breviscapus* (灯盏细辛 *dengzhanxixin*).
2. Names in the Bai language somewhat resembling their Han Chinese counterparts or being literal translation of these. An example for a name showing phonetic similarities is *Dianthus chinensis* (Chinese name: 石竹 *shizhu*, Bai name: *zisu*); according to all three main informants, the word *zisu* does not carry any particular meaning in Bai. An example for a Bai name being the literal translation of the Chinese is *Thalictrum delavayi* (Chinese name: 马尾黄连 *maweihuanglian*, Bai name: *maweidewuanlin*).
3. Names in the Bai language showing no resemblance in meaning or pronunciation with their Han Chinese counterparts. Examples are: *Vaccinium fragile* (Chinese name: 土千年健 *tuqiannianjian*, Bai name: *guluzi*) and *Solanum nigrum* (Chinese name: 龙葵 *longkui*, Bai name: *kuagudeng*).

Thus the plant names basically follow the general pattern of the Bai language described by Fitzgerald (1941: 14). The existence of Bai names unrelated to their Chinese counterparts could be used as an indicator for locally evolved knowledge on the respective species. Yet, unique Bai names also exist for neophytes from the Americas like *Mirabilis jalapa* (Chinese name: 紫茉莉 *zimoli*, Bai names: *baifanghuju*, *bafu*). This latter point would suggest quite a rapid evolution of such names. It is noteworthy, that all of the main informants generally used the Chinese plant names, even when communicating with other Bai people, and in many cases had to think for quite a while until they remembered the name in their own language. Regarding the origin of knowledge, it is difficult to distinguish between locally evolved traditional knowledge on medicinal plants and knowledge based on sources outside of the Shaxi valley[49]. This is particularly the case because of three reasons.

[49] This point is confirmed by Weckerle et al. (2009), who conclude that medicinal plant knowledge in Shaxi is strongly influenced by mainstream TCM knowledge, particularly books on herbal medicine published in the 1970s. They claim that these generally had quite an impact on the standardization of medicinal plant knowledge throughout rural China.

1. None of the local informants saw Bai medicine as anything separated from traditional Chinese medicine. Thus all medicinal plant knowledge must be seen in the broader context of herbal medicine in Han dominated China.
2. In Chinese herbal medicine there is a long history of including plants used by ethnic minority groups into the *materia medica* (Bensky et al., 2004: xv). As a wide selection of medicinal plant books is available throughout China for prices affordable even for rural farmers, the knowledge of most local people represents a mix of information obtained from relatives and friends on one side and written publications on the other. This is exemplified by the knowledge of the three main informants, which represented a mix of oral tradition passed on from people within the Shaxi valley and additional knowledge from medicinal plant books
3. Shaxi has been on the way of a long distance trade route for centuries. This quite likely resulted in an extensive cultural exchange between the local Bai and surrounding peoples, which most likely also influenced the local knowledge on medicinal plants.

The medicinal plants documented also include several introduced plants for example from the Americas (e.g.: *Bougainvillea glabra, Mirabilis jalapa, Nicandra physalodes*). Considering the rapid incorporation of New World crops into agriculture (Schmitt (2007) and references therein) and the long tradition of incorporating “foreign” medicinal plants into official Chinese *materia medica* (Bensky et al., 2004: xv) indicates that this is not a special case for medicinal plants in Shaxi.

Fig. 13: Medicinal plants **(A)** *Bupleurum marginatum* **(B)** *Bletilla striata* **(C)** *Clematis chrysocoma* **(D)** *Erigeron breviscapus* **(E)** *Clematis peterae* **(F)** *Origanum vulgare*

4.2.3. Data on cultivated and merchandised medicinal plants

As a means of identifying locally important medicinal plant species and to investigate which of them had particular potential for local cultivation and sale, information on locally traded and cultivated herbal medicine was collected. These data are supplemented by the information provided from the local government and obtained through an excursion to a well-known medicinal plant farm in the *Dali* Prefecture.

Locally traded medicinal plants

Besides being a major social event and tourist attraction, the weekly market in *Sideng* also serves as a platform for dealing with fresh and dried medicinal plants (fig. 14).
There are several merchants from other parts of Yunnan, who more or less regularly frequent this Friday market and offer their products for sale. These deal with a broad selection of popular TCM products, some of which also grow in the Shaxi area. Yet, all of them stated that they have never bought medicinal plants in Shaxi and did not show particular interest in doing so, as they had their regular suppliers. Also, every Friday local people bring a limited number of local medicinal plants to the market to sell them to local customers. A list of the species observed is given in table 4.

Table 4: Medicinal plants traded on the weekly market in *Sideng*.

Latin Name[1]	**Local Name**	**Plant part** (state[2])	**Price in CNY**[3]
Aconitum carmichaelii	*fuzi*	root (d)	20/*jin*[5]
Agastache rugosa	*baohu*	leaf (f)	1/bundle
Ainsliaea pertyoides	*yexiahua*	wp[4] (f)	5/*jin*
Amorphophallus rivieri	*moyu*	tuber (f)	0.1/ *jin*
Amorphophallus rivieri[6]	*moyu*	tuber (p)	1.5/ *jin*
Anaphalis bulleyana	*wuxiancao*	wp (f)	1/bundle
Angelica sinensis (Oliv.) Diels[7]	*danggui*	root (f)	8-20/ *jin*
Arisaema elephas	*xiangnanxing*	tuber (f)	3/ *jin*
Arisaema cf. *erubescens*	*tiannanxing*	fruit (f)	10/ *jin*
Arisaema cf. *erubescens*	*tiannanxing*	tuber (f)	5/ *jin*
Bletilla formosana	*xiaobaiji*	rhizome (f)	7/ *jin*
Bletilla striata	*dabaiji*	rhizome (f)	7/ *jin*
Botrypus sp.	*jueqi*	frond (f)	4/bundle
Bulbophyllum sp.	*guoshangye*	wp (f)	5/ *jin*
Bupleurum marginatum	*chaihu*	wp (f)	0.5/bundle
Cinnamomum glanduliferum	*xiangzhangguo*	fruit (d)	18/ *jin*
Colocasia esculenta[6]	*yutouhua*	inflorescense (f)	4/ *jin*
Colocasia esculenta[6]	*yutou*	tuber (f)	1.5-2/ *jin*
Coriandrum sativum[6]	*xiangcai*	wp (f)	0.5/ *jin*
Cymbopogon cf. *distans*	*xuancao*	wp (d)	1/bundle
Dipsacus asper	*xuduan*	root (f)	2/ *jin*
Eleocharis dulcis (Burm. f.) Trin. ex Hensch[6, 7]	*mati*	corm (f)	2/ *jin*
Erigeron breviscapus	*dengzhanxixin*	wp (d)	5/ *jin*
Gentiana cephalantha	*longdancao*	wp (d)	40/ *jin*
Geum aleppicum	*shuiyangmei*	wp (f)	2/bundle
Hemiphragma heterophyllum	*zhuajinyou*	wp (d)	2/bundle
Houttuynia cordata[6]	*yuxingcao*	leaf (f)	5/ *jin*
Houttuynia cordata[6]	*yuxingcao*	root (f)	3/ *jin*
Lichenes[6]	*shuhuacai*	wp (d)	18/ *jin*
Lilium davidii[6]	*baihe*	bulb (f)	7/ *jin*
Lilium davidii[6]	*baihe*	tepal (d)	12/ *jin*
Lycopodium japonicum	*shengjincao*	wp (f)	2/bundle
Lycopus lucidus[6]	*dishenzi*	rhizome (d)	5-7/ *jin*
Onosma paniculata	*hongdanshen*	root (d)	20/ *jin*
Origanum vulgare	*xiangru*	wp (d)	1/bundle

Latin Name[1]	**Local Name**	**Plant part** (state[2])	**Price in CNY**[3]
Ottelia acuminata (Gagnep.) Dandy[6, 7]	*haicaihua*	inflorescense (f)	12/bundle
Paris polyphylla	*chonglou*	rhizome (f)	40-130/ *jin*
Potentilla fulgens	*fanbaiye*	wp (f)	3/bundle
Psammosilene tunicoides	*dudingzi*	root (f)	20/ *jin*
Pueraria lobata[6]	*gegen*	root (f)	3/ *jin*
Pteridium aquilinum (L.) Kuhn[6, 7]	*juecai*	shoots (p)	2.5/ *jin*
Reineckea carnea	*yudaicao*	wp (f)	1/bundle
Sagittaria trifolia[6]	*cigu*	tuber (f)	4/ *jin*
Schizonepeta tenuifolia	*jinjie*	wp (d)	2/bundle
Sechium edule (Jaquin) Swartz[6, 7]	*yangsigua*	fruit (f)	12/ *jin*
Smallanthus sonchifolius[6]	*xuelianguo*	tuber (f)	4/ *jin*
Stachys sieboldii Miquel[6]	*ganlu*	root (f)	7/ *jin*
Toona sinensis (A. Jussieu) M. Roemer[6, 7]	*xiangchun*	leaf (f)	3/bundle
Valeriana jatamansi	*matixiang*	wp (f)	5/ *jin*
Xanthium sibiricum	*cangerzi*	fruit (d)	7/ *jin*

[1]The plant families and authors of most species are given in Appendix 1.1.
[2]"State" refers to the condition of the plant parts when they are offered for sale; "d" means dry, "f" means fresh, "p" means processed.
[3]Exchange rate at the time of research (15.11.2010): 1 CNY=0.15 USD
[4]"wp" stands for whole plant.
[5] A *jin* is a Chinese pound (equivalent to 500 g), plants sold in bundles were not weighted by the sellers.
[6]Sold as food rather than as medicine.
[7]No specimens collected, photographical images only.

This list also includes some plants, which were not actually sold as medicine but rather as food (fig. 14 E&F). As there is, however, a continuum between food and medicinal plants (see e.g.: Etkin (2006) and Kabuye and Ngugi (2002)[50]) and the given plants do have recorded medicinal properties (Yunnan Institute of Materia Medica, 2004 to 2009), which were usually also confirmed by the sellers upon inquiry, they are included here.
Besides the food plants (with the exception of Lichenes, *Pteridium aquilinum* and *Toona sinensis*), *Agastache rugosa* and partly *Paris polyphylla*, all these plants were collected in the wild. None of the sellers considered dealing with medicinal plants his profession but rather a means of gaining a limited auxiliary income. There was however one man from *Silian*, who, besides being farmer, could be considered a semiprofessional medicinal plant dealer. He did not collect plant material himself, but rather functioned as a middleman between collectors and merchants. Every Friday he was standing at a fixed position on *Sideng*'s main street and bought what collectors brought to him. He focused, however, on quite a limited number of species (mainly *Arisaema elephas*, *Bletilla formosana* and *striata*, *Erigeron breviscapus*, and *Paris polyphylla*) of which he knew that he could sell them without difficulty.
The analysis of locally merchandized medicinal plants can be viewed as an ideal way of identifying species important to the local community, economically as well as for household healthcare. Yet, many of the medicinal products are only sold seasonally, especially in winter, when many people have the time to go plant collecting and the demand for remedies against cold is particularly high. Thus, much of the shown data was not available before the construction of the garden had begun. Therefore, this information influenced the choice of herbal medicine for the garden only to a minor degree.

[50] Kabuye and Ngugi (2002) claim, "there are advantages in not separating nutrition from medicine, as the two are complementary or even interchangeable in management of health problems". Personal observation in rural China strongly supports this claim, as the people of Shaxi attach medicinal properties to virtually any non-synthetic foodstuff. Etkin (2006: 102) confirms this observation by her statement: "the distinction between Chinese medicine and food has been especially porous".

Fig. 14: Locally traded medicinal plants **(A)** Selection of dried non-local herbal medicines **(B)** *Agastache rugosa* and *Bupleurum marginatum* bought for home usage **(C)** *Agastache rugosa* and *Schizonepeta tenuifolia* offered for sale by Bai woman from *Jianglehei* **(D)** and **(F)** medicinal plants sold as vegetables: *Houttuynia cordata* (D) and *Colocasia esculenta* (F) **(E)** *Paris polyphylla* seedlings offered for sale for cultivation

Locally cultivated medicinal plants

Due to the high price, many farmers were cultivating *Paris polyphylla* on a small scale (from three to one hundred plants, with an average of 26.4(±25.4) indviduals; n=15). The rhizomes for the cultivation were either dug up in the wild or, as the plant was becoming increasingly rare, bought on the market when small (fig. 14E), then grown until they reach a good size and then sold. None of the questioned persons had yet tried to grow the plants from seed. Besides this and some medicinal plants grown in private gardens for non-commercial purposes, three species of medicinal plants were observed commercially cultivated in Shaxi township in 2010.
Dipsacus asper was cultivated on a field in *Shilong* (fig. 17A). The farmer had attempted growing *D. asper* on 2.5 *mu*[51] previous wasteland for the first time, to see whether it was profitable. As he had not yet harvested, he could only estimate a yield of 1'600 CNY[52] per *mu*. He intended to sell the dried roots to a middleman from outside the Shaxi valley.
Aconitum carmichaelii was cultivated in several locations, two of which were visited.
In a Lisu village east of *Silian*, a family had been cultivating *Aconitum* for 15 years on rich soil located on a densely vegetated hillside (fig. 17B). They processed the roots themselves by steaming them together with ginger. One *jin*[53] of the dried and processed roots they sold for 25 CNY to a middleman from outside the Shaxi valley. They considered the cultivation labor intensive yet more profitable than growing potatoes.
In *Shaping*, a woman cultivated *Aconitum* for the first time in 2010 on a small plot of land normally used for growing vegetables. Her sister's family grew the plant on more than 50 *mu* in a place outside of the Shaxi valley and had had very good results, which tempted her to try it as well. She did, at the time of research, not know how high the yield would be, as she had not yet harvested.
Erigeron breviscapus was cultivated for the first time in 2010 on a total of 106 *mu* in *Beilong*, by 80 different households. The cultivation project had been initiated by a pharmaceutical company from Kunming, which specialized on *E. breviscapus*. Scientists from this company had found that *Erigeron* from *Jianchuan* County had a particular high content of the effective component *breviscapine*[54]. Therefore the company, in cooperation with the local government, identified suitable areas for cultivation in this county and convinced the respective farmers to replace their former crops with this medicinal plant species. In case the cultivation failed to be successful, the government promised compensation of up to 1'400 CNY per *mu* if the farmers' yield was below that amount. The contract with the company was running on an annual basis, seeds were provided and payment settled after the quality of the harvested product was controlled.
According to the numbers provided by the village government, the yield per *mu* ranged from 1'000 to 5,400 CNY (with an average of 2'034 CNY; compared to 2'600 CNY for tobacco, 1'800 CNY for rice and 1'500 for corn; fig. 15). These numbers conform quite well to the data obtained from interviews conducted with private households (n=12). According to these, the yield per *mu* ranged from 600 to 5'200 with an average of 2'875 (±1'553) CNY. Of the interviewed farmers, 83% expressed satisfaction with growing *Erigeron.* Yet, five (42%) of them mentioned the cultivation was comparatively labor intensive, as the seedlings needed to be kept in nursery fields before transplanting, the fields required a high amount of weeding, and because harvesting and drying the crop was more complicated than for other crops.

[51] A *mu*, or Chinese acre, is a commonly used surface measure in China; 1 *mu* = 1/15 ha.
[52] Exchange rate at the time of research (15.11.2010): 1 CNY=0.15 USD.
[53] A *jin* is a Chinese pound; equivalent to 500 g.
[54] The flavonoid 4'-scutellarin-7-glucuronide, known in Chinese as 灯盏素 (*dengzhansu*), shown to be effective against cerebral ischemia (Yiming et al., 2008).

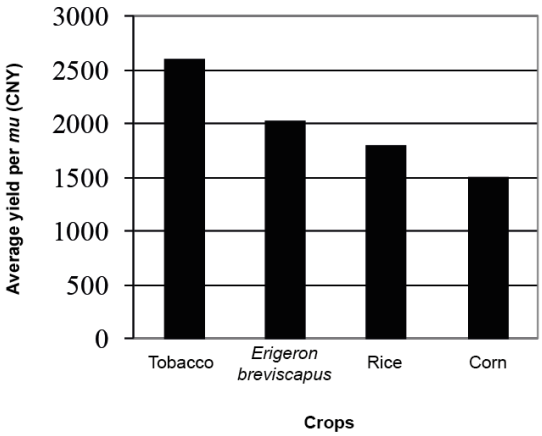

Fig. 15: Average yields per area of common crops in Shaxi in comparison to the medicinal herb *Erigeron breviscapus.* Numbers according to the village government of *Beilong.*

The fields, that had proven most suitable for cultivation of *E. breviscapus*, were former cornfields, which have a rather poor sandy soil and low water holding capacity. However the majority of fields used in 2010 were rice fields, which have a much more nutritious soil and are capable of holding more water. Considering that 2010 had been the first year of *Erigeron* cultivation and that in 2011 the area was reduced to the 60 *mu*, which had yielded the highest profit in 2010, the average yield was expected to increase.

According to the head of the agricultural department of the *Jianchuan* County People's Government, *E. breviscapus* was cultivated on a total of 500 *mu* in the entire county in 2010 and an increase to 1'200 *mu* was planned for 2011. The price offered by the pharmaceutical company was 25 CNY per kilogram dried product. Another two companies had offered a better price, were however unable to provide seeds. The agricultural department expected a yield of 250-300 kg dried product per *mu* resulting in 6'250-7'500 CNY/*mu*. These numbers seem idealistic yet not impossible in the future, as further research on the cultivation of *E. breviscapus* was being conducted both by the pharmaceutical company and the agricultural department.

Given the early stage of *Erigeron* cultivation in *Jianchuan* and the fact that it grows best on former corn fields, which yield a rather small profit, it seems that this particular medicinal plant has a large potential in local agriculture. If the plants would be industrially dried and processed locally, it would further increase the potential for the local economic development and reduce the labor for the participating farmers. On the other hand it would also reduce the farmer's income; whether this reduction stands in a good comparison to the reduction in labor is difficult to assess.

The agricultural department provided numbers for three other species of medicinal plants grown commerically in *Jianchuan* County (fig. 16). These were *Aconitum carmichaelii* (on 2'000 *mu*), *Dipsacus asper* (on 4'000 *mu*) and *Ligusticum sinense* cv. *chuanxiong* (on 3'000 *mu*). They mentioned that these three were cultivated by private farmers without contracts with pharmaceutical companies or support from the local government.

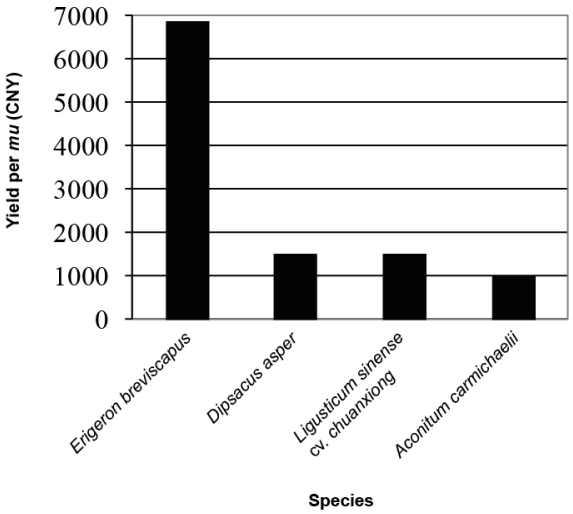

Fig. 16: Expected (in the case of *Erigeron breviscapus*) and realized yields of the medicinal plants most commonly cultivated in *Jianchuan* County. Numbers according to the head of the County's agricultural department.

The agricultural department of the *Shaxi Township People's Government* provided data on medicinal plants cultivated in Shaxi in 2011. According to these data, medicinal plants were cultivated on a total of 497 *mu*. An overview of the locations at which the respective species were cultivated is given in table 5. Unfortunately, the department was not able to provide more details about the cultivation and yields of the various species and cultivation sites.

Table 5: Medicinal plants commercially cultivated in Shaxi in 2011. Data provided by Shaxi's agricultural department.

Species	**Total area cultivated** (*mu*)	**Area per village** (*mu*)
Aconitum carmichaelii	255	*Sangoudui*[1] (150), *Huoshan*[2] (100), *Lianhe* (5)
Erigeron breviscapus	160	*Huoshan*[2] (100), *Beilong* (60)
Paris polyphylla	40	*Taping*[3] (30), *Lianhe* (10)
Platycodon grandiflorus (Jacquin) A. Candolle	20	*Taping*[3]
Angelica sinensis	15	*Meiling*[4] (10), *Shilong* (5)
Dipsacus asper	5	*Longweishan*[5]
Aucklandia lappa Decne.	2	*Huacongshan*[6]
Total	497	

[1]Lisu village belonging to *Shilong*; [2]Han village belonging to *Dongnan*; [3]Han village belonging to *Hongxing*; [4]Yi village belonging to *Changle*; [5] Lisu village belonging to *Beilong*; [6]Yi village belonging to *Hualong*.

It is noteworthy, that 80% of the land cultivated with medicinal plants is located in the hills or on the hilltops and 84% of this land is situated in villages inhabited by the local ethnic minorities Han, Lisu and Yi. These villages are generally poorer (Huber et al. 2010) and the crops grown yield lower profits than the rice grown in the valley bottom[55]. This indicates that medicinal plant cultivation has quite a potential of contributing to the income generation, particularly in the poorer villages, in Shaxi.

In the Han village *Hongxing*, three farmers founded a cooperative, with equal shares, to cultivate medicinal plants in 2011. They did some research themselves to investigate possibilities and thus decided to grow three species of medicinal plants on a total area of 40 *mu*. *Aconitum carmichaelii* was to be grown on 20 *mu* with an expected yield of 6'000-8'000 CNY per *mu* each year. *Platycodon grandiflorus* was grown on 20 *mu*, the expected yield being 12'000 CNY per *mu* after two years time. *Paris polyphylla* was grown on four *mu*, the expected yield being 30'000 CNY per *mu* after a period of three years and more if harvested

[55] The village *Hongxing* (Han) is an exception to this generalization. Although, it lies too high for large-scale rice cultivation, the large amount of tobacco cultivated and the connection to a paved road make it a comparably wealthy village.

after four or five years[56]. The farmers hoped to sell the harvest themselves, fresh and unprocessed, directly to a pharmaceutical company. If the project proved successful, they considered investing into a processing plant in Shaxi.
Paris polyphylla was grown from seedlings, the other two sown out. Both seeds and seedlings were bought in *Ludian*[57]; the prices were as follows:

- *A. carmichaelii*: 7 CNY/kg seeds
- *P. polyphylla*: 2 CNY/seedling
- *P. grandiflorus*: 250 CNY/kg seeds

The land was formerly used for growing tobacco and corn. These were grown on red soil, which local farmers consider at most average in quality for agriculture. Along with the medicinal plants, the farmers planted peach trees. They expected the medicinal plants to require less water than the former crops and, in contrast to these, to require only manure as fertilizer. They did however expect to have to use pesticides. The fact that medicinal plant cultivation requires comparably little fertilizer, makes it particular attractive, as the *Regional Economic Development Strategy* of the *Shaxi Rehabilitation Project* identified the excessive use of fertilizers in agriculture as one of the major threats to Shaxi's sustainable development (SRP, 2009). Despite the fact that one of the farmers was the village's communist party secretary, no support from the local government was sought nor granted. This example shows that an increased cultivation of medicinal plants in Shaxi does not necessarily require support from outside of Shaxi. It seems that, whenever the local farmers consider such undertakings feasible, they are quite well able to gather the required information and propagation material themselves. It is noteworthy that this cooperation in *Hongxing* started the combination of orchards and medicinal plant cultivation. If this proves to be successful, other farmers in Shaxi may copy the principal scheme.

Large-scale cultivation of medicinal plants

To investigate possibilities for large scale cultivation of medicinal plants in Shaxi, an excursion to a large medicinal plant farm in *Huadianba* (*Xizhou* Township, *Dali* County) was undertaken (fig. 17C). Here, on a high plain in the *Cangshan* range at an altitude of about 3'200 m a.s.l., Chinese medicine had been grown since 1959 in a collective farm, operated by the Yunnan government. Several local farmers later copied the successful concept.
On the plain, there is a black soil, rich in nutrients, and there is ample supply of water from the surrounding mountains. The leaders of the collective decide on an annual basis what plants to grow according to the success of the previous year and the demand from the merchants. These decisions were observed and mostly copied by the private farmers. Given the long cultivation history of the place, they have little difficulty to sell their produce as they have established connections to pharmaceutical companies, which receive the fresh or dried plant material in the city of *Xiaguan* about 35 km away. Interviews with the workers of the collective showed that nine species of Chinese medicinal plants were cultivated on the plain in 2010; these are shown in table 6. Unfortunately, no one was able to provide details on the total area cultivated and the yield per area of the individual species.

[56] There is an obvious discrepancy between the information given by the interview partners in *Hongxing* and the agricultural department. This is most likely explained by misinformation by the agricultural department which makes the entire dataset received from this department somewhat questionable.
[57] *Ludian* is a township in the neighboring *Lijiang* prefecture, famous within Yunnan as a source for medicinal plants. For a detailed description of the location see Pei et al. (2010).

Fig. 17: Medicinal plant cultivation and local soils **(A)** *Dipsacus asper* field in *Shilong* **(B)** Cultivated *Aconitum carmichaelii* in Lisu village **(C)** Farmer in *Huadianba* laying out *Anisodus acutangulus* fruits for drying **(D)** Red Ferralisol (*hongtu*) above limestone (*baitu*) **(E)** Yellow Alfisol (*huangtu*) under pine trees **(F)** Black soil (humus, *heitu*) under evergreen broad-leaved trees

Table 6: Herbal medicines cultivated on the medicinal plant farm in *Huadianba*. Data according to workers on the farm.

Latin Name	**Chinese Name**	**Price/kg** in CNY (state[1])
Aconitum carmichaelii	乌头 (wutou)	6 (f)
Angelica sinensis	当归 (danggui)	n.d.
Anisodus acutangulus	三分三 (sanfensan)	2 (f)
Atractylodes sp.	白术 (baishu)	12 (d)
Aucklandia lappa	木香 (muxiang)	2 (f), 8 (d)
Eutrema sp.	山嵛菜 (shanyucai)	10 (f)
Ligusticum sinense cv. *chuanxiong*	川芎 (chuanxiong)	14 (d)
Paris polyphylla	重楼 (chonglou)	300 (d)
Rheum palmatum L.	大黄 (dahuang)	6 (d)

[1]"State" refers to the state in which the plants are sold; "d" and "f" being dried and fresh products respectively.

Personal observation indicates that *Aconitum carmichaelii*, *Anisodus acutangulus* and *Eutrema* sp. (*wasabi*) occupied the largest areas in 2010 with *wasabi* ranking first. According to the farmers they only began growing *wasabi* in 2008 and the produce is sold to Japan. Similar cultivation undertakings would probably also be feasible on the plains of the hilltops East and West of the Shaxi valley. There are several locations with comparable conditions; large patches of land were not cultivated at the time of research; and the inhabitants of the villages on the hilltops are among the poorest people of Shaxi, which provides for a financial interest in trying new crops. All of the medicinal plants cultivated in *Huadianba* would probably also grow well on the meadows above the Shaxi valley. As *A. acutangulus* naturally occurs in Shaxi but is becoming increasingly rare, this would be a particularly interesting plant for local cultivation. However, *P. polyphylla*, due to its high price, and *Eutrema* sp., due to its reported success and demand overseas, seem also very promising. The two main issues would most likely be specific training of the villagers for the cultivation of medicinal plants and establishing contacts to pharmaceutical companies. Here the *Shaxi Rehabilitation Project* could help to bridge the gap between farmers and local authorities and thus enable a goal-oriented support for the farmers, interested in the commercial cultivation of medicinal plants.

4.2.4. Local classification of soil and vegetation types

Soil types

To supplement the collected background information on medicinal plants, villagers, regarded as experts on the topic by the local community, were asked about their personal way of classifying the locally present soils. This information also provides certain insights into the worldview of the local community. Further, the obtained information helped to structure the medicinal plant garden following local concepts and believes. An overview of the soil types distinguished by the soil's color by the questioned farmers is given in table 7. Below, this is described in some more detail and an alternative way of classifying soils is given.

Table 7: Overview of the soil types distinguished by local informants by the soil's color.

Local name	**English**[1]	**Scientific Classification**[2]	**Informants** (%), n=13
Hongtu	Red soil	Lateritic Ferralisol	92
Huangtu	Yellow soil	Sandy Alfisol	92
Baitu	White soil, chalk	Limestone Primarosol	77
Shanqitu	Leaf litter	L-layer of various soils	77
Heitu	Black soil		69
	Humus	H-layer of various soils	46
	Bog soil	Aqueous Soil	23
Hetu	Brown soil		69
	Paddy soil	Anthrosol	46
	Mixed yellow and red soil		31

[1] The English name is either a literal translation of the Chinese term or a description of the soil referred to.

[2]The Scientific Classification follows the genetic Soil Classification of China; see Shi et al. (2004) for a discussion of this and a comparison with other classification systems.

Twelve informants distinguished soil types by color. Of these, all mentioned and agreed on the characteristics of red (fig. 17D)) and yellow soil (fig. 17E), both of which are also used in construction work. Ten persons mentioned white soil, which is used for plastering of buildings. Further ten informants distinguished *shanqitu*, which is half fermented leaf litter, as an individual soil type. Black and brown soils were mentioned by nine informants each. However, they did not fully agree on the characteristics of these soils. While three men said black soil is moist soil next to standing water, another six considered black soil to be the soil underneath large stands of broad-leaved trees (the humus layer of different soil types; fig. 17F). According to four informants, brown soil is a mixture of red and yellow soil, whereas six informants called the soil in rice fields brown soil. One informant distinguished these two brown soils and referred to the mixed red and yellow soil as *congtu*. The same informant also mentioned an additional soil type: river sediments (*yutu*), which he said is very rich soil and can be used to fertilize rice fields. On the other hand, five informants said soils could be distinguished by their pH. Here again, however, there was some confusion; while three men said the soil East of the *Heihui* River was alkaline and West of the river acidic, the other two claimed the opposite.
This rather profound knowledge in combination with a fair bit of confusion shows the truth behind one informant's statement:

> "Knowledge about soils is extremely important for farmers. However, it is a very complex subject, too difficult for many people to understand." (M, 68, Bai, *Changle*, college; field notes August 2010)

In regard to gardening, several informants mentioned black or brown soils are the best; yet for growing vegetables fertilizer ought to be added. Five informants said that for growing Chinese medicine, red soil mixed with *shanqitu* (as a slow release fertilizer) is ideal, regardless of the kind of medicinal plant. Further, four men mentioned that in medicinal plant cultivation organic fertilizer should be added only with great care, as this may lead to the

rotting of the plants' subterranean parts. One informant additionally stated that many local medicinal plant species do not require nutritious soil and therefore, no, or only a little, fertilizer is required for their cultivation.
Interestingly, a particularly knowledgeable man from *Changle* claimed that a parallel can be drawn between human diseases and Chinese medicine on the one hand and plant requirements and fertilizer on the other hand. Thus, he said a distorted *yin*/*yang* or warm/cold balance in plants could be reestablished by giving the appropriate kind of fertilizer. According to him, organic fertilizer can be warm (chicken, sheep, horse and pigeon dung), cold (buffalo and milk cow dung) or neutral (pig and "yellow cow" dung). Cold fertilizer takes longer to ferment and to release nutrients, whereas too much warm fertilizer can kill plants by "burning" them (*shaosi*). This and also the usage of herbal medicine for veterinary purpose shows, that the concepts underlying Traditional Chinese Medicine should not be regarded as something separate from the rest of the culture, but rather as deeply imbedded in ancient Chinese philosophy. The principal ideas behind this philosophy (see Appenix 5.1.) are applicable to virtually every aspect of life.

Vegetation types

While the questions concerning soil were generally well received, the inquiries regarding vegetation types were hardly understood by the local people. This may be due to language barriers or the lack of an abstract system of classifying vegetation types among the local population. Thus, specific answers were only received after hinting that altitude may be a way of distinguishing between different types of vegetation. Consequently, most answers followed this concept. Yet, the informants simply stated what kind of plants predominate at different altitudes in the Shaxi area. The given answers basically agree with the description of the local vegetation given in the introduction of this thesis.
One informant, however, did give three particularly interesting insights. First, he was the only one to mention the evergreen broad-leaved forests, which he called *fengshuilin* (lit.: "wind water forest") and considered growing in locations, where water is not limiting. Second, he claimed that the valley bottom, too, should be vegetated with a kind of broad-leaved forest[58], this one, however, he called *limu* forest and unfortunately could not explain in more detail what kind of tree *limu* is[59]. Third, he said that when he was younger, the pine forests dominating the surrounding hills were much thicker. This last statement is in accordance with the statement made by another informant:

> "After the liberation, many pine trees were cut down. The problem about that is, that many different herbs and medicinal plants were lost. Also there is a big problem with erosion now." (M, 70, Bai, Silian, high school; field notes August 2010)

This also indicates a strong environmental awareness of at least some of the local people.

4.2.5. Insights into local gardening practices and concepts

As it was intended to base the design of the medicinal plant garden as well as possible on the local style of gardens, information on the topic was gathered through interviews with 25 local

[58] This claim is supported by Tang (2010), who claims that subtropical evergreen broad-leaved forests once covered most of subtropical Yunnan.
[59] It is possible, that the small patches of large trees around many temples are artifacts of such broad-leaved forests (Tang, 2010).

gardening experts. An overview of the answers received is presented in table 8. For the exact questions asked refer to Appendix 2.1.

Table 8: Overview of the answers received from local experts questioned on local gardens and gardening practices.

Questions	**Common answers**	**Informants** (%), n=25[1]
Origin of gardening traditions	Strong Han Chinese influence	100
	Completely derived from Han traditions	28
Specialties of local gardens	Design of the courtyard	48
	Decorated walls	12
Features of local gardens aside from plants	Water features	84
	Decorative rocks	68
	Table and chairs	52
Reason for having a garden	Creation of a pleasant environment	64
	Pragmatic reason	20
	Gardening as hobby	8
Special meaning of plants	Depending on individual person	68
	Symbolisms of specific plants	52
	Important meaning for agriculture	12
Plants specifically grown in temples	Cypress	80
	Ficus religiosa L.	4
Source of ornamental plants grown in local gardens	Wild plants of the surrounding hills	92
	Plant sellers at weekly market	72
	Souvenirs from elsewhere	20
Factors affecting the choice of plants for individual gardens	Availability	48
	Living standard	36
Foundation for choosing a plant's position within the garden	Randomly chosen	44
	Practical considerations	32
	Aesthetic aspects	20
	According to tradition	8
Origin of knowledge related to gardening	Social contacts	68
	Personal experience	56
	Literature	28

[1]As more than one answer was possible per question and informant, the sum of percentages may exceed 100.

When asked whether the local gardens are a special Bai tradition or rather Han Chinese, all informant saw a strong Han influence, with seven people even claiming that they are completely derived from Han Chinese tradition. What many did see as a characteristic distinguishing the gardens of the local Bai people was the traditional makeup of the courtyard[60], especially the existence of a screen wall (*zhaobi*). Also, three informants claimed that walls decorated with paintings and scriptures (*huazi*) were typical for Bai courtyards. Schmitt (2007) showed that the courtyard architecture (*sanfangyizhaobi*) is by no means limited to the Bai cultural sphere and quite likely originated in Southeast China. The *huazi* usually display common themes and patterns from traditional Chinese paintings and the scripture is always in Han Chinese characters.
Several informants stated that in the past having a garden with flowers (*huayuan*) was a privilege of the richest people of the valley, who, as two people mentioned, liked to show their higher status by "acting like the Han". For poorer people the courtyard was needed to raise animals and to grow some vegetables. Now, however, with the living standards improving, more and more people could afford to have a garden for leisure.
Thus three different kinds of gardens can be distinguished in Shaxi:

[60] In Chinese the word *yuan* can refer to a garden or park as well as to a courtyard, which made clear questions on the topic somewhat difficult.

- The gardens of the poorer farmers with a packed mud or concrete floor, hardly any ornamental plants and often with attached space for animals (fig. 18A).
- The courtyards of the wealthier farmers, merchants or academics. The floors of these are mostly paved with attractive sand stones or bouldering. They contain a variety of ornamental plants and often, decorative stones (*jiashan*) and some sort of water features (fig. 18B).
- Temple gardens, which in addition to ornamental plants contain sacred or special temple plants and mostly a lawn, which provides place for the crowds of worshippers and spectators on festival days (fig. 18C).

All three of these commonly contain areas where vegetables are grown, either inside the courtyard or in the direct surrounding, As most of the interviews were conducted in courtyards belonging to the second type of gardens, it is not surprising that the majority of interviewees considered aesthetic aspects as the most important for a garden and stated the purpose of their garden was to create a pleasing environment and improve the family well being. Another two said gardening was simply their hobby (*aihao*). One mentioned Bai tradition as the reason for building a garden. A mere five people claimed pragmatic reasons, such as growing vegetables and/or medicinal plants or cultivating orchids for sale. Nonetheless, it seems that ideally practical and aesthetic aspects should be combined, as the most common gardening plants mentioned include many fruit trees that also compel with their attractive looks, e.g. peach, plum, pomegranate and citrus trees. A list of the most often mentioned garden plants is given in table 9 (fig. 18 D-F). Other plants that were commonly observed in gardens (yet only singularly mentioned in interviews) are: *Alcea rosea*, *Begonia* spp., *Chaenomeles speciosa*, *Dahlia pinnata*, *Magnolia* spp., *Malus domestica*, *Nothopanax delavayi*, *Osmanthus fragrans*, and *Rhododendron* spp.

Table 9: Most commonly mentioned ornamental plants grown in Shaxi's gardens.

Latin Name	**Chinese name**	**Bai name**	**Informants** (%), n=25	**Special meaning** (number of informants)
Paeonia spp.	牡丹 (*mudan*)	*boduhu*	88	Symbolize wealth (9)
Prunus mume	梅花 (*meihua*)	*jihu*	84	Symbolize strength in difficult times (7)
Orchidaceae	兰花 (*lanhua*)	n.d.	76	Represent beauty (5)
Pinus yunnanenis	松树 (*songshu*)	sia	68	Symbolize longevity (13)
Rosa spp.	玫瑰 (*meigui*)	n.d.	60	
Prunus persica	桃树 (*taoshu*)	*da*	56	Flowering indicates time to sow rice (3)
Punica granatum	石榴 (*shiliu*)	*suamingo*	56	Flowering indicates time to transplant rice seedlings (3)
Bambusoideae	竹子 (*zhuzi*)	*tsoa*	48	Symbolize resilience (7)
Chrysanthemum spp.	菊花 (*juhua*)	n.d.	44	
Citrus spp.	柑橘 (*ganju*)	*jiuzi*	36	

The majority of interviewees said that some plants carry a special meaning, which usually depends on the individual gardener. Yet most were not able to name such a special plant for themselves. For the few that could, this meaning was related to some personal story.
A poet from *Changle* for example explained that for him pines are special as he named his last book after these trees. Yet there are certain plants, with a symbolic meaning on which several informants agreed. Thus peonies symbolize wealth; Pines (and more generally all coniferous trees) signify longevity; Bamboo stands for resilience; Orchids represent beauty and the winter flowering plum trees, as the foretellers of spring, indicate strength in difficult times. Maybe it is due to their symbolic value that three of these (pine, bamboo and plum) should, according to five informants, be present in every garden. Also, three interviewees mentioned

links to agriculture: the peach blossom indicates the time to sow the rice and the beginning of the pomegranate bloom marks the best time to plant out the rice seedlings.
Further, the existence of special temple plants was inquired. Here, most people mentioned cypresses (*baishu*). One also mentioned *Ficus religiosa* (*putishu*) and said he planted two of these trees in the temple of *Silian*. However, when the temple was later visited, it showed that these showed no similarity with *Ficus.* Another species that was observed in many temples (and nowhere else) is *Lagerstroemia indica*, this tree was however not mentioned by any informants.
There are basically two origins of the plants found in Shaxi's gardens: The surrounding hills and the two professional plant sellers at the weekly market. The latter mainly deal with common ornamental plants not native to the area, e.g.: *Bougainvillea glabra, Buxus* sp., *Cassia bicapsularis, Citrus* spp., *Eriobotrya japonica, Ficus* sp., *Fragaria* x *ananassa* Duch., *Ginkgo biloba, Hibiscus syriacus, Kerria japonica, Magnolia* spp., *Osmanthus fragrans, Prunus* spp., *Zamia* sp. Additionally, several local people gain some auxiliary income by digging up shrubs (mainly *Nothopanax delavayi, Pinus yunnanensis* and *Rhododendron* spp.) in the hills and selling them as ornamental plants on the Friday market. Also, orchids (*Cymbidium* spp.) are bought or collected in the wild outside of Shaxi, then propagated and later sold for up to 10'000 CNY per pot. Further, passionate gardeners bring along special plants from holidays or receive them as gifts; examples are *Abutilon striatum* and *Wisteria* cf. *sinensis*.
Thus, the local gardens contain an interesting mixture of local plants, considered suiting as ornamentals, spiced with a rather limited number of non-natives. The selection of plants mainly depends on availability and living standard. Personal observation indicates a strong preference for woody plants, which, as well as herbaceous ornamental plants, are preferably grown in flowerpots. Lawns are very uncommon and can almost only be found in temple gardens and on public land.
The planting position of individual plants is either chosen at random, because of practical reasons (e.g. water, soil and light requirements), considering aesthetic aspects, or according to tradition[61].
The knowledge about plants' requirements and gardening techniques comes from elders and neighbors, personal experience, books, or people claimed to "just know". When asked to describe these techniques or requirements the interviewees had obvious difficulties putting their practical knowledge into abstract words[62]. The only requirement mentioned by several people was that orchids should be held in the shade.
The majority interviewees stated that, besides plants, a garden should contain some sort of water feature. These are often combined with decorative rocks (often referred to as *jiashan* lit.: fake mountain). Many informants also mentioned a table and chairs to rest or to play Mahjong. Consequently these features are also commonly found in – at least the larger – local gardens. Particularly water and *jiashan*, which often form a decorative unit, are attractive to the eye and often create space for special plants like begonias, ferns, mosses and water lilies.

4.2.6. Choice of a location for the medicinal plant garden

In order to base the decision where to build the garden on the opinion of a broader public, a preference ranking was compiled based on the choices made by 29 randomly chosen villagers in paired comparison tasks. The result is presented in table 10. For a detailed account of the results obtained, please refer to Appendix 2.2.

[61] None of the two informants was able to further specify what these traditions were.
[62] This may be seen in the context of the distinction between abstract knowledge and know-how (*savoir* and *savoir faire*), made by Clément (1998)

Table 10: Preference ranking on a location for the medicinal plant garden. Based on paired comparison tasks conducted with local villagers (n=29).

Location	Purpose	Score[1]
Three Religions Temple in *Changle*	Visiting and learning	2.28
Private house in *Changle*	Cultivation for public use	2.34
Private house in *Sideng*	Cultivation for public use	3.28
Private house in *Sideng*	Visiting and learning	3.45
Benzhu temple in *Sideng*	Visiting and learning	3.72
Private house in *Changle*	Visiting and learning	4.72

[1]1.0 being the best and 6.0 the worst possible score.

The interviewees were further questioned on their reasoning for the decisions made. Generally speaking, *Changle* was considered a more appropriate place for cultivation, as the soil was better and the people more skillful farmers. *Sideng* on the other hand was seen as the better place for tourists to visit, as *Changle* was too far away for them to go there. Yet, the *Benzhu* temple in *Sideng* was often considered too small for the construction of a garden and private houses were often considered unfit for an expositional garden, as the owners would take advantage of that position. Also, several people from outside of *Sideng* mentioned, that they would be happy for an attraction in another village, as they were "jealous of the people from *Sideng* getting rich from tourist money". (M, 43, Bai, *Aofeng*, primary school; field notes August 2010)
According to the result of the ranking and other considerations (e.g.: previous interviews with local villagers and tourists, practical considerations regarding the actual construction of the garden, availability of a potential caretaker) a plot next to the temple in *Changle* was chosen as the location for the medicinal plant garden. The actual site for the garden is an enclosed compound, not directly part of the temple, which would be somewhat inappropriate, as temples did not play a traditional role in medicinal plant cultivation in Shaxi. The temple itself is located on a small hill, overlooking the traditional farming village and the valley beyond (fig. 19A). This point might increase the attractiveness of the garden to tourists. The distance for visitors was not considered problematic, as the interviews with tourists showed the willingness of visitors to walk the distance of 30 minutes from *Sideng* to the temple in *Changle*. Being part of the temple compound, the plot lies on public land, managed by the village's elderly people society. As the temple compound is a sort of social center of the village, local people from diverse age groups and social backgrounds frequent the place. School children, adolescent boys and girls as well as elderly people frequently come there to play, drink, talk, or just to relax. Further, it is the centre of social activity at almost all festivals, both religious and non-religious (e.g.: annual poet and artist meeting, the celebrations for the annual holiday for elderly people).

4.2.7. Choice of herbal medicine to be planted

The interviews with local villagers and experts resulted in a rather limited list of plants for cultivation; most likely due to the high number of medicinal plant known locally, which makes a spontaneous choice rather difficult. A pre-selection, based on various criteria (see methodology) was made and the choice, which plants to plant, subsequently based on a preference ranking. It showed that extremely rare plants, such as *Gastrodia elata* Blume, and visually very attractive species, such as *Lagerstroemia indica*, were particularly popular. Very common plants, like *Artemsia* spp. and *Polygonum hydropiper*, on the other hand, ranked particularly low. The full ranking list can be seen in Appendix 2.3.
In addition to the grouping tasks, the interview partners (n=30) were questioned about their reasoning for the choices made. The most common characteristics important for the choice were: useful (mentioned by 24 informants), rare (17), beautiful (11), and easy to grow (10).

Fig. 18: Three types of gardens and common gardening plants **(A)** Farmer's garden in *Changle* with concrete floor and attached space for animals **(B)** Garden of a wealthy merchant in *Beilong* with water feature, decorative rocks and tables **(C)** Inner garden of the *Three religions Temple* in *Changle* **(D)** *Paeonia* sp. **(E)** *Cymbidium* sp. **(F)** *Nothopanax delavay*

The most common reasons for objecting to plants were, that the respective species were too common (26) or impossible to grow (in the valley bottom; 12). The local preferences were further analyzed, through dividing the plants used in the grouping tasks into categories of natural habitats or, in the case of cultivated plants, reasons for cultivation. The results can be seen in Table 11**.**

Table 11: Categories of natural habitat or reason for cultivation together with the average score received by the species of these categories through the paired comparison tasks.

Habitat or cultivation category	**Number of plants** (n=123)[1]	**Average score**[2] (±sd)
Subalpine meadows of hilltops	15	0.660(±0.188)
Broad-leaved evergreen forests in gullies	29	0.610(±0.201)
Pinus-Quercus forests on ridges	27	0.570(±0.153)
Sclerophyllous scrubs on foot of hills	21	0.495(±0.181)
In or among fields	36	0.385(±0.222)
In villages or their direct surrounding	37	0.374(±0.212)
Cultivated as medicine	14	0.686(±0.153)
Cultivated as ornamental	24	0.660(±0.166)
Cultivated for food	15	0.463(±0.179)
Total		0.536(±0.224)

[1]Most species occur in more than one of the categories.
[2]0.0 being the lowest and 1.0 the highest score possible.

It is noteworthy here, that the average score rises with increasing distance from the villages in the valley bottom. This can be explained by the – at least perceived by the inhabitants of the valley bottom – rareness of the plants and by the common believe that plants from elevated locations are generally more effective. Also, the plants cultivated as food rank considerably lower than ornamental plants, most likely due to aesthetic aspects, and plants grown as medicine, which may, at least perceived to be, particularly effective.
In addition to this, the plants were divided into use categories, to investigate whether or not plants used for common ailments were generally ranked higher than remedies for rather uncommon diseases. Here however, few differences were observed. (For the results of this analysis, refer to Appendix 2.3.) This suggests, that the interview partners decided whether a medicinal plant was particularly useful primarily by the species good reputation rather than based on what disease the plant is used for.
All species with a score of 0.6 or higher were chosen for planting. However, a few of these had to be excluded for practical reasons, such as limited availability of propagation material. In the process of collecting plant material, others were additionally chosen for planting out of other reasons, such as landscaping preferences or recommendations by local medicinal plants experts. During this process, the preferences mentioned by the local informants during the course of the interviews were always taken into consideration. Further, medicinal plants already growing on the designated site for the garden were also incorporated into the planting plan. Thus, a total of 122 species were chosen to be grown in the garden (fig. 19B-F). A full list of these together with detailed data on their natural habitat is given in Appendix 1.2.

4.3. Design and construction of the Shaxi medicinal plant garden

All decisions regarding the design and construction of the garden were based on the information obtained in the previous interviews. These data were further reviewed considering western landscaping and scientific knowledge, originating from interviews

conducted in Switzerland[63], from literature[64], and from personal experience. Attempts were made to combine these two complementary knowledge systems as well as possible.

4.3.1. Design of the garden

The design of the garden represents the information gathered from both local people and tourists. Thus, it incorporates many local features and concepts and tries to combine aesthetical and practical aspects, creating an adequate atmosphere for both leisure and learning. To show the various purposes of the garden and medicinal plants in Shaxi, parts of it are designed in a field-like fashion, representing commercial cultivation; while in other areas the design focuses on showing the beauty of the cultivated plants and the variety of medicinal plants from different local habitats. As the garden was intended to be aesthetically appealing to local people and tourists alike, features observed in local gardens were included as well as ideas mentioned by the interviewed tourists.
Within the garden, various artificial habitats were created, generally not in a way as to provide ideal growing conditions for the respective species, but rather to mimic the conditions of the natural habitats as well as possible. The idea behind this was that by adjusting the plants' artificial habitats to natural conditions, the respective plants might strive in the respective locations even after the invasion of weeds. Regarding the planting strategy, an important advice from both Swiss and local experts was, not to "put all eggs in one basket". Following this advice, at least two individuals were planted of each species. Regarding the mode of propagation, different ways were combined wherever possible. Thus, in most cases whole plants were planted together with additional subterranean parts and seeds were sown in the same area. The 122 species of medicinal plants grown in the garden are subdivided into sections according to their habitat and categories of local cultivation. A list of these sections and the plants grown within the respective area is given in table 12.

Table 12: Sections of medicinal plants in the garden and list of species growing in the respective sections.

Name of section	**Plants cultivated**
Cultivated plants	*Aconitum carmichaelii*, *Anisodus acutangulus*, *Dipsacus asper*[1], *Erigeron breviscapus*, *Isatis tinctoria*, *Leonurus japonica*, *Ligusticum sinense* cv. *chuanxiong*[1], *Lilium davidii*
Flower medicine	*Aloe vera*[1], *Alcea rosea*, *Bougainvillea glabra*[1], *Cardiocrinum giganteum*, *Chaenomeles speciosa*, *Cynoglossum amabile*[1], *Dianthus chinensis*, *Ginkgo biloba*, *Hibiscus syriacus*, *Hosta plantaginea*, *Lonicera japonica*, *Mirabilis jalapa*[1], *Osmanthus fragrans*, *Tropaeolum majus*, *Wisteria sinensis*
Food plants	*Colocasia esculenta*[1], *Coriandrum sativum*[1], *Eriobotrya japonica*, *Foeniculum vulgare*[1], *Houttuynia cordata*[1], *Lycopus lucidus*[1], *Mentha* cf. *rotundifolia*[1], *Perilla frutescens*[1], *Sagittaria trifolia*[1], *Schizonepeta tenuifolia*
Red soil plants	*Asparagus mairei*[1], *Bletilla formosana*[1], *Bletilla striata*, *Cosmos bipinnata*[1], *Hibiscus trionum*[1], *Leontopodium andersonii*[1], *Origanum vulgare*, *Peucedanum rubricaule*[1], *Salvia trijuga*[1], *Salvia yunnanensis*

[63] Interviews were conducted before the fieldwork period with Andreas Sommerhalder, the owner of the landscaping company *Plantago*, and Kuno Bachmann, the landscape designer of the same company, to gather in depth information on what these experts considered important in regard to the design and construction of such a garden. Further Patricia Willi, the owner of the native plant nursery *Wildstaudengärtnerei*, was questioned on important aspects to consider when cultivating and propagating wild plants for gardening purposes.
[64] Whenever possible, the data on growing conditions locally collected were compared with the information available on the respective species or genera in the online database Plants for a Future (http://www.pfaf.org) and in Cheers (2003).

Name of section	Plants cultivated
Shade loving plants	*Amorphophallus rivieri*[1], *Arisaema elephas*, *Bupleurum marginatum*, *Cimicifuga yunnanensis*, *Delphinium* cf. *taliense*[1], *Gynura japonica*, *Lycopodium japonicum*, *Nothopanax delavayi*, *Ophiopogon japonicus*[1], *Paris polyphylla*, *Phytolacca acinosa*, *Rhodobyrum giganteum*, *Rodgersia pinnata*, *Rubus xanthocarpus*, *Rumex nepalensis*[1], *Schisandra* cf. *neglecta*, *Senecio scandens*
Water loving plants	*Acorus calamus*[1], *Anemone vitifolia*, *Corallodiscus lanuginosus*, *Inula helianthus-aquatilis*[1], *Juncus setchuensis*[1], *Lophatherum gracile*[1], *Prunella hispida*, *Pteris nervosa*[1], *Pteris vittata*[1], *Reineckea carnea*, *Sanguisorba officinalis*[1], *Thalictrum delavayi*[1], *Lycium chinense*
Wild plants	*Achyranthes aspera*[1], *Arisaema* cf. *erubescens*, *Bidens* cf. *pilosa*[1], *Clematis peterae*[1], *Commelina communis*[1], *Dactylicapnos torulosa*[1], *Dioscorea* cf. *opposita*[1], *Galinsoga parviflora*[1], *Pharbitis purpurea*[1], *Rubia yunnanensis*[1], *Viola philippica*[1]
Weed medicine	*Anemone rivularis*[1], *Datura stramonium*[1], *Dicrocephala chrysanthemifolia*[1], *Geranium nepalense*[1], *Cyperus cyperoides*[1], *Nicandra physalodes*[1], *Plantago major*[1], *Pueraria lobata*[1], *Solanum nigrum*[1], *Verbena officinalis*[1]
Yellow soil and karst rock plants	*Agrimonia pilosa*[1], *Ajuga forrestii*[1], *Anaphalis bulleyana*[1], *Arisaema yunnanense*, *Berberis pruinosa*, *Clematis fasciculiflora*[1], *Fragaria nilgerrensis*[1], *Geranium strictipes*, *Onosma paniculatum*, *Pimpinella candolleana*[1], *Polygonum paleaceum* var. *pubifolium*[1], *Potentilla fulgens*, *Psammosilene tunicoides*, *Scutellaria amoena*[1], *Selaginella pulvinata*[1], *Siphonostegia chinensis*[1], *Spiranthes sinensis*
Yellow soil and pine forest plants	*Ainsliaea yunnanensis*[1], *Codonopsis convolvulacea* var. *pinifolia*[1], *Drosera peltata*[1], *Gaultheria fragrantissima*[1], *Gentiana cephalantha*, *Gnaphalium hypoleucum*[1], *Hypericum bellum*[1], *Murdannia divergens*[1], *Pinus yunnanensis*[1], *Rhododendron decorum*[1], *Triplostegia grandiflora*, *Vaccinium fragile*[1]

[1]Included in the planting plan in addition to the top-ranking species of the grouping task (see 3.2.7.).

In the cultivated plant section, species that are locally grown as medicine were planted on a particularly large area per species. The flower medicine section, on the other hand, is made up of ornamental plants, some of which only very few local people would consider medicinal. These were included for two reasons: to increase the aesthetic appeal of the garden and to introduce their rather unknown medicinal qualities to a larger part of the local public[65]. The food plants section was included, to show the continuum between nutritional and medicinal plants, to make the local community more aware of the medicinal qualities of many of their food products, and because several tourists mentioned particular interest in local food specialties. A pond and a dry river were built and decorated with rocks, as water features and *jiashan* are present in almost all upper-class gardens in Shaxi. Additionally, this provided ideal artificial habitats for water loving plants, naturally growing next to streams, ponds, irrigation channels, and rice fields. Both the weed medicine and the wild plants sections show plants that grow in the villages, their direct surrounding, or among fields. Many of these species are very common and some grow in weed-like abundance. The majority of these were already growing on the site for the garden. A few additional species were added, to show that even plants perceived to be weeds often have useful properties. The shade loving plants are mostly from the broad-leaved evergreen forests and include some of the locally most valued species, such as *Nothopanax delavayi*, *Paris polyphylla*, and *Schisandra* cf. *neglecta*. The red soil plants and both yellow soil plants sections were included, as these soil types and the respective habitats account for a large portion of the medicinal plants recorded in Shaxi and thus they are meant to show the variety of local habitats and geological features. For the creation of the pond and the dry riverbed local limestone was used, local sandstone for the seating area, and pebbles and sand from the river for the paths. Generally local materials were used whenever possible and when additional labor was required (e.g.: for the transportation of soil and plants), local people were hired and adequately paid.

[65] As was suggested by several local medical experts.

4.3.2. Information presented in the garden

The information presented to visitors was compiled according to the details gathered in previous interviews with local people and tourists. On one hand, this information was supposed to be simple and easy to understand. On the other hand, it should be sufficient for local villagers and schoolchildren as well as for foreign visitors to get an insight on how the respective species are used, what they are used for and where they can be found. Signs were designed and produced by an advertisement company in *Xiaguan*, the capital of the *Dali* Prefecture, based on the information collected in interviews with informants in Shaxi, crosschecked and supplemented with information obtained from literature resources[66]. All the information on the signs is presented in both Chinese and English[67]. A carpenter from *Sideng* handcrafted wooden frames for the signs.
At the entrance of the garden a sign welcomes visitors and introduces the ideas behind the project. The sign also gives a quick introduction to traditional Chinese medicine and to the terms used to describe the plants cultivated in the garden. For each of the sections in the garden, one sign is provided, introducing important aspects of the respective medicinal plants. Besides the species' names and usages, their habitat, medicinal properties, and, where considered appropriate, other facts of interest are given. Pictures of all the plants are displayed next to the written information, so visitors can locate the species in the garden and make a connection between the living plants and the abstract information[68]. Wherever available, the plants' names were additionally given in the Bai language in *pinyin*[69] and Chinese characters. It is hoped that, through the signs in combination with the living plants, the awareness for and knowledge about the large variety of local medicinal plants may increase among the local population.
All the signs can be seen in Appendix 3.

4.3.3. Imbedding the garden in the local community

Introducing the medicinal plant garden to the local community and creating connections to both individuals and institutions was seen as absolutely essential for the acceptance of the local people for the project. Therefore, it was explained to and discussed with representatives of various branches of the local government before, during, and after the construction of the garden. Besides seeking their permission, the aim of these meetings was to find consent on how the garden and the associated concepts could be linked with and incorporated into other projects and the general development of the village *Changle* and the Shaxi Valley as a whole. Further, two middle school classes (fig. 21A) along with their teachers were once invited to the garden and twice to guided walks into the hills, were ethnobotany in general and specifically this project were explained and open questions answered. During one of these excursions each of the 42 students prepared at least one specimen of a medicinal plant species. Through these means, a sense of a personal connection to the local herbal medicine

[66] For the characteristics and properties of medicinal plants, the series Illustrated handbook for medicinal materials from nature in Yunnan (Yunnan Institute of Materia Medica, 2004-2009) was used as a reference. The introduction to Chinese medicine is based on Bensky et al. (2004) and Liu et al. (2003).
[67] The necessary translations were done by Shirley Huo, a professional translator resident in *Sideng*.
[68] This option was chosen over individual signs for each species, as these would be rather small and easy to get lost. Further, this way of presenting information allows for a certain dynamic of the growth of the medicinal plants, not requiring all plants to grow in the exact same location a few years after planting.
[69] *Pinyin* is the official Romanization for the Chinese language.

as well as to the associated knowledge and an increased interest in these topics is hoped to be sparked in at least some of the children. Also, whenever interested villagers came to the garden or asked about it, the ideas behind it and some of the cultivated species were introduced to them. A caretaker (fig. 21B) was chosen, following the criteria mentioned by villagers in previous interviews. He lives close by the compound of the *Three Religions Temple* and cultivates medicinal plants himself in his home garden. Being a respected expert for medicinal plants among his village community, he is frequently visited by other villagers seeking advice about healthcare and herbal medicine. Usually, he does not charge a fee for supplying advice and herbal remedies. He agreed to supply the surplus produced by the garden to local villagers for free. As he is one of the three main informants (see 3.1.2.), his ideas and recommendations were incorporated into the design and construction of the garden from the very beginning. He is reimbursed for his efforts through the donations given by visitors to the garden and through the money raised by the sale of postcards (See 3.3.4.). Finally, an opening ceremony (fig. 21C) was held, during which the concepts and ideas behind this project were explained to a broader public and the garden was symbolically returned into local hands. More than 200 people from *Changle* itself and villages throughout the valley participated in this ceremony, including the head of the township and the village governments as well as the respective secretaries of the Communist Party.
Through these provisions, a sense of community responsibility and pride for the medicinal plant garden may form. A proper imbedding of such a project can be regarded as the best way of achieving sustainability and long-term benefits for the local community (Ticktin et. al, 2002).

Fig. 19: Location of the garden and plants cultivated within **(A)** View of *Changle* from the West with the *Three Religions Temple* in the center **(B)** *Alcea rosea* **(C)** *Hypericum bellum* **(D)** *Lilium davidii* **(E)** *Commelina communis* **(F)** *Phytolacca acinosa*

Fig. 20: Creation of the medicinal plant garden **(A)** The plot before the construction had begun **(B)** to **(F)** During the process of construction **(G)** and **(H)** The finished garden in winter

Fig. 21: Imbedding the garden in the local community and connections to tourism **(A)** Middle school children visiting the garden **(B)** The designated caretaker examining plants for cultivation in the garden **(C)** Visitors at the opening ceremony **(D)** Tourist taking a good look at one of the signs **(E)** and **(F)** Examples from the exhibition in the *Xingjiao* temple in *Sideng*: botanical illustration of *Ipomoea purpurea* (E) and framed specimen of *Ternstroemia gymnanthera* (Wight et. Arn.) Beddome (F)

4.3.4. Links of the garden with tourism

The garden was connected to the existing tourism infrastructure by the following means:

- Advertisement posters, briefly introducing the garden, displaying a botanical illustration of *Aconitum carmichaelii*, and showing the way to the garden, were posted in most restaurants and guesthouses of the Shaxi valley.
- Connections to several non-local tour guides, who frequently come to Shaxi, were established and lead to the garden, where the ideas behind the project were introduced to them. All of these showed interest in bringing tour groups to the garden, as many tourists coming to Shaxi were particularly interested in local culture and ecology.
- The publishers of the most commonly used guidebooks were contacted and informed of this new point of interest in Shaxi. Writers of two such guidebooks were encountered in Shaxi; they were lead to the garden and the project was described to them in detail.
- A permanent exhibition (fig. 21E&F) was organized in *Sideng*'s *Xingjiao* temple, one of the locations most popular with tourists in Shaxi. The exhibition displays 20 botanical illustrations of medicinal plants, all of which are cultivated in the garden, produced by Caroline Frances-King[70]. Further, 16 framed specimens of locally used ritual plants, collected by Peter Staub[71], are exhibited. Both illustrations and specimens are accompanied by introductions to the local usage of these plants in Chinese and English.
- Postcards of ten selected botanical illustrations[72] were prepared and offered for sale in four selected locations[73] in *Sideng*. The proceeds are to 100% used for the upkeep of the garden and are directly transferred to the caretaker.

In order to support local initiatives for community-based tourism, possibilities for gaining auxiliary income through tourism were discussed with local villagers. It was concluded, that particularly village home stays and trekking tours lead by local people had potential to benefit members of the local community. Thus, two people, considered particularly qualified, were selected and their names and phone numbers advertised in the garden, together with a brief introduction to possible tours they could lead. In *Changle* and *Mapingguan*, one local household per village was selected as a potential home stay, where tourists could spend one ore more nights. These households were advised on adequate provisions and advertised in the garden. Further, ideas mentioned by tourists, such as the sale of local medicinal products, refreshments and snack food, were discussed with local villagers. Many people showed interest in these ideas. Yet, they first wanted to see how many visitors would actually come to *Changle*, so they could properly estimate the financial feasibility of such undertakings.
This focus on links with tourism was considered important, as many local informants mentioned the need of financial benefits of the garden in order to guarantee for long-term interest in the project and to make villagers more willing to participate in the garden's upkeep. Thus, the connections with tourism can be viewed as a tool for guaranteeing the garden's sustainability, through which other beneficial impacts can be achieved.

[70] For more on C. Frances-King's art visit her blog at: http://botanicalart.wordpress.com.
[71] See Staub (2011) for details on ritually used plants in Shaxi.
[72] The selection was mainly based on aesthetical aspects. Information on the plants is given in Chinese and English on the postcards' backside.
[73] One hotel, mainly frequented by upper-class tourists and groups; one hostel, mainly frequented by younger individual tourists and groups of students; two cafés on the central market square.

4.4. Preliminary Evaluation of the Project

4.4.1. The garden, its sustainability and potential impacts

Transfer of knowledge and awareness building

All informants questioned on the topic (n=25), saw the garden and the information presented within as a good way of making the knowledge obtained through research available to the local public. Further, it was thought that the garden could help in spreading the knowledge of specialists among the local community, particularly the younger generation. Several people mentioned that the connections with the local educational system and the holding of a grand opening were particularly important for the initiation of this process.
The principal of Shaxi's middle school and the head of its science department saw a lot of potential for integrating the garden in the school's educational program. They specifically wanted to make visits to the garden part of the official curriculum for eighth and ninth graders. However, they as well as eleven questioned students saw an obstacle in this way. Namely, that China's educational system requires students to pass province-wide organized exams in order to proceed to a higher level of education. These exams do not allow for local adjustments. Thus, the syllabus has to strictly follow the provincial guidelines, which leave rather limited time for conducting excursions. Nonetheless, the visits to the garden seemingly had quite an impact on some of the students, as several of them were observed in the garden in the following weeks. They were carefully studying the information on the signs and three students asked their biology teacher to provide additional information on herbal medicine in general and especially the medicinal plants growing in Shaxi.
Both local government authorities (n=5) and farmers (n=15), thought that the cultivation of medicinal plants in such an expositional garden could convince farmers to cultivate more medicinal plants on their own land. While the government officials saw mainly the potential increase in income for the farmers, five medicinal plant specialists (n=6) mentioned, that by the increased cultivation of popular medicinal plants, their wild populations might get a chance to recover (compare Schippman et. al, 2002). This last point is also considered important by local people, who see a rapid decline in wild populations (see 3.1.1). Hamilton (2004) grants medicinal plants a special role in biological conservation, as their meaning to many local and indigenous communities can be used to achieve conservation of natural habitats more generally. Given that Tang (2010) considers the over-harvesting of medicinal plants one of the major disturbances of natural vegetation in subtropical Yunnan, there seems to be quite a potential for environmental conservation through a more sustainable usage and management of medicinal plants in Shaxi. Considering that Ineichen (2007) observed no medicinal plants commercially grown in Shaxi and by 2011 there were a total of 497 *mu* of land cultivated with herbal medicine, it seems that the local farmers are quite willing to adopt new crops, as long as they see potential for the cultivation being profitable. This assumption is supported by Huber et al. (2010), who showed that the majority of the interviewed farmers were interested in medicinal plant cultivation, although they did have some reservations. The example from *Huadianba* indicates that other farmers are likely to adapt the scheme of the larger projects for medicinal plant cultivation in Shaxi[74], which may eventually lead to the development of new industries in the Shaxi valley (SRP, 2009).
Also, the incorporation of the garden into local initiatives for gaining an auxiliary income through tourism may support one of the Shaxi Rehabilitation Project's goals of valley wide poverty alleviation. A perceived interest of tourists in local culture and ecology may also help

[74] Namely the cultivation of *Erigeron breviscapus* in *Beilong* and *Huoshan* and the cooperative in *Hongxing.*

in making the local people more aware of the value of the local environment and cultural heritage, including the traditional knowledge on medicinal plants. Both villagers from *Changle* (n=20) and people involved in the local tourism industry (n=12) thought that the garden would attract tourists to *Changle* and spark interest in further exploring the Shaxi valley. Whether or not the ideas of sleeping in village home stays and hiring local guides are taken up, was still too early to investigate by the end of the research period. However, tourists questioned on that topic (n=13) did show great interest. Further, the large amounts of suggestions and ideas spontaneously expressed by tourists (see 3.1.2.), show a broad range of interests among the visitors and quite a potential for the development of small local businesses catering to tourists. The writers of the guidebooks lead to the garden seemed impressed of the idea and expressed interest in mentioning the garden in the respective new issues; these were however not published by the time of writing. Additionally, a small tourist guidebook for Shaxi was being compiled in 2011 and the writer expressed great interest in including the garden and its background in this booklet.
The increased awareness of and knowledge about locally available herbal medicine among the local population could also result in an increased usage of medicinal plants in household healthcare. This could not only help in keeping traditional local knowledge alive (Silori & Badola, 2000), but also have impacts on the health of villagers, as some informants mentioned they hesitate to treat a minor ailment due to financial restrictions. The importance of incorporating traditional medicine into rural healthcare systems is also stressed by the World Health Organization (WHO, 2002).

Sustainability of the project

A comparison with similar projects (Barbara Frei-Haller and Annita Ankli, pers. comm.) indicates, that providing for the sustainability of such projects is a major issue difficult to solve. Thoroughly including the local community in the project and a proper embedment of the project in local structures can be regarded as a key component in guaranteeing for its sustainability.
By the end of the research period, it was still too early to evaluate the project's sustainability. However, the qualification and financial reimbursement of the local caretaker should guarantee for the sustainable upkeep of the garden. Further, the connections of the garden with educational and tourism structures could provide for a long-term interest in the garden among the local population.

4.4.2. Lessons learned

Regarding a successful approach for implementing the access and benefit-sharing requirements by the means of constructing an ethnobotanical garden, several important lessons were learned during the course of this study. Particularly, it was seen, that the goals and ideas behind such a project should be explained in detail to the local public from the very beginning. A caretaker should be chosen as early as possible, based on the requirements and characteristics considered important for this choice by the local community. The designated caretaker should be included in the design and construction of the garden throughout the process. Due to the limited time in the research area, many important data (especially the local medicinal plant database and information on locally cultivated and merchandised medicinal plants) had to be collected throughout the entire process. Having these data available before the design of the garden, would have allowed for a better judgment of which species are locally important. Therefore, it can be concluded that the person(s) creating such a garden should already be very familiar with the local conditions, relevant for such an undertaking. Using the information gathered through this study and through the comparison

with similar projects, a general guideline for this way of implementing ABS requirements in the context of ethnobotanical projects can be outlined.

1. Establish the feasibility of such a project. Inquire whether a garden is wanted by the local population and what the purpose of the garden should be according to the local people. Identify potential benefits for the local community.
2. Inform all levels of the local community of the planned project, including both individuals and institutions. Particular attention should be paid to the system of hierarchy in the research area, to avoid offending local authorities. Discuss all relevant topics with the authorities and obtain permission for building a garden. All activities and processes should be subject to prior inform consent and be on mutually agreed terms.
3. Base all decisions regarding the garden's location, its design, its function, and ist maintenance on opinions of the local public. Try to understand the local community's *emic* views on the ecosystem and the society and try to incorporate these, as well as possible, into the project, as these may provide a more realistic evaluation of local needs and conditions (Berkes, 1999: 33).
4. Construct the garden following local people's advice and using as many local products as possible. If additional labor is required, hire local workers and explain the ideas behind the project to them. If a local caretaker is found, design and construct the garden together with her/him and discuss all questions arising throughout the process with that person.
5. Properly imbed the garden in the local community. This can be achieved by various means and should include both individual members of the community as well as institutions. Linking the garden to the local educational system can be considered particularly valuable if transfer of knowledge and awareness building are goals of the projects.
6. Make adequate provisions for the upkeep of the garden. These should include financial provisions to finance the maintenance and reimburse the caretaker for his efforts.

All of these points require an in depth understanding of the local culture and ecology. Thus, projects of this sort are best carried out in the context of long-term ethnobotanical research. While Innerhofer and Bernhardt (2011), too, came to the conclusion that all major decisions in regard to the creation of an ethnobotanical garden are best based on local ideas and opinions, Lima et al. (2002) tried to achieve a high degree of local participation through training courses and seminars for the local people. Clearly there is not one ideal way for the implementation of such projects. Rather, adaptations are necessary at each step of the planning and execution process to adapt to local conditions and incorporate input from the respective local community.

5. References

Angiosperm Phylogeny Group (APGIII). Angiosperm phylogeny website. Website accessed August 25th 2011: http://www.mobot.org/mobot/research/apweb.

Bensky, D., S. Clavey and E. Stöger. 2004. Chinese herbal medicine: materia medica (3rd edition). Eastland Press, Seattle.

Berkes, F. 1999. Sacred ecology: traditional ecological knowledge and resource management. Taylor and Francis, Philadelphia.

Bernard, H.R. 2006. Research methods in anthropology: Qualitative and quantitative approaches. AltaMira Press, Oxford.

Bertschi, P. and M. Junker. 2004. The sustainability-oriented guiding plan for teh Shaxi Valley. Semester thesis at the ETH Zurich. Unpublished.

Bradley, D. 2003. Lisu. In: Thurgood, G. and R.J. LaPolla (eds.). 2003. The Sino-Tibetan languages. Routledge, London. Pp.: 222-35.

CBD (The Secretariat of the Convention on Biological Diversity; ed.). 2002. Bonn Guidelines on Access to Genetic Resources and Fair and Equitable Sharing of Benefits Arising out of their Utilization. Secretariat of the Convention on Biological Diversity, Montreal.

CBD (The Secretariat of the Convention on Biological Diversity; ed.). 2011. Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization. Secretariat of the Convention on Biological Diversity, Montreal.

Cheers, G. (ed.). 2003. Botanica: Das Abc der Pflanzen: 10.000 Arten in Text und Bild. Tandem Verlag GmbH, Potsdam. In German.

Clément, D. 1998. L'ethnobiologie/ethnobiology. Anthropologica 40(1):7-35.

Etkin, N.L. 2006 Edible medicines: An ethnopharmacology of food. The University of Arizona Press, Tucson.

Feola, J. 2007. Becoming modern by becoming ancient: Cultural heritage preservation in Shaxi, Yunnan, China. School for International Training China: Yunnan Language and Cultures. Kunming. Unpublished.

Fitzgerald, C.P. 1941. The tower of five glories: A study of the Min Chia of Ta Li, Yunnan. Re-published by Caravan Press Ltd. HongKong (2005).

Flora of China Editorial Committee (ed.). 1994 to present. Flora of China. Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis.

Frances-King C. Caroline' s botanical art blog. http://botanicalart.wordpress.com.

Glück, U. 1993. Ist die chinesische Medizin mit unserer Denkweise vereinbar? Schweizer Medizinische Wochenschrift 123:1005-12. In German.

Hamilton, A.C. 2004. Medicinal plants, conservation and livelihoods. Biodiversity Conservation 13:1477-1517.

Hess, K. 2010. Integration chinesischer und westlicher Medizin in einer Offizin in Shaxi, China. Semester thesis in pharmaceutical sciences at the ETH Zürich. Unpublished. In German.

Hinrichs, T.J. 2001. Early Chinese medical literature: The Mawangdui medical manuscripts. Bulletin of the History of Medicine 75(1):121-3.

Hsu, E. 2000. Early Chinese medical literature: The Mawangdui medical manuscripts. Journal of the Royal Anthropological Institue 6(2):343-4.

Huang, J., S.J. Pei, and C.L. Long. 2004. An ethnobotanical study of medicinal plants used by the Lisu people in Nujiang, Northwest Yunnan, China. Economic Botany 58:253-264.

Huber, F.K., R. Ineichen, Y.P. Yang, and C.S. Wecklerle. 2010. Livelihood and conservation aspects of non-wood forest product collection in the Shaxi valley, Southwest China. Economic Botany 64:189-204.

Huft, M.J. 2002. Legal entities as a flexible tool in benefits sharing programs. In: Stepp, J.R., F.S. Wyndham and R.K. Zarger (eds.). 2002. Ethnobiology and biocultural diversity: Proceeding of the seventh international congress of Ethnobiology. The University of Georgia Press, Athens, Georgia. Pp.: 11-20.

Ineichen, R. 2007. Traditionen in Kultur: Medizinalpflanzen im Shaxi-Tal, Südwest-China. Diploma thesis in Ethnobotany at the University of Zürich. Unpublished. In German.

Innerhofer, S. and K.G. Bernhardt. 2011. Ethnobotanic garden design in the Ecuadorian Amazon. Biodiversity Conservation 20: 429-39.

Katzen, J. 2002. Shaxi valley: using history to address the future. In: Mitchell, S. (ed.). 2002. Tourism and development in Yunnan. Yunnan Fine Arts Publishing House, Kunming.

Lesser, W. 1998. Sustainable us of genetic resources under the Convention on Biological Diversity: exploring access and benefit sharing issues.

Li, X.W. and D. Walker. 1986. The plant geography of Yunnan Province, Southwest China. Journal of Biogeography 13(5): 367-397.

Lima, R.X. de, S. Menezes-Silva, A. César Svolenski, L. Buck-Silva and E. Fernandes-Pinto. 2002. An ethnobotanical survey of the environmental protection area of Guaraqueçaba-Paraná, Brazil. In: Stepp, J.R., F.S. Wyndham and R.K. Zarger (eds.). 2002. Ethnobiology and biocultural diversity: Proceeding of the seventh international congress of Ethnobiology. The University of Georgia Press, Athens, Georgia. Pp.: 95-112.

Liu, G.Z., Q.P. Xu, and T. Wang (edts.). 2003. The essentials of traditional Chinese herbal medicine. Foreign Language Press, Beijing.

Kabuye, C.S. and G.W. Ngugi. 2002. Nutrition and medicine: An integrated approach to human health in traditional systems. In: Stepp, J.R., F.S. Wyndham and R.K. Zarger (eds.). 2002. Ethnobiology and biocultural diversity: Proceeding of the seventh international congress of Ethnobiology. The University of Georgia Press, Athens, Georgia. Pp.: 241-9.

Ma, Y. 1989. China's minority nationalities. Foreign Language Press, Beijing.

Martin, G.J. 2003. Ethnobotany. A methods manual. People and plants conservation manual. Chapman and Hall, London.

McRae, J.R. 1995. Buddhism and popular religion of the Bai people of Yunnan Province. Cornell University Arts&Sciences Newsletter. Website accessed July 29th 2011: http://www.arts.cornell.edu/newsletr/fall95/mcrae.htm

Mitchell, S. 2007. Shaxi: A new model for tourism development. Ethnic-China. Website accessed July 29th 2011: http://www.ethnic-china.com/Bai/baishaxi.htm.

Morel, A. and D. Forster. 2002. Sideng mission report. Environmental sanitation survey July-August 2002. Sandec/Eawag, Duebendorf. Internal Report. Unpublished.

Myers, N., R.A. Mittermeier, C.G. Mittermeier, G.A.B. da Fonseca and J. Kent. 2000. Biodiversity hotspots for conservation priorities. Nature 403:853-858.

Ni, J. 2001. A biome classification of China based on plant functional types and the BIOME3 model. Folia Geobotanica 36:113-129.

Pei, S.J., Y.H. Li, and S.Z. Yin. 1996. Ethnobotanical investigation of plant drugs at local markets in North-west Yunnan of China. In: Pei, S.J., Y.G. Su, C.L. Long, K. Marr, and D.A. Posey (eds.). Proceedings of the Second International Congress of Ethnobiology. Yunnan Science and Technology Pree, Kunming. Pp. 150-169.

Pei, S.J, A.C. Hamilton, L.X. Yang, H.Y. Huai, Z.W. Yang, F. Gao, and Q.X. Zhang. 2010. Conservation and development through medicinal plans: a case study from Ludian (Northwest Yunnan, China) and presentation of a general model. Biodiversity Conservation 19:2619-2636.

Schippmann, U., D.J. Leaman and A.B. Cunningham. 2002. Impact of cultivation and gathering of medicinal plants on biodiversity: global trends and issues. In FAO 2002. Biodiversity and the ecosystem approach in agricultures, forestry and fisheries. Satellite event on the occasion of the ninth regular session of the commission on genetic resources for food and agriculture. Inter-departmental working group on biological diversity for food and agriculture. Rome.

Schmitt, J.H. 2007. Uprooted referents: an ethnography of historical consciousness among the Bai nationality of the Dali Plain, Yunnan Province , the People's Repuplic of China. Ph. D. thesis, University of Virginia. Unpublished.

Schütz, J.-P. and P. Brang. 1995. L'horizontoscope: un étonnant outil practique de sylviculture, notamment en haut montagne. ONF Bulletin technique 28:1-7. In French.

Shi, X.Z., D.S. Yu, X.Z. Pan, W.X. Sun, Z.G. Gong, E.D. Warner, and G.W. Petersen. 2002. A framework for the 1:1,000,000 soil database of China. Seventeenth World Congress of Soil Science, Bangkok. Conference paper pp. 1757.

Shi, X.Z., D.S. Yu, E.D. Warner, W.X. Sun, G.W. Petersen, Z.T. Gong, and H. Lin. 2004. Cross-reference system for translating between genetic soil classification of China and Soil Taxonomy. Soil Science Society of America Journal 70(1):78-83.

Silori, C.S. and R. Badola. 2000. Medicinal plant cultivation and sustainable developments. A case study in the buffer zone of the Nanda Devi Biosphere Reserve, Western Himalaya, India. Mountain research and development 20:272-279.

Soothill, W.E. 1913. The three religions of China: Lectures delivered at Oxford. Hooder and Stoughton, London.

SRP (Shaxi Rehabilitation Project; ed.). 2009. Regional economic development plan for the Shaxi valley. Unpublished.

Staub, P. 2011. Etnoboatnical study of ritual plants used by the Bai people of Shaxi, Southwest China. MSc thesis in ethnobotany at the University of Zürich. Unpublished.

Stephenson, D.J. Jr. 2002. Lease, contact, and license: An introduction to alternative mechanisms for protecting the intellectual property of Ameircan Indians in the

context of the human genome project. In: Stepp, J.R., F.S. Wyndham and R.K. Zarger (eds.). 2002. Ethnobiology and biocultural diversity: Proceeding of the seventh international congress of Ethnobiology. The University of Georgia Press, Athens, Georgia. Pp.: 31-42.

Stevens, K.G. 2001. Chinese mythological gods. Oxford University Press, Oxford.

Tang, C.Q. 2010. Subtropical montane evergreen broad-leaved forests of Yunnan, China: diversity, succession dynamics, human influence. Frontiers in Earth Sciences in China 4(1):22-32.

Ticktin, T., G. De la Peña Valencia, C. Illsley Granich, S. Dalle, and F. Ramírez. 2002. Participatory ethnoecological research for conservation: Lessons from case studies in Mesoamerica. In: Stepp, J.R., F.S. Wyndham and R.K. Zarger (eds.). 2002. Ethnobiology and biocultural diversity: Proceeding of the seventh international congress of Ethnobiology. The University of Georgia Press, Athens, Georgia. Pp.: 575-84.

Thurgood, T. 2003. A subgrouping of the Sino-Tibetan languages: The interaction between language contact, change, and inheritance. In: Thurgood, G. and R.J. LaPolla (eds). 2003. The Sino-Tibetan languages. Routledge, London. Pp.: 3-21.

UN (The Secretariat of the United Nations; ed.). 1992. Convention on Biological Diversity. Secretariat of the United Nations, New York.

Vogel, A.W., M.Z. Wang, and X.Q. Huang. 1995. People's Republic of China: Red reference soils of the subtropical Yunnan province. Soil Brief China 1. Institue of Soil Science – Academica Sinica, Nanjing and International Soil Reference and Information Centre, Wageningen.

Weckerle, C.S., R. Ineichen, F.K. Huber and Y.P. Yang. 2009. Maos' heritage: Medicinal plant knowledge among the Bai in Shaxi, China, at a crossroads between distinct local and common widespread practice. Journal of Ethnopharmacology 123:213-228.

WHO (World Health Organization; ed.). 2002. Traditional medicine strategy launched. Bulletin of the World Health Organization 80(7).

Wiersma G. 2003. Yunnan Bai. In: Thurgood, G. and R.J. LaPolla (eds.). 2003. The Sino-Tibetan languages. Routledge, London. Pp.: 651-73.

Xiao, X.M. (ed). 2003. China's ethnic minorities. Foreign Language Press, Beijing.

Yiming, L., H. Wei, L. Aihua, and Z. Fandian. 2008. Neuroprotective effects of breviscapine against apoptosis induced by transient focal cerebral ischaemia in rats. Journal of Pharmacy and Pharmacology 60(3):349-355.

Yunnan Chuban She (ed.). 1992-1995. Yunnan zhongcaoyoa jingxuan (volumes 1 and 2). Yunnan Publishing House, Kunming. In Chinese.

Yunnan Instititue of Materia Medica (ed.). 2004-2009. Illustrated handbook of medicinal materials from nature in Yunnan (volumes 1-5). Yunnan Science and Technology Press, Kunming. In Chinese.

Yunnan Renmin Chubanshe (ed.). (1971).Yunnan zhongcaoyao. Yunnan People's Press, Kunming. In Chinese.

Appendix

A.1. Medicinal plants

A.1.1. Full list

Table 2: Full list of medicinal plants documented in Shaxi in the course of this thesis.

Scientific name[1]	**Family**[2]	**Specimen Nr.**	**Local names**[3]	**Usage**
Abutilon striatum Dicks ex Lindl.	Malvaceae	10091804-01	灯笼花 *denglonghua*	Decoction of leaves or flowers against diarrhea, hematoma and pain.
Achillea wilsoniana Heimerl ex Hand.-Mazz.	Asteraceae	10091810-01	蜈蚣草 *wugongcao*	Poultice of leaves to stretch tendons, as haemostatic; decoction of leaves to stop internal bleeding.
Achyranthes aspera L.	Amaranthaceae	10091701-09	土牛膝 *tuniu xi*	Decoction of root to improve blood circulation; decoction of whole plant against rheumatic pain.
Achyranthes bidentata Blume	Amaranthaceae	10082201-03	牛膝 *niu xi*	Decoction of root as liver and kidney tonic.
Aconitum brevicalcaratum var. *parviflorum* F.H. Chen & Y. Liu	Ranunculaceae	10101202-01	附子 *fuzi*, 乌头 *wutou*	Decoction of root to drive out cold, against rheumatic pain and stomachache.
Aconitum carmichaelii Debx.	Ranunculaceae	10092901-05	附子 *fuzi*, 乌头 *wutou*	Decoction of root to drive out cold, against rheumatic pain and stomachache.
Aconitum episcopale var. *episcopale* H. Léveillé	Ranunculaceae	10092502-02	附子 *fuzi*, 乌头 *wutou*	Decoction of root to drive out cold, against rheumatic pain and stomachache.
Acorus calamus L.	Acoraceae	10071301-01	菖蒲 *changpu*, *kuancoupu**, *kucupu**	Decoction of rhizome against indigestion.

Scientific name[1]	**Family**[2]	**Specimen Nr.**	**Local names**[3]	**Usage**
Adenophora stricta subsp. *confusa* (Nannf.) Hong	Campanulaceae	10083101-04	沙参 *shashen*	Decoction of root against (lung heat induced) cough and to tonify the yin.
Agastache rugosa O. Ktze.	Lamiaceae	10081801-01	藿香 *huoxiang*, *baohu**	Leaves baked into cakes or as an infusion against cough.
Agrimonia pilosa Ldb.	Rosaceae	10070702-02	黄龙尾 *huanglongwei*	Decoction of whole plant against internal bleeding, diarrhea and irregular or painful menstruation.
Ainsliaea pertyoides Franch.	Asteraceae	10092302-10	叶下花 *yexiahua*	Decoction of subterranean parts to release phlegm, against cough and lung heat.
Ainsliaea yunnanensis Franch.	Asteraceae	10091811-04	燕麦灵 *yanmailing*, *dayuzi**	Decoction of whole plant against stomachache and indigestion; poultice of root against rheumatic pain.
Ajuga forrestii Diels	Lamiaceae	10080101-01	夏枯草 *xiakucao*	Decoction of whole plant against diarrhea and to expel worms.
Aloe vera (L.) N.L. Burman	Asphodelaceae	10102001-01	芦荟 *luhui*	Sap of leaves externally applied against skin problems and burns or eaten as a laxative.
Alcea rosea L.	Malvaceae	10091701-04	蜀葵 *shukui*, 鸡冠花 *jiguanhua*	Infusion of petals against pain in bone and muscles; decoction of root against diarrhea and intestinal pain.
Amorphophallus rivieri Durieu	Araceae	10110701-01	魔芋 *moyu*, *niu**	Decoction of tuber against traumatic injuries; fresh tuber externally applied against snakebites; after processing eaten as vegetable.
Anaphalis bulleyana (J.F. Jeffr.) Chang	Asteraceae	10092803-01	午香草 *wuxiangcao*	Decoction of whole plant against cold, flu and throat ache; natural antibiotic.
Anemone rivularis Buch.-Ham.	Ranunculaceae	10070705-07 & 10072601-05	虎掌草 *huzhangcao*, *liugudeng**, *kagudeng**	Poultice of fruits against snakebites; decoction of the whole plant against cough, rheumatic pain and traumatic injuries.
Anemone cf. *vitifolia*	Ranunculaceae	10083101-11	野棉花 *yemianhua*, *baiyeye**	Poultice of root against rheumatic pain and to quicken the healing of fractures.
Anisodus acutangulus C.Y. Wu & C. Chen	Solanaceae	10110201-01	三分三 *sanfensan*	Decoction of root against severe pain; poultice of root against rheumatic pain.

Scientific name[1]	**Family**[2]	**Specimen Nr.**	**Local names**[3]	**Usage**
Anredera cordifolia (Tenore) Steenis	Basellaceae	10081801-06	藤三七 *tengsanqi*	Alcoholic extract of tubers against liver problems; tubers eaten as vegetable.
Anthogonium gracile Wall. ex Lindl.	Orchidaceae	10082401-01	水白芨 *shuibaiji*, *gobeziyou**	Decoction of rhizome as haemostatic and against respiratory system disorders; powder of dried rhizome solved in water externally applied against dry skin.
Antirrhinum majus L.	Plantaginaceae	10091808-01	龙口花 *longkouhua*	Decoction of whole plant against traumatic injuries.
Aralia sp.	Araliaceae	10082002-06	楤木 *congmu*	Poultice of the white part of the bark against rheumatic pain and arthritis.
Aralia yunnanensis Franch.	Araliaceae	10080104-02	土人参 *turenshen*	Decoction of root to "dispel wind" (祛风 *qufeng*), to strengthen muscles and bones.
Arctium lappa L.	Asteraceae	10082004-02	牛蒡根 *niubanggen*	Decoction of leaves against running nose and respiratory system disorders; alcoholic extract of root against spinal pain.
Arisaema elephas Buchet	Araceae	10063008-01 & 10092803-02	象天南星 *xiangtiannanxing*, 大半夏 *dabanxia*, *kujinyou**, *anadu***	Fresh tuber externally applied against snake- and insect bites.
Arisaema cf. *erubescens*	Araceae	10091813-02	天南星 *tiannanxing*, *kujinyou**	Tuber cut into thin slices (with a non metallic knife) and cooked for a long time to detoxify, decoction drunken against chronic cough and bronchitis; fresh tuber externally applied against insect and snakebites; fruits eaten fresh or as a decoction after strokes.
Arisaema yunnanense Buchet	Araceae	10070701-01	半夏 *banxia*	Decoction of tuber against cough, cold and headache.
Artemisia cf. *argyi*	Asteraceae	10122601-01	家艾 *jiaai*, *qi'an**	Decoction of whole plant against painful menstruation; dried leaves used for moxibustion.
Artemisia cf. *cappillaris*	Asteraceae	10082002-02	青蒿 *qinghao*	Decoction of whole plant to release toxins.
Artemisia cf. *dubia* var. *dubia*	Asteraceae	10091802-03	黑蒿 *heihao*	Decoction of leaves against stomachache; used as incense.

Scientific name[1]	**Family**[2]	**Specimen Nr.**	**Local names**[3]	**Usage**
Artemisia cf. *kanashiroi*	Asteraceae	10091802-06	白蒿 *baihao*	Decoction of whole plant as haemostatic; decoction of root against cold; used as incense.
Asarum sp.	Aristolochiaceae	10092302-09	细辛 *xixin*	Decoction of leaves to relieve pain and dispel wind cold.
Asparagus mairei Levl.	Asparagaceae	10092302-04	天门冬 *tianmendong*, *wugizi**	Alcoholic extract of root against coughing and constipation
Asparagus setaceus (Kunth.) Jessop	Asparagaceae	10091812-14	文竹 *wenzhu*	Decoction of rhizome to clear toxins from blood.
Asyneuma chinense Hong	Campanulaceae	10072503-02	鸡肉参 *jiroushen*	Decoction of root to tonify *qi* and nerves and to give fresh energy.
Bauhinia brachycarpa Wall. ex Benth.	Fabaceae	10071301-02	马鞍叶 *maanye*	Decoction of fresh leaves against persistent cough; poultice against burns and eczema.
Begonia grandis subsp. *sinensis* (A. Candolle) Irmscher	Begoniaceae	10092101-06	海棠 *haitang*	Poultice of whole plant against snakebites.
Begonia maculata Raddi	Begoniaceae	10091807-05	海棠 *haitang*	Decoction of whole plant against throat ache; poultice against snakebites and traumatic injuries.
Begonia sp.	Begoniaceae	10082201-06	海棠 *haitang*	Decoction of whole plant against throat ache; poultice against snakebites and traumatic injuries.
Berberis pruinosa Franch.	Berberidaceae	10063010-01	三颗针 *sankezhen*; *wubanqu**, *moba**, *saweizi**	Decoction of bark to dispel heat and against inflammation of the small intestine; fruits eaten against bloated stomach.
Bidens cf. *pilosa*	Asteraceae	10072003-01	鬼针草 *guizhencao*, *houzhizi**	Poultice or decoction of whole plant against snakebites and rheumatic pain.
Bletilla formosana (Hayata) Schlechter	Orchidaceae	10101201-01	小白芨 *xiaobaiji*, *gobeziyou**	Decoction of rhizome as haemostatic and against respiratory system disorders; powder of dried rhizome solved in water externally applied against dry skin.

Scientific name[1]	Family[2]	Specimen Nr.	Local names[3]	Usage
Bletilla striata (Thunb.) Rchb.f.	Orchidaceae	10072901-01	大白芨 *dabaiji*, 牛白芨 *niubaiji*, *gobeziyou**	Decoction of rhizome as haemostatic and against respiratory system disorders; powder of dried rhizome solved in water externally applied against dry skin.
Bougainvillea glabra Choisy	Nyctaginaceae	10091812-13	叶子花 *yezihua*	Infusion of flowers against irregular or painful menstruation.
Bulbophylum sp.	Orchidaceae	10123101-01	果上叶 *guoshangye*	Decoction of whole plant against cold and cough.
Bupleurum longicaule var. *amplexicaule* C.Y. Wu	Apiaceae	10092502-05	柴胡 *chaihu*	Decoction of whole plant against cold and fever.
Bupleurum marginatum Wall. ex DC.	Apiaceae	10072901-03 & 10082501-03	柴胡 *chaihu*	Decoction of whole plant against cold and fever.
Calendula officinalis L.	Asteraceae	10082004-06	金盏菊 *jinzhanju*	Decoction of subterranean parts to dispel heat and quicken the blood flow; decoction of flowers as haemostatic
Campanula cf. *colorata*	Campanulaceae	10082002-04	石参 *shishen*	Decoction of leaves against cold.
Campylotropis hirtella (Franch.) Schindl.	Fabaceae	10083101-06	大红袍 *dahongpao*	Decoction of root against indigestion, flowers eaten with honey against tuberculosis.
Campylotropis trigonoclada (Franch.) Schindl.	Fabaceae	10102301-01	三楞草 *sanlengcao*	Decoction of whole plant against pain and diarrhea.
Canna indica L.	Cannaceae	10091701-05	美人蕉 *meirenjiao*	Decoction of rhizome as kidney tonic, to lower the blood pressure and to drain dampness.
Cannabis sativa L.	Cannabaceae	10091807-01	大麻 *dama*, *susuzi**	Seeds eaten against constipation and as snack food.
Capsella bursa-pastoris (L.) Medik.	Brassicaceae	10082003-02	荠菜 *jicai*	Decoction of whole plant to dispel heat and ease a bad temper; young leaves eaten as vegetable and as kidney tonic.
Carduus crispus L.	Asteraceae	10082101-02	小蓟 *xiaoji*	Decoction of whole plant to clean the blood and quicken the blood flow.

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Carpesium abrotanoides L.	Asteraceae	10092101-09	金挖耳草 *jinwaercao*	Decoction of whole plant to dispel worms.
Carpesium cernuum L.	Asteraceae	10081201-01	挖耳草 *waercao, niguguzi**	Decoction of whole plant against toothache.
Cassia bicapsularis L.	Fabaceae	10082101-10 & 10091804-02	黄花槐 *huanghuahuai*	Decoction of leaves against constipation.
Cephalotaxus sinensis var. *sinensis* (Rehd. et Wils.) Li	Taxaceae	10091807-06	红豆杉 *hongdoushan*	Decoction of leaves and bark can heal everything including cancer.
Chaenomeles speciosa (Sweet) Nakai	Rosaceae	10091812-01	木瓜 *mugua, mengua**	Alcoholic extract or dried fruits against joint problems, rheumatic pain and vomiting.
Chenopodium album L.	Amaranthaceae	10082101-09	野灰菜 *yehuicai*	Decoction of whole plant against diarrhea.
Chloranthus spicatus (Thunb.) Makino	Chloranthaceae	10091801-03	珠兰 *zhulan*; *zaosangfu*, yuzima**	Decoction of leaves against throat ache.
Chrysanthemum morifolium Ramat.	Asteraceae	10091812-03	菊花 *juhua*	Infusion of flowers against headache and dizziness and as tonic.
Cimicifuga yunnanensis Hsiao	Ranunculaceae	10092901-06	升麻 *shengma*	Decoction of subterranean parts against severe flu and headache, yet over dosage can result in strong headache which can be cured by drinking pig fat.
Cinnamomum glanduliferum (Wall.) Meissn.	Lauraceae	10091812-02	香樟果 *xiangzhangguo*	Dried seeds pulverized and used as spice in cooking against digestive system disorders.
Cirsium chlorolepis Petrak ex Hand.-Mazz.	Asteraceae	10063007-01	大蓟 *daji*	Decoction of root against internal bleeding.
Clematis chrysocoma Franch.	Ranunculaceae	10072901-02	木通 *mutong, meizi**	Decoction of whole plant against rheumatic pain and as diuretic.

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Clematis fasciculiflora var. *fasciculiflora* Franch.	Ranunculaceae	10072903-05 & 10083101-08	木通 *mutong*, 滑叶藤 *huayeteng*, *simeizi**	Decoction of leaves against knife wounds and traumatic injuries.
Clematis peterae Hand.-Mazz.	Ranunculaceae	10072002-01	木通 *mutong*, *meizi**	Decoction of whole plant against rheumatic pain and as diuretic.
Clerodendrum bungei Steud.	Lamiaceae	10080105-02	臭牡丹 *choumudan*	Decoction of leaves or root to dispel heat, against hemorrhoids and traumatic injuries
Codonopsis convolvulacea var. *pinifolia* Kurz	Campanulaceae	10091811-01	鸡蛋参 *jidanshen*	Decoction of the root to tonify blood, *qi*, and lung.
Codonopsis convulvulacea Kurz	Campanulaceae	10080104-01	鸡蛋参 *jidanshen*	Decoction of the root to tonify blood, *qi*, and lung
Coix lacryma-jobi L.	Poaceae	10081801-08	素珠果 *suzhuguo*	Powder of seeds solved in water as diuretic and as spleen tonic; decoction of roots to drain dampness and against urinary tract infection; infusion of the leaves to warm the stomach and to improve the flow of the *qi*; dried fruits used as beads for ornamental purposes.
Colocasia esculenta (L.) Schott	Araceae	10091810-02	芋 *yu*, 芋头花 *yutouhua*, *bizikou**	Rhizome eaten as vegetable to dispel heat; poultice of leaves and stems against swellings, and snake- and insect bites; inflorescence eaten as vegetable against stomachache.
Commelina communis L.	Commelinaceae	10072502-01	地地藕 *didiou*, *maercao*; *siwenduzi**, *manide**, *guozuozi**	Decoction of whole plant against fever and cold.
Conyza canadensis (L.) Cronquist.	Asteraceae	10091802-01	小飞蓬 *xiaofeipeng*	Fresh leaves eaten to dispel worms.
Corallodiscus lanuginosus (Wallich ex R. Brown) B.L. Burtt	Gesneriaceae	10083101-05	石胆草 *shidancao*, *aihua*; *nahu**	Decoction of whole plant to dispel heat and against traumatic injuries.

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Coriandrum sativum L.	Apiaceae	10111801-01	香菜 *xiangcai*, *majie**	Decoction of whole plant against wind-cold; seeds eaten against indigestion; used as culinary herb
Cosmos bipinnata Cav.	Asteraceae	10082201-08	波斯菊 *bosiju*; *ninju**, *komenshao**	Decoction of whole plant against cold and hepatitis.
Cotoneaster sp.	Rosaceae	10091801-04	*Gidakuzi**	Infusion of leaves against cough.
Crepis cf. *napifera*	Asteraceae	10092503-05	万丈深 *wanzhangshen*	Decoction of whole plant to clear the lung and for detoxification.
Crepis cf. *phoenix*	Asteraceae	10080106-01	万丈深 *wanzhangshen*	Decoction of the whole plant to clear the lung and for detoxification.
Crepis sp.	Asteraceae	10092501-09	万丈深 *wanzhangshen*	Decoction of the whole plant to clear the lung and for detoxification.
Crotalaria yunnanensis (Franch.)	Fabaceae	10091811-02	猪屎豆 *zhushidou*	Decoction of whole plant to "dispel wind" (祛风 *qufeng*) and remove toxins.
Cyananthus cf. *delavayi*	Campanulaceae	10092503-03	蓝种花 *lanzhonghua*	Decoction of root against pain and swellings.
Cymbopogon cf. *distans*	Poaceae	10092302-02	芸香草 *yunxiangcao*	Decoction of whole plant against cold and to dispel heat.
Cynanchum cf. *otophyllum*	Apocynaceae	10070801-01	青羊参 *qinyangshen*, *mianlu**	Decoction of root against rheumatic pain: decoction of leaves as a tonic.
Cynoglossum amabile Stapf et Drumm.	Boraginaceae	10070101-06 & 10111802-01	狗屎花 *goushihua*, *qianhuzi**	Decoction of whole plant against diarrhea and pain in urinary tract.
Cynoglossum lanceolatum Forssk.	Boraginaceae	10092501-01	狗屎花 *goushihua*, *qianhuzi**	Decoction of whole plant against cough.
Cyperus cyperoides (L.) Kuntze	Cyperaceae	10082201-01	香附子 *xiangfuzi; sacao**, *jixingcao**	Decoction of whole plant against skin irritations and irregular menstruation.
Dactylicapnos torulosa (Hook. f. et Thoms.) Hutchins.	Papaveraceae	10063003-01	野落松 *yeluosong*; *duzhizi**, *qianjineng**, *tusizi**, *kuade *	Poultice of whole plant against swellings, inflammations and snakebites; decoction of whole plant as haemostatic and to lower the blood pressure.

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Dahlia pinnata Cav.	Asteraceae	10082201-05 & 10091813-09	大理花 *dalihua*， 大丽菊 *daliju*	Decoction of tuber to relieve pain (particularly toothache) ; poultice against inflammations and traumatic injuries.
Datura stramonium (L.)	Solanaceae	10070801-05	曼陀罗, *mantuoluo*, *zugou**	Decoction of leaves against short breath and cough; infusion of flowers against stomachache; pulverized seeds mixed with pig fat applied on cheek against toothache.
Delphinium cf. *grandiflorum*	Ranunculaceae	10092102-01	草乌 *caowu*; *wuzangcao**, *xidengz*i	Decoction of subterranean parts or whole plant against inflammation of the intestine; against bloated stomach, and to dispel heat
Delphinium cf. *taliense*	Ranunculaceae	10092502-04	鸡足草乌 *jizucaowu*; *wuzangcao**, *xidengz*i	Root steamed with pig's kidney as a kidney tonic; decoction of whole plant to dispel heat.
Dianthus chinensis L.	Caryophyllaceae	10082201-02 & 10091812-04	石竹 *shizhu*, *zisu**	Decoction of above ground plant parts as diuretic and against kidney stones
Dichrocephala chrysanthemifolia (Blume) DC.	Asteraceae	10071201-06 & 10072601-03	鱼眼草 *yuyancao*	Decoction of whole plant against toothache, cold, and diarrhea.
Dioscorea cf. *collettii*	Dioscoreaceae	10072401-03	山药 *shanyao*	Tuber as vegetable to lose weight; decoction against rheumatism.
Dioscorea cf. *opposita*	Dioscoreaceae	10111802-03	山药 *shanyao*, *mianluo**	Decoction of tuber as a tonic and against diarrhea and cough.
Dipsacus asper Wallich ex C.B. Clarke	Dipsacaceae	10071101-01 & 10082501-01	续断 *xuduan*, *nositu**	Decoction or poultice of root against traumatic injuries, inflammations, hip and knee pain.
Diuranthera cf. *minor*	Asparagaceae	10092102-03	兰花参 *lanhuashen*	Poultice of root against traumatic injuries
Drosera peltata Smith	Droseraceae	10072505-01	珍珠草 *zenzhucao*, *qurenlong*; *kujimahu**, *caoniwa**	Decoction of whole plant against indigestion and traumatic injuries.
Eleutherococcous cf. *gracilistylus*	Araliaceae	10111803-02	五加皮 *wujiapi*	Decoction of root to strengthen muscles and as diuretic.
Epilobium hirsutum L.	Onagraceae	10072602-01	白带丹 *baidaidan*	Decoction of whole plant to drain dampness and against diarrhea.

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Erigeron breviscapus (Vabt.) Hand.-Mazz.	Asteraceae	10070505-01 & 10072506-04	灯盏细辛 *dengzhanxixin*	Decoction of whole plant against cold and inflammations; poultice against toothache.
Eriobotrya japonica (Thub.) Lindl.	Rosaceae	10091807-03	枇杷 *pipa*	Decoction of leaves against throat ache and cough, best mixed with *Taraxacum* spp. Fruits eaten.
Eupatorium heterophyllum DC.	Asteraceae	10083101-12 & 10091807-02 & 10091812-08	泽兰 *zelan*	Decoction of leaves to improve blood circulation and against irregular menstruation
Fagopyrum dibotrys (D. Don) H.Hara	Polygonaceae	10082202-04	荞麦 *qiaomai, jiregua**	Pulverized root in rice porridge against digestive system disorders of children.
Fallopia dentatoalata (F. Schmid) Holub.	Polygonaceae	10090501-01	何首乌 *heshouwu*	Decoction of whole plant as kidney tonic and to prevent graying of hair.
Ficus carica L.	Moraceae	10091701-03	无花果 *wuhuaguo*	Fruits eaten to remove toxins, against constipation and indigestion, to tonify the spleen.
Foeniculum vulgare Mill.	Apiaceae	10070101-03	茴香 *huixiang, meishiuzi**	Infusion of seeds against stomachache and swollen testes; leaves used as culinary herb.
Fragaria nilgerrensis var. *nilgerrensis* Schlecht	Rosaceae	10092501-02	白草莓 *baicaomei, bapu**	Decoction of whole plant against diarrhea and skin problems; fruits eaten.
Galinsoga parviflora Cav.	Asteraceae	10091701-02	辣子草 *lazicao*; *miacao*, kolazi**	Decoction of whole plant against throat inflammation and eye problems.
Galium cf. *aparine*	Rubiaceae	10092101-08	茜草 *qiancao*	Decoction of whole plant against bleeding gums and as diuretic.
Gaultheria fragrantissima Wall.	Ericaceae	10092503-01	沙果 *shaguo, faxiayou**	Poultice of root and leaves against rheumatic pain and chilblains.
Gentiana cephalantha Franch. ex Hemsl.	Gentianaceae	10092902-02	龙胆草 *longdancao*	Decoction of whole plant against cold, sore throat, and to dispel heat.
Gentiana cf. *squarrosa*	Gentianaceae	10092801-03	小龙胆 *xiaolongdan*	Decoction of whole plant to clear the lung and eyes.

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Geranium nepalense Sweet	Geraniaceae	10070701-03	五星草 *wuxingcao; wupanshei, sazihu*, mazocao**	Decoction of whole plant against traumatic injuries, pain and numbness of muscles.
Geranium strictipes R. Knuth	Geraniaceae	10072904-03	隔山消 *geshanxiao, baididan**	Decoction of root against digestive system disorders.
Geum aleppicum Jacq.	Asteraceae	10091807-07 & 10092901-04	水杨梅 *shuiyangmei*	Decoction of root against throat ache.
Ginkgo biloba L.	Ginkgoaceae	10091812-06	银杏 *yinxing*	Decoction of leaves against heart disorders; seeds eaten to resolve sputum.
Gladiolus gandavensis Van Houtte	Iridaceae	10091813-03	杆花 *ganhua*	Poultice of bulb against traumatic injuries, hematoma, and swellings.
Glycyrrhiza yunnanensis S. H. Cheng & L. K. Dai ex P. C. Li	Fabaceae	10111804-02	甘草 *gancao*	Decoction of root against cough and bronchitis.
Gnaphalium adnatum (Wall. ex DC.) Kitam.	Asteraceae	10082501-02	百叶子 *baiyezi*	Decoction of whole plant against cold, cough, and rheumatic pain.
Gnaphalium affine D. Don	Asteraceae	10070101-04	大石花 *dashihua*，*nomong**	Decoction of whole plant against cough; young leaves eaten as famine food.
Gnaphalium hypoleucum DC.	Asteraceae	10092801-07	鼠麴草 *shuqucao, mihuhu**	Decoction of whole plant against diarrhea.
Gonostegia hirta (Bl.) Wedd.	Urticaceae	10082202-03	糯米草 *nuomicao*	Poultice of root against traumatic injuries.
Gynura japonica (Thunb.) Juel.	Asteraceae	10072401-01 & 10092101-04	土三七 *tusanqi*，水当归 *shuidangui*	Decoction of root with pig fat, red sugar and rice liquor to dispel heat; poultice of root against traumatic injuries; decoction of leaves against internal injuries.
Habenaria arietina Hook.	Orchidaceae	10082501-05 & 10083101-07	鸡肾参 *jishenshen*	Decoction of tuber as kidney tonic.

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Halenia eliptica D. Don	Gentianaceae	10091809-01	青鱼胆 *qingyudan*	Decoction of whole plant to dispel heat and as liver and gall tonic.
Hedera cf. *nepalensis*	Araliaceae	10091813-05	常春藤 *changchunteng*	Decoction of whole plant to dispel heat and remove toxins; poultice against rheumatic joint pain.
Hemerocallis plicata Stapf.	Xanthorrhoeaceae	10072401-05	萱草 *xuancao*	Decoction of tuberous root parts as tonic, haemostatic and against dizziness and anxiety among elderly people.
Hemiphragma heterophyllum var. *heterophyllum* Wall.	Plantaginaceae	10092902-01	鞭打绣球 *biandaxiuqiu, zhuajinyou**	Decoction of whole plant to stretch tendons.
Heracleum rapula Franch.	Apiaceae	10080104-03	藁本 *gaoben*	Decoction of dried root against cough and rheumatic joint pain.
Hibiscus syriacus L.	Malvaceae	10070701-06	芙蓉花 *furonghua*, *manju**	Infusion of flowers against diarrhea.
Hibiscus trionum L.	Malvaceae	10091803-01	灯笼花 *denglonghua*; *po**, *gonenohaisi**	Decoction of whole plant against diarrhea; decoction of seeds against stomachache.
Houttuynia cordata Thunb.	Saururaceae	10071201-02	鱼腥草 *yuxingcao*, *shiezhuzi **	Whole plant eaten raw or as decoction against cold and cough and to resolve phlegm.
Hydrangea macrophylla (Thunb.) Ser.	Hydrangeaceae	10091813-04	八仙花 *baxianhua*	Decoction of leaves and flowers to dispel heat.
Hypericum cf. *bellum*	Hypericaceae	10070505-04	土连翘 *tulianqiao, xiusou**	Decoction of root against cold and fever; decoction of leaves against stomachache and indigestion; poultice of leaves against inflammations and snakebites; decoction of fruits against cough.
Impatiens balsamina L.	Balsaminaceae	10090101-01	凤仙花 *fengxianhua*, 金风子 *jinfengzi*	Decoction of whole plant to improve the blood flow, against edema, and to ease labor pains.
Impatiens uliginosa Franch.	Balsaminaceae	10072902-01	凤仙花 *fengxianhua*	Poultice of whole plant against snakebites and traumatic injuries; decoction of whole plant to improve blood flow and against anxiety and rheumatic pain.

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Inula helianthus-aquatilis C.Y. Wu	Asteraceae	10070702-02	旋覆花 *xuanfuhua*; *wakuzi**; *xuanninyou**	Decoction of whole plant to resolve phlegm and against cough; washing with decoction of flowers against skin irritations.
Inula nervosa Wall.	Asteraceae	10083101-10	铁脚威灵仙 *tiejiaoweilingxian*	Decoction of whole plant against muscular-skeletal disorders and disorders of the stomach.
Ipomoea purpurea (L.) Roth	Convolvulaceae	10082004-01	牵牛花 *qianniuhua*; *manguzi**, *didahu**	Seeds eaten or as decoction against constipation, difficulty urinating and against worms.
Isatis tinctoria L.	Brassicaceae	10091701-12	板蓝根 *banlangen*	Washing with decoction of root against pox and ulcers; decoction of leaves against fever and dizziness.
Jasminum nudiflorum Lindl.	Oleaceae	10111804-03	金梅花 *jinmeihua*, *jinlaipin**	Decoction of whole plant against worms; poultice of leaves on knife wounds.
Juncus setchuensis Buchen.	Juncaceae	10072601-04	秧草根 *yangcaogen*, *zuniu**	Decoction of roots or whole plant against toothache and inflammation of the throat.
Kerria japonica (L.) DC.	Rosaceae	10082101-01	金弹子 *jindanzi*	Infusion of flowers against cough and lung heat.
Kochia scoparia (L.) Schrad.	Amaranthaceae	10092301-01	地肤子 *difuzi*	Decoction of whole plant against cold; dried stems used to make brooms.
Kyllinga brevifolia Rottb.	Cyperaceae	10091806-01 & 10092802-01	水蜈蚣 *shuiwugong*	Decoction of whole plant against cough and joint pain; poultice against irritated skin.
Lagerstroemia indica L.	Lythraceae	10082001-02 & 10091701-11	紫薇 *ziwei*, 火把花 *huobahua*	Decoction of flowers to stop excessive bleeding after giving birth.
Leontopodium andersonii C.B. Clarke	Asteraceae	10090503-01	火绒草 *huorongcao*, *baiminhu**, *suojiyou*	Decoction of whole plant against traumatic injuries; poultice against and snake- and insect bites.
Leontopodium dedekensii (Bur. et Franch.) Beauv.	Asteraceae	10072904-04	火绒草 *huorongcao*, *baiminhu**, *suojiyou*	Decoction of whole plant against traumatic injuries; poultice against and snake- and insect bites.

Scientific name[1]	**Family**[2]	**Specimen Nr.**	**Local names**[3]	**Usage**
Leonurus japonicus Houtt.	Lamiaceae	10063001-01	益母草 *yimucao*, *demosi**	Decoction of whole plant against irregular and painful menstruation and amenorrhea; given to cows after they have given birth to expel the placenta.
Lespedeza cuneata (Dum. Cours.) D. Don.	Fabaceae	10091809-02	铁扫帚 *tiesaozhou*	Decoction of whole plant to dispel heat, against cold and as diuretic.
Leycesteria formosa var. *formosa* Wall.	Caprifoliaceae	10070705-01	梅竹叶 *meizhuye*	Decoction of whole plant to drain dampness and against rheumatic joint pain.
Ligusticum sinense cv. *chuanxiong* S.H. Qiu et al.	Apiaceae	10081801-03	川芎 *chuanxiong*	Decoction of root against irregular and painful menstruation, amenorrhea, and headache; alcoholic extract against traumatic injuries.
Lilium davidii Duch.	Liliaceae	10082001-03	百合 *baihe*	Decoction of bulbs against cough; soup made of tepals to dispel heat and strengthen the yin; bulbs and tepals used as vegetable.
Lilium sp.	Liliaceae	10092902-04	野百合 *yebaihe*	Powder of dried bulbs is cooked with pork against lung deficiency.
Liriope spicata (Thunb.) Lour.	Asparagaceae	10091812-01	麦冬 *maidong*, *wugizi**	Decoction of tuberous root parts against constipation and cough caused by lung heat.
Lobelia cf. *sessilifolia*	Campanulaceae	10092901-03	梗菜 *gengcai*	Decoction of whole plant to remove toxins and against inflammations; poultice of root against snakebites.
Lonicera acuminata Wall.	Caprifoliaceae	10070504-02	金银花 *jinyinhua*	Decoction of flowers against wind-heat cold (*fengre ganmao*) and throat inflammations; decoction of vine against arthritic swellings and pain and to dispel heat and release toxins.
Lonicera japonica Thunb.	Caprifoliaceae	10071001-01	金银花 *jinyinhua*	Decoction of flowers against wind-heat cold (*fengre ganmao*) and throat inflammations; decoction of vine against arthritic swellings and pain and to dispel heat and release toxins.
Lophatherum gracile Brongn.	Poaceae	10091701-10	淡竹叶 *danzhuye*; *dozisei**, *disideng**	Decoction of leaves against herpes and pain while urinating; decoction of tuber against fever.
Lycium chinense Mill.	Solanaceae	10082004-04	枸杞 *gouqi*	Decoction of root bark to dispel heat and against hot cough; leaves eaten to dispel heat and release toxins; decoction of fruits to dispel heat and release toxins, and against dizziness.

Scientific name[1]	**Family**[2]	**Specimen Nr.**	**Local names**[3]	**Usage**
Lycopodium japonicum Thunb.	Lycopodiaceae	10110201-01	伸筋草 *shenjincao, aosouyizi**	Decoction of whole plant to stretch tendons.
Lycopus lucidus Turcz.	Lamiaceae	10091810-03	泽兰 *zelan*, 地参子 *dishenzi, gesingzi**	Decoction of aboveground parts against irregular menstruation, amenorrhea, and edema.
Lysimachia cf. *lobeloides*	Primulaceae	10092503-02	旱仙桃 *hanxiantiao*	Poultice of whole plant as haemostatic and against traumatic injuries and knife cuts.
Magnolia delavayi Franch.	Magnoliaceae	10092101-05	玉兰 *yulan*	Decoction of seeds against nose bleeding.
Magnolia x alba (DC.) Figlar	Magnoliaceae	10091801-06	白玉兰 *baiyulan*， 缅桂 *miangui*	Infusion of flower buds against cough and to resolve phlegm; decoction to release moisture from joints.
Malva verticillata L.	Malvaceae	10070101-05	土黄耆 *tuhuangqi, aguluzi**	Decoction of root to resolve phlegm; poultice of bark against inflammations and foot pain.
Melilotus indicus (L.) All.	Fabaceae	10083101-03	辟汗草 *pihancao*	Decoction of whole plant to dispel heat and to ease breathing when hot.
Mentha cf. *rotundifolia*	Lamiaceae	10082001-01	薄荷 *bohe*	Decoction or infusion of leaves (or whole plant) against wind-cold, as a tonic, and against stomachache.
Mentha haplocalyx Briq.	Lamiaceae	10091803-05	薄荷 *bohe*	Decoction or infusion of leaves (or whole plant) against wind-cold, as a tonic, and against stomachache.
Merremia hungaiensis (Lingelsh. et Borza) R.C. Fang	Convolvulaceae	10082002-03	地瓜 *digua*	Decoction of tuber against dry lung pain and hepatitis; tuber eaten as spleen tonic and as famine food.
Mirabilis jalapa (L.) Candolle.	Nyctaginaceae	10081801-02	紫茉莉 *zimoli*; *baifanghuju**, *bafu**	Decoction of root against urinary tract infection; poultice of chewed leaves and seeds, grinded into a paste, against inflammations and bad skin.
Murdannia divergens (C.B. Clarke) Bruckn.	Commelinaceae	10091811-03	竹叶参 *zhuyeshen, jiehuzi**	Decoction of whole plant against cough; poultice to quicken the healing process of fractures.

Scientific name[1]	Family[2]	Specimen Nr.	Local names[3]	Usage
Myriactis nepalensis Less.	Asteraceae	10092901-07	大鱼眼草 *dayuyancao*	Decoction of whole plant against digestives system disorders.
Nicandra physalodes (L.) Gaertn.	Solanaceae	10070101-05	边芬 *bianfen*	Paste made of dried powdered seeds, solved in hot water against cold, cough, running nose; decoction of whole plant against infection of genitourinary system.
Nothopanax delavayi (Franch.) Harms. ex Diels.	Araliaceae	10091812-12	梁王茶 *liangwangcha*, *guojigan**	Infusion of dried leaves (or eaten fresh or fried) against throat pain and as a tonic; decoction against gallstones and digestive system disorder; decoction of bark against cold.
Oenanthe linearis Wall. ex DC.	Apiaceae	10091803-03	水芹菜 *shuiqincai*, *shujizi**	Decoction of whole plant to cool the blood and against swellings.
Oenothera glazioviana Micheli	Onagraceae	10091701-06	夜来香 *yelaixiang*	Decoction of root to dispel heat, against throat ache and cold.
Onosma paniculatum Bur. et Franch.	Boraginaceae	10072904-07	滇紫草 *dianzicao*, *hongdanshen*; *zida**, *jinahu**	Decoction of root together with *Cimicifuga yunnanensis* against rubella; poultice of root against burns; used to dye candles.
Ophiopogon bodinieri Levl.	Asparagaceae	10071201-05	麦冬 *maidong*, *wugizi**	Decoction of tuberous root parts against constipation and cough caused by lung heat.
Ophiopogon japonicus (L.) Ker Gawl.	Asparagaceae	10070701-04 & 10092101-10	麦冬 *maidong*, *wugizi**	Decoction of tuberous root parts against constipation and cough caused by lung heat.
Origanum vulgare L.	Lamiaceae	10072001-01	牛至 *niuzhi*, 香薷 *xiangru*	Decoction of whole plant against cold, fever, heat stroke and vomiting.
Osmanthus fragrans cv. *aurantiacus* Lour	Oleaceae	10091801-02	金桂 *jingui*	Infusion of flowers against cold and toothache; decoction of root against stomachache, toothache, and aching muscles.
Osmanthus fragrans Lour.	Oleaceae	10091801-01	四季桂 *sijigui*	Infusion of flowers against cold and toothache; decoction of the root against stomachache, toothache, and aching muscles.
Oxalis corniculata L.	Oxalidaceae	10070701-02	浆草 *jiangcao*	Decoction of whole plant with red sugar against digestive system disorders and fever; poultice against traumatic injuries; eaten raw or in soup as famine food.

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Paris polyphylla Sm.	Melanthiaceae	10063006-01 & 10091701-13	重楼 *chonglou*	Poultice of rhizome against inflammations and as haemostatic; decoction against pain and cold and as diuretic.
Passiflora edulis Sims	Passifloraceae	10082202-01 & 10091801-05	罗汉果 *luohanguo*, 西番莲 *xifanlian*	Fruits eaten to dispel heat, to remove toxins and against irregular or painful menstruation.
Pedicularis rex C.B. Clarke ex Maxim.	Orobanchaceae	10092502-03	还阳草 *huanyangcao* 风尾参 *fengweishen*	Decoction of root to tonify *qi* and spleen and to strengthen the yang.
Pentapanax tomentellus var. *tomentellus* (Franch.) C.B Shang	Araliaceae	10091801-07	五加皮 *wujiapi*	Decoction of root bark to strengthen muscles and as diuretic.
Perilla frutescens (L.) Britton	Lamiaceae	10082004-03 & 10091812-09	紫苏 *zisu*, 马苏 *masu*, *soyou**	Decoction of whole plant against cold, cough, and to release toxins; leaves used as culinary herb against stomach pain and to release toxins.
Peucedanum rubricaule Shan et Sheh	Apiaceae	10080106-02	红前胡 *hongqianhu*, *kunweishiu**	Decoction of root against wind-heat cold (*fengre ganmao*), cough, and feeling of excessive pressure on lungs.
Lablab purpureus (L.) Sweet	Fabaceae	10091804-04	豆子 *douzi*, *nadengha**	Decoction or eaten as vegetable as a spleen tonic, and against indigestion and edema.
Phytolacca acinosa Roxb.	Phytolaccaceae	10070801-06	商陆 *shanglu*; *shangnaihuang**,*zoucimian**, *suzi**	Decoction of root against difficulties urinating and constipation; alcoholic extract to treat skin problems.
Pimpinella candolleana Wight et Arn.	Apiaceae	10082002-01	杏叶防风 *xingyefangfeng*	Decoction of root against rheumatic pain and digestive system disorders.
Pinus yunnanensis Franch.	Pinaceae	10092801-06	云南松 *yunnansong*, *sia**	Decoction of leaves against traumatic injuries and rheumatism; young cones in alcohol or freshly eaten against bruises from fights.
Plantago major L.	Plantaginaceae	10070101-01	车前 *cheqian*, *piachusen**	Decoction of whole plant against cold, cough, kidney stones and urinary tract infection.

Scientific name[1]	**Family**[2]	**Specimen Nr.**	**Local names**[3]	**Usage**
Platycladus orientalis (L.) Franco	Cupressaceae	10091812-14	侧柏 *cebai*	Decoction of seeds against indigestion and congestion; decoction of leaves against internal bleeding; poultice of leaves as haemostatic.
Polygonatum cf. *cirrhifolium*	Asparagaceae	10092804-01	黄精 *huangjing*	Decoction of rhizome against heavy breathing, as kidney and liver tonic.
Polygonatum cf. *punctatum*	Asparagaceae	10072502-02	玉竹 *yuzhu*	Decoction of whole plant against inflammation of the lung, cough, and as respiratory system tonic.
Polygonum hydropiper L.	Polygonaceae	10070804-01 & 10091802-02	辣蓼 *laliao*, *qingwuzi**	Poultice of leaves as haemostatic and to prevent inflammations; decoction against diarrhea.
Polygonum nepalense Meisn.	Polygonaceae	10091802-05 & 10092901-05	蓼草 *liaocao*	Decoction of whole plant against throat ache and diarrhea.
Polygonum paleaceum var. *pubifolium* Wall.	Polygonaceae	10070502-03 & 10072503-04	草血竭 *caoxuejie*, *soji**	Decoction of root against traumatic injuries, pain and swellings, as haemostatic and against stomachache.
Potentilla fulgens Wall. ex Hook.	Rosaceae	10072904-02	翻白叶 *fanbaiye*; *culuzi**, *zidiyue**	Decoction of whole plant against traumatic injuries, digestive system disorders, and as haemostatic.
Potentilla griffithii Hook. f.	Rosaceae	10072903-04	翻白叶 *fanbaiye*; *culuzi**, *zidiyue**	Decoction of whole plant against traumatic injuries, digestive system disorders, and as haemostatic.
Primula poissonii Franch.	Primulaceae	10092802-02	海仙花 *haixianhua*	Decoction of whole plant against pain in the trachea.
Prunella hispida Benth.	Lamiaceae	10070703-01 & 10070705-02 & 10072904-05	夏枯草 *xiakucao*	Decoction of whole plant against inflammations, eye disorders and dizziness.
Psammosilene tunicoides W.C. Wu et C.Y. Wu	Caryophyllaceae	10092801-01	独定子 *dudingzi*, *asojie**, *diwugeng**	Decoction of root against traumatic injuries and stomachache; poultice against knife wounds.
Pteracanthus sp.	Acanthaceae	10083101-09	毛马兰 *maomalan*	Decoction of root to improve the blood flow, to dispel heat and remove toxins.

Scientific name[1]	Family[2]	Specimen Nr.	Local names[3]	Usage
Pteris cretica var. *nervosa* (Thunb.) Ching eth S.H. Wu	Pteridaceae	10092302-03	凤尾草 *fengweicao*, 凤尾蕨 *fengweijue*, *xuguala**	Decoction of whole plant against bronchitis, inflammations, and genitourinary tract infections.
Pteris vittata L.	Pteridaceae	10092302-07	贯众 *guanzhong*, *xuguala**	Decoction of rhizome against diarrhea, rheumatic pain, traumatic injuries, and to stimulate the appetite.
Pterygiella duclouxii Franch.	Scrophulariaceae	10092801-02	草连翘 *caolianqiao*	Decoction of whole plant against inflammation of the lung and to clear eyes.
Pueraria lobata (Willd.) Ohwi	Fabaceae	10082101-03	葛根 *gegen*	Root eaten to dispel heat; decoction against fever and diarrhea.
Punica granatum L.	Lythraceae	10070801-02 & 10091812-05	石榴 *shiliu*	Decoction of fruit exocarp against worms and inflammations.
Pyrola decorata H. Andr.	Ericaceae	10092902-06	鹿黄草 *luhuangcao*	Decoction of whole plant against cold and inflammations.
Reineckea carnea (Andrews) Kunth	Asparagaceae	10092302-01	玉带草 yudaicao; *zubingna**, *gizuginian**	Decoction of whole plant against cough, internal bleeding, and muscular-skeletal disorders.
Rhodobryum giganteum (Schwaegr.) Par.	Bryaceae	10092901-06	回心草 *huixincao*	Decoction of whole plant against circulatory system and heart disorders and against high blood pressure; steam from decoction for clearing eyes.
Rhododendron decorum Franch.	Ericaceae	10091804-03	白杜鹃 *baidujuan*; *baidahu**, *daishipenghou**	Decoction of petals against fever and inflammations; eaten as culinary herb to improve the blood flow.
Rodgersia pinnata var. *pinnata* Franch.	Saxifragaceae	10101202-02	岩陀 *aitou*, *sayou**, *yigung**	Decoction of rhizome against cold, headache, and traumatic injuries; poultice as haemostatic.
Rosa sp.	Rosaceae	10091813-06	玫瑰花 *meiguihua*	Infusion of flowers to improve blood circulation and against irregular and painful menstruation.
Roscoea cf. *tibetica*	Zingiberaceae	10063005-01	鸡脚参 *jijiaoshen*	Decoction of root against dry cough and to moisten the lungs.

Scientific name[1]	**Family**[2]	**Specimen Nr.**	**Local names**[3]	**Usage**
Rubia podantha Diels	Rubiaceae	10081601-01	大红参 *dahongshen*, 茜草 *qiancao, dadangyancao**	Decoction of rhizome against traumatic injuries.
Rubia yunnanensis Diels	Rubiaceae	10070704-01	小红参 *xiaohongshen*, 茜草 *qiancao, xiaodangyancao**	Decoction of rhizome to increase the blood flow and against irregular menstruation.
Rubus xanthocarpus Bur. et Franch.	Rosaceae	10071207-01 & 10080105-01	两面针 *liangmianzhen, zisu**	Decoction of the root against diarrhea; Decoction of leaves against cold and toothache.
Rumex nepalensis Spreng.	Polygonaceae	10070505-06 & 10072601-01	土大黄 *tudahuang, denugeneme**	Root chewed or as a decoction against inflammation of the small intestine and hepatitis; poultice to treat traumatic injuries and skin infections.
Sagittaria trifolia L.	Alismataceae	10091803-02	慈姑 *cigu, gudingzi**	Decoction of subterranean parts as internal haemostatic and as washing agent for eyes.
Salvia splendens Ker Gawl.	Lamiaceae	10091812-07	一串红 *yichuanhong*	Decoction of whole plant to dispel heat, remove toxins, and against traumatic injuries.
Salvia trijuga Diels	Lamiaceae	10083101-02	紫丹参 *zidanshen, zubingne**	Decoction of root against insomnia, painful and irregular menstruation, and impotence.
Salvia yunnanensis C.H. Wright	Lamiaceae	10072506-01	滇丹参 *diandanshen, zubingne**	Decoction of root against painful and irregular menstruation and anxiety.
Sambucus adnata Wall. ex DC.	Adoxaceae	10092901-02	血藤 *xueteng*	Poultice of root to speed up the healing process of fractures; decoction against inflammations.
Sambucus chinensis Lindl.	Adoxaceae	10082501-04	血满草 *xuemancao, xuefeng*	Poultice of root to speed up the healing process of fractures; decoction against inflammations.
Sanguisorba officinalis L.	Rosaceae	10082002-05	金不换 *jinbuhuang*	Decoction of root as internal haemostatic.
Satyrium nepalense var. *nepalense* D. Don	Orchidaceae	10092902-07	对对参 *duiduishen*	Decoction of subterranean parts as kidney and yang tonic and against impotence.

Scientific name[1]	Family[2]	Specimen Nr.	Local names[3]	Usage
Saxifraga cf. *gemmipara*	Saxifragaceae	10092503-04	虎耳草 *huercao*	Decoction of whole plant against diarrhea.
Schisandra cf. *neglecta*	Schisandraceae	10080103-01	五味子 *wuweizi*	Decoction of fruits against respiratory system disorders and as kidney tonic; decoction of the vine to improve blood circulation, to relieve pain, and to relax muscles.
Schizonepeta tenuifolia (Benth.) Briq.	Lamiaceae	10072603-02 & 10111801-02	荆芥 *jingjie/jinggai*	Decoction of whole plant against cold, flu, and headache.
Scutellaria amoena C.H. Wright	Lamiaceae	10070502-02 & 10072503-05	黄芩 *huangjin*	Decoction of root against cough and to dispel heat.
Selaginella pulvinata (Hook. et Grev.) Maxim.	Sellaginellaceae	10102001-01	卷柏 *juanbai*	Decoction of whole plant against painful menstruation and traumatic injuries.
Senecio cf. *chrysanthemoides*	Asteraceae	10072902-02	萝卜叶 *luoboye*, 千里光 *qianliguang*, 九里光 *qiuliguang*	Dried, powdered root eaten or dissolved in water against cough, over usage should be avoided due to toxicity. Decoction of whole plant against inflammations. Also for veterinary purposes.
Senecio cf. *laetus*	Asteraceae	10092902-05	萝卜叶 *luoboye*, 千里光 *qianliguang*, 九里光 *qiuliguang*	Dried, powdered root eaten or dissolved in water against cough, over usage should be avoided due to toxicity. Decoction of whole plant against inflammations.
Senecio cf. *raphanifolius*	Asteraceae	10092902-03	一支箭 *yizhijian*	Decoction of root or cooked with meat or powdered for external application: against traumatic injuries or inflammations.
Senecio scandens Buch.-Ham	Asteraceae	10072902-03	千里光 *qianliguang*, 九里光 *qiuliguang*	Decoction of whole plant against cold and diarrhea; as a washing agent against eczema.
Senecio sp.	Asteraceae	10092503-06	萝卜叶 *luoboye*, 千里光 *qianliguang*, 九里光 *qiuliguang*	Dried, powdered root eaten or dissolved in water against cough, over usage should be avoided due to toxicity. Decoction of whole plant against inflammations.
Serissa cf. *japonica*	Rubiaceae	10091812-10	六月雪 *liuyuexue*	Decoction of whole plant to drain dampness and as spleen tonic.

Scientific name[1]	Family[2]	Specimen Nr.	Local names[3]	Usage
Sida szechuensis Matsuda	Malvaceae	10092302-08	黄花稔 *huanghuaren*, *guluhua**, *gegedeng**	Decoction of whole plant, best mixed with *Solanum nigrum*, against pain in small intestine, gall bladder, and prostate gland.
Sida yunnanensis S.Y. Hu	Malvaceae	10091805-01	黄花稔 *huanghuaren*, *guluhua**, *gegedeng**	Decoction of whole plant, best mixed with *Solanum nigrum*, against pain in small intestine, gall bladder, and prostate gland.
Siegesbeckia orientalis L.	Asteraceae	10082004-05	豨莶草 *xixiancao*	Alcoholic extract or decoction of whole plant against rheumatic pain.
Silene baccifera L. Roth	Caryophyllaceae	10092901-01	九牯牛 *jiuguniu*	Decoction of root or poultice of smashed leaves and fruits to stretch tendons.
Silene gracilicaulis C.L. Tang	Caryophyllaceae	10092801-08	小牛制 *xiaoniuxi*	Decoction or alcoholic extract of root against traumatic injuries, or together with *wujiapi* (various genera and species of Araliaceae) to expel toxins and against stomachache; poultice to quicken the healing of fractures.
Silene platyphylla Franch.	Caryophyllaceae	10072903-02	大牛制 *daniuxi*	Decoction or alcoholic extract of root against traumatic injuries, or together with *wujiapi* (various genera and species of Araliaceae) to expel toxins and against stomachache; poultice to quicken the healing of fractures.
Silene yunnanensis Franch.	Caryophyllaceae	10092801-04	小牛制 *xiaoniuxi*	Decoction or alcoholic extract of root against traumatic injuries, or together with *wujiapi* (various genera and species of Araliaceae) to expel toxins and against stomachache; poultice to quicken the healing of fractures.
Siphonostegia chinensis Benth.	Orobranchaceae	10092302-05	阴行草 *yinxingcao*; *ahuzi**, *minzi**	Decoction of whole plant against hepatitis and traumatic injuries.
Smallanthus sonchifolius (Poepp. et Endl.) H. Rob.	Asteraceae	10111803-01	雪连果 *xuelianguo*	Tuber eaten as vegetable against constipation, to detoxify and to lower the blood pressure.
Solanum aculeatissimum Jacq.	Solanaceae	10093001-01	刺天茄 *citianqie*	Yellow fruits (best heated on a tile over a fire) externally applied on cheek against toothache.
Solanum nigrum L.	Solanaceae	10082003-01	龙葵 *longkui*, *kuagudeng**	Decoction of whole plant against kidney stones and difficulties urinating.

Scientific name[1]	**Family**[2]	**Specimen Nr.**	**Local names**[3]	**Usage**
Solanum pseudocapsicum L.	Solanaceae	10091701-08	洋辣子 *yanglazi*	Decoction of root to relieve pain and against traumatic injuries.
Sonchus oleraceus L.	Asteraceae	10090101-02	苦马菜 *kumacai, daimengbabazi**	Decoction of whole plant against skin problems; leaves eaten fresh as famine food.
Sophora japonica L.	Fabaceae	10091813-07	槐树 *huaishu*	Decoction of the fruits to dispel heat and as haemostatic.
Spiranthes sinensis (Pers.) Ames	Orchidaceae	10071901-01 & 10082501-06	盘龙参 *panlongshen, yiduzi**	Decoction of whole plant as kidney tonic; poultice against skin problems; decoction of the root against impotence.
Stellaria vestita Kurz	Caryophyllaceae	10092502-01	抽筋草 *choujincao*	Decoction of whole plant against cramps, muscular-skeletal pain and rheumatic pain.
Stellaria yunnanensis Franch.	Caryophyllaceae	10072904-01	万线草 *wanxiancao*	Decoction of root as kidney tonic; poultice to quicken the healing of fractures.
Swertia punicea Hemsl.	Gentianaceae	10092502-06	草龙胆 *caolongdan*	Decoction of whole plant to detoxify the liver and against pain while urinating.
Tagetes sp.	Asteraceae	10091701-14	野菊花 *yejuhua*	Infusion of whole plant against cold.
Talinum paniculatum (Jacq.) Gaertn.	Portulacaceae	10081801-07	土人参 *turenshen*	Decoction of root against irregular menstruation, as spleen tonic, and to dispel internal cold.
Thalictrum cf. *javanicum*	Ranunculaceae	10080103-02	小黄连 *xiaohuanglian, wuanlin**	Decoction of whole plant to dispel heat, remove toxins and as pain inhibitor.
Thalictrum delavayi Franch.	Ranunculaceae	10070704-01 & 10072506-03	马尾黄连 *maweihuanglian, maweidewuanlin*, xiaohuamian*	Decoction of whole plant to dispel heat and against toothache.
Thlaspi arvense L.	Brassicaceae	10091701-01	蓝菜 *lancai*	Decoction of whole plant against indigestion and to remove toxins; young shoots eaten as vegetable.
Triplostegia grandiflora Gagnep.	Dipsacaceae	10082501-07	双参 *shuangshen*	Decoction of root as kidney tonic, against impotence and menstrual disorders.

Scientific name[1]	**Family**[2]	**Specimen Nr.**	**Local names**[3]	**Usage**
Tropaeolum majus L.	Tropaeolaceae	10082101-08 & 10111802-02	旱金莲 *hanjinlian*	Decoction of whole plant against eye problems; poultice against traumatic injuries.
Urtica atrichocaulis (Hand.-Mazz.) C.J. Chen	Urticaceae	10070801-07	小蓟麻 *xiaojima, xiaohaoqingzi**	Leaves eaten after food poisoning; decoction of whole plant against cough and fever.
Vaccinium fragile Franch.	Ericaceae	10072504-01	土千年健 *tuqiannianjian, guluzi* *	Poultice of chewed leaves as haemostatic.
Verbascum thapsus L.	Scrophulariaceae	10072903-03	大毛叶 *damaoye*，一柱香 *yizhuxiang*	Decoction of whole plant against inflammations of the appendix and lungs, and to dispel heat.
Verbena officinalis L.	Verbenaceae	10070101-02	马鞭草 *mabiancao, mabingsa**	Decoction of whole plant after traumatic injuries.
Viola betonicifolia Sm.	Violaceae	10092101-07	犁头草 *litoucao, liqiancao*	Poultice of whole plant against inflammations.
Viola delavayi Franch.	Violaceae	10071201-03	黄花地丁 *huanghuadiding*	Poultice of whole plant as haemostatic; decoction as internal haemostatic.
Viola philippica Cav.	Violaceae	10070701-05	犁头草 *litoucao, liqiancao*	Decoction of whole plant against eye problems.
Viola philippica var. *pseudojaponica* Cav.	Violaceae	10082101-12	犁头草 *litoucao, liqiancao*	Poultice of whole plant against snakebites and ulcers.
Wahlenbergia marginata (Thunb.) A.DC.	Campanulaceae	10072903-01	蓝花参 *lanhuashen*	Decoction of whole plant against cough and to resolve phlegm.
Wisteria cf. *sinensis*	Fabaceae	10091807-04	紫藤 *ziteng*	Decoction of leaves, flowers, seeds and young stems to expel toxins and parasitic insects; decoction of the root against skin problems and toothache.
Xanthium sibiricum Patrin ex Widder	Asteraceae	10083101-01	苍耳子 *cangerzi*	Decoction of fruits against running nose and cold.

Scientific name[1]	**Family**[2]	**Specimen Nr.**	**Local names**[3]	**Usage**
Zingiberaceae	Zingiberaceae	10092302-06	野姜 *yejiang*	Decoction of rhizome to improve the blood flow, against cough and cold; alcoholic extract against diarrhea.
Zinnia elegans Jacq.	Asteraceae	10091701-07	白日草 *bairicao*	Decoction of whole plant to drain dampness, dispel heat, and remove toxins.

[1]According to the *Flora of China* (1994 to present).
[2]According to the Angiosperm Phylogeny Group (APG III)
[3]Local names are given in Chinese characters (*hanzi*) and the official transcription, *pinyin*. Names marked with a "*" are in the Bai language.

A.1.2. Species cultivated in the garden

Table 3: List of medicinal plants cultivated in the garden, together with details on their locally documented habitat.

Species	**Habitat**	**Soil**[1]	**Water requirements**[2]	**Light requirements**[3]
Achyranthes aspera	Wasteland	Yellow, brown Alfisol	Medium-low	Half shade
Aconitum charmichaelii	Field, garden	Black Anthrosol	Medium-high	Half shade
Acorus calamus	Aquatic	Black Aqueous soil	High	Half shade-shade
Agrimonia pilosa	Path side, wasteland	Yellow, brown Alfisol	Medium-low	Sun-half shade
Ainsliaea yunnanensis	*Pinus*-*Quercus* forest	Yellow, brown Alfisol	Medium-low	Half shade
Ajuga forrestii	Subalpine meadow	Yellow, brown Alfisol	Medium	Half shade-sun
Alcea rosea	Garden	Black Anthrosol	Medium-high	Sun-half shade
Aloe vera	Garden	Sandy Anthrosol	Medium-low	Sun
Amorphophallus rivieri	Garden	Black Anthrosol	Medium-high	Half shade-shade
Anaphalis bulleyana	SEBLF	Black H-layer	Medium-high	Half shade
Anemone rivularis	Near water, path side, wasteland	Black Anthrosol; yellow Alfisol	High	Sun-half shade
Anemone vitifolia	Near water, path side, wasteland	Black Anthrosol; yellow Alfisol	Medium-high	Half shade
Anisodus acutangulus	Garden	Red Ferralisol and *shanqitu*	Medium	Sun-half shade
Arisaema elephas	SEBLF	Black H-layer	Medium-high	Shade-half shade
Arisaema cf. *erubescens*	Hedge, path side, scrub	Yellow, brown Alfisol	Medium	Half shade
Arisaema yunnanense	*Pinus*-*Quercus* forest, scrub	Yellow, brown Alfisol	Medium-low	Sun-half shade
Asparagus mairei	Scrub	Red Ferralisol	Medium-low	Half shade-sun
Berberis pruinosa	Hedge, scrub	Yellow, brown Alfisol	Medium-low	Sun-half shade
Bidens cf. *pilosa*	Path side, wasteland	Yellow, brown Alfisol	Medium	Half shade
Bletilla formosana	*Pinus*-*Quercus* forest, SEBLF	Black H-layer	Medium-high	Shade
Bletilla striata	*Pinus*-*Quercus* forest, scrub	Red Ferralisol; yellow, brown Alfisol	Medium-low	Sun-half shade
Bougainvillea glabra	Garden	Black Anthrosol	Medium-high	Sun-half shade
Bupleurum marginatum	Path side, scrub	Yellow, brown Alfisol; with thick H-layer	Medium-high	Half shade
Cardiocrinum giganteum (Wall.) Makino	Garden	Red Ferralisol and *shanqitu*	Medium-high	Half shade-sun
Chaenomeles speciosa	Garden, hedge	Yellow, brown Alfisol	Medium	Sun-half shade

Species	**Habitat**	**Soil**[1]	**Water requirements**[2]	**Light requirements**[3]
Cimicifuga yunnanensis	Subalpine meadow	Yellow, brown Alfisol; with thick H-layer	Medium-high	Shade-Half shade
Clematis fasciculiflora var. f*asciculiflora*	Scrub	Red Ferralisol; yellow, brown Alfisol	Medium-low	Sun
Clematis peterae	Hedge, path side, wasteland	Yellow, brown Alfisol	Medium	Half shade
Codonopsis convolvulaceae var. *pinifolia*	*Pinus*-*Quercus* forest	Yellow, brown Alfisol	Medium-low	Half shade
Colocasia esculenta	Field, garden	Black Anthrosol	High	Half shade-sun
Commelina communis	Path side, SEBLF, wasteland	Yellow, brown Alfisol with thick H-layer	High	Half shade-shade
Corallodiscus lanuginosus	Scrub	On calciferous rocks	Low	Sun
Coriandrum sativum	Garden	Black Anthrosol	Medium	Sun-half shade
Cosmos bipinnata	Garden, Scrub	Red Ferralisol	Medium-low	Sun
Cynoglossum amabile	Path side, wasteland	Yellow, brown Alfisol	Low	Sun
Cyperus cyperoides	Near water, path side, subalpine meadow, wasteland	Yellow, brown Alfisol	Medium-high	Sun
Dactylicapnos torulosa	Hedge, path side, wasteland	Yellow, brown Alfisol	Medium	Half shade
Datura stramonium	Path side, wasteland	Yellow, brown Alfisol	Medium	Half shade-sun
Delphinium cf. *taliense*	*Pinus*-*Quercus* forest, scrub	Yellow, brown Alfisol	Medium-low	Half shade
Dianthus chinensis	Garden	Black Anthrosol	Medium-high	Half shade-shade
Dicrocephala chrysanthemifolia	Path side, wasteland	Yellow, brown Alfisol	Medium	Half shade-sun
Dioscorea cf. *opposita*	Hedge, wasteland	Yellow, brown Alfisol	Medium	Half shade-sun
Dipsacus asper	Field, path side, scrub wasteland	Yellow, brown Alfisol	Low	Sun-half shade
Drosera peltata	*Pinus*-*Quercus* forest, subalpine meadow	Yellow, brown Alfisol	Low	Sun-half shade
Erigeron breviscapus	Field, path side, scrub, subalpine meadow	Yellow, brown Alfisol	Medium-low	Sun-half shade
Eriobotrya japonica	Garden	Black Anthrosol	Medium	Half shade
Foeniculum vulgare	Garden, wasteland	Black Anthrosol	Medium	Sun-half shade
Fragaria nilgerrensis	Path side, *Pinus*-*Quercus* forest, scrub	Yellow, brown Alfisol	Low	Sun
Galinsoga parviflora	Path side, wasteland	Yellow, brown Alfisol	Medium-low	Half shade
Gaultheria fragrantissima	*Pinus*-*Quercus* forest, scrub, SEBLF	Yellow, brown Alfisol	Medium	Half shade-shade
Gentiana cephalantha	*Pinus*-*Quercus* forest,	Yellow, brown	Medium-high	Shade-half shade

Species	Habitat	Soil[1]	Water requirements[2]	Light requirements[3]
	subalpine meadow	Alfisol, with thick H-layer		
Geranium nepalense	Path side, wasteland	Yellow, brown Alfisol	Medium-low	Sun-half shade
Geranium strictipes	Path side, scrub	Yellow, brown Alfisol	Medium-low	Sun-half shade
Ginkgo biloba	Garden	Black Anthrosol	Medium	Sun
Gnaphalium hypoleucum	Scrub, subalpine meadow	Yellow, brown Alfisol	Low	Sun
Gynura japonica	Garden, SEBLF	Black Humus	Medium-high	Shade-half shade
Hibiscus syriacus	Garden	Black Anthrosol	Medium	Sun
Hibiscus trionum	Path side, wasteland	Red Ferralisol	Medium-low	Sun-half shade
Hosta plantaginea (Lam.) Aschers.	Garden	Black Anthrosol	Medium-high	Half shade
Houttuynia cordata	Garden, near water	Humus rich sand	High	Half shade-shade
Hypericum bellum	Path side, scrub	Yellow, brown Alfisol	Medium-low	Sun
Inula helianthus-aquatilis	Near water	Black Aqueous soil	High	Half shade-sun
Isatis tinctoria	Garden	Red Ferralisol and *shanqitu*	Medium	Sun
Juncus setchuensis	Near water	Black Aqueous soil	High	Sun-half shade
Leontopodium andersonii	*Pinus-Quercus* forest, scrub	Brown mixed Alfisol and Ferralisol	Low	Sun-half shade
Leonurus japonica	Garden, path side, wasteland	Yellow, brown Alfisol	Medium	Half shade-sun
Ligusticum sinense cv. *chuanxiong*	Garden	Black Anthrosol	Medium-high	Half shade
Lilium davidii	Field, garden	Brown Anthrosol	Medium-high	Sun-half shade
Lonicera japonica	Garden, hedge	Yellow, brown Alfisol with thick H-layer	Medium	Half shade
Lophatherum gracile	Wasteland	Black Anthrosol	Medium	Half shade-shade
Lycium chinense	Garden, hedge, near water	Yellow, brown Alfisol	Medium-high	Sun-half shade
Lycopodium japonicum	SEBLF, subalpine meadow	Yellow, brown Alfisol with thick H-layer	Medium-high	Shade
Lycopus lucidus	Field, path side	Brown Anthrosol	Medium	Sun
Mentha cf. *rotundifolia*	Garden	Black Anthrosol	Medium	Half shade
Mirabilis jalapa	Garden, path side, wasteland	Yellow, brown Alfisol	Medium-low	Sun-half shade
Murdannia divergens	*Pinus-Quercus* forest	Yellow, brown Alfisol	Medium-low	Half shade-sun
Nicandra physalodes	Path side, wasteland	Yellow, brown Alfisol	Medium-low	Half shade-sun
Nothopanax delavayi	Garden, SEBLF	Black H-layer	Medium-high	Shade-half shade
Onosma paniculatum	*Pinus-Quercus* forest	Yellow, brown	Low	Half shade-sun

Species	Habitat	Soil[1]	Water requirements[2]	Light requirements[3]
		Alfisol		
Ophiopogon japonicus	Near water, SEBLF	Black H-layer; Aqueous soil	Medium-high	Shade-half shade
Origanum vulgare	Scrub, subalpine meadow	Yellow, brown Alfisol	Medium-low	Sun-half shade
Osmanthus fragrans	Garden	Black Anthrosol	Medium-high	Half shade
Paris polyphylla	Garden, scrub, SEBLF	Yellow, brown Alfisol with thick H-layer	Medium-low	Half shade-shade
Perilla frutescens	Garden	Black Anthrosol	Medium-high	Sun-half shade
Peucedanum rubricaule	Path side, scrub	Red Ferralisol	Low	Half shade-sun
Pharbitis purpurea	Hedge, path side, wasteland	Yellow, brown Alfisol	Medium	Half shade-sun
Pimpinella candolleana	Path side, *Pinus*-*Quercus* forest	Yellow, brown Alfisol	Medium-high	Sun-half shade
Pinus yunnanensis	Pinu-Quercus forest	Yellow, brown Alfisol; Red Ferralisol	Medium-low	Sun-half shade
Plantago major	Path side, wasteland	Yellow, brown Alfisol	Medium	Half shade-sun
Polygonum paleaceum var. *pubifolium*	Path side, *Pinus*-*Quercus* forest, scrub	Yellow, brown Alfisol	Low	Sun-half shade
Potentilla fulgens	Path side, subalpine meadow	Yellow, brown Alfisol	Medium-low	Sun
Prunella hispida	Near water, path side	Yellow, brown Alfisol with thick H-layer	High	Half shade-shade
Psammosilene tunicoides	Scrub	Thin H-layer above calciferous rock	Low	Sun
Pteris nervosa	Hedge, scrub	Yellow, brown Alfisol	Medium	Half shade-shade
Pteris vittata	Near water	Black Aqueous soil	High	Shade-half shade
Pueraria lobata	Garden, wasteland	Yellow, brown Alfisol	Medium-low	Half shade-sun
Reineckea carnea	Near water, SEBLF	Black H-layer	Medium-high	Half shade-shade
Rhodobryum giganteum	Near water, SEBLF	Black H-layer	High	Shade
Rhododendron decorum	*Pinus*-*Quercus* forest, SEBLF	Yellow, brown Alfisol with thick H-layer	Medium	Half shade
Rodgersia pinnata	Subalpine meadow	Yellow, brown Alfisol with thick H-layer	Medium-high	Half shade-shade
Rubia yunnanensis	Path side, wasteland	Yellow, brown Alfisol	Medium-low	Half shade-sun
Rubus xanthocarpus	SEBLF	*Shanqitu*	Medium-high	Shade
Rumex nepalensis	Near water, path side, wasteland	Black Anthrosol; yellow, brown Alfisol	Medium	Half shade-sun
Sagittaria trifolia	Aquatic	Black Aqueous soil	High	Half shade-sun

Species	**Habitat**	**Soil**[1]	**Water requirements**[2]	**Light requirements**[3]
Salvia trijuga	Scrub	Red Ferralisol	Low	Sun-half shade
Salvia yunnanensis	Path side, *Pinus-Quercus* forest	Brown mixed Alfisol and Ferralisol	Low	Sun
Sanguisorba officinalis	Near water, subalpine meadow	Black Aqueous soil	High	Sun-half shade
Schisandra cf. *neglecta*	SEBLF	*Shanqitu*	Medium-high	Shade
Schizonepeta tenuifolia	Garden	Black Anthrosol	Medium	Sun
Scutellaria amoena	Path side, *Pinus-Quercus* forest, scrub	Yellow, brown Alfisol	Medium-low	Sun-half shade
Selaginella pulvinata	Xeromorphic grassland	Thin H-layer above calciferous rock	Low	Sun
Senecio scandens	Hedge, path side	Yellow, brown Alfisol	Medium-low	Half shade-sun
Siphonostegia chinensis	*Pinus-Quercus* forest	Yellow, brown Alfisol	Medium-low	Half shade
Solanum nigrum	Path side, wasteland	Yellow, brown Alfisol	Medium	Half shade-sun
Spiranthes sinensis	Near water, subalpine meadow	Yellow, brown Alfisol	Medium-high	Sun
Thalictrum delavayi	Near water	Black H-layer	Medium-high	Shade-half shade
Triplostegia grandiflora	*Pinus-Quercus* forest	Yellow, brown Alfisol	Medium-low	Half shade-shade
Tropaeolum majus	Garden, hedge	Yellow, brown Alfisol with thick H-layer	Medium-high	Half shade
Vaccinium fragile	*Pinus-Quercus* forest, scrub	Yellow, brown Alfisol	Medium-low	Half shade-sun
Verbena officinalis	Path side, wasteland	Yellow, brown Alfisol	Medium-low	Sun-half shade
Viola philippica	Path side, wasteland	Yellow, brown Alfisol	Medium	Half shade-shade
Wisteria sinensis	Garden	Black Anthrosol	Medium	Sun-half shade

[1]A combination of scientific (Shi et al. (2002)) and local classification (see table 7 pg. 54).
[2]Estimated from proximity to a stream or body of standing water and from the habitats relief and soil permeability.
[3]Hours of direct sunlight in June, measured with a *Horzontoscope*. Seven categories: shade (0-2h), shade-half shade (2-3.5h), half shade-shade (3.5-5h), half shade (5-7h), half shade-sun (7-8.5h), sun-half shade (8.5-10h), sun (10-12h).

A.2. Supplemental data

A.2.1. Interview guides

Local opinions and ideas on creating a medicinal plant garden

1. Do you think such a garden is a good idea? What do you consider the purpose of such a garden? (Do you think it should be there to visit, or mainly for cultivating medicinal plants?) Do you think people should be allowed to use the plants of the garden/remove plant material?
   你认为建这么的中药园是一个好主意吗？你觉得有什么目的？（是参观的或者主要是培植重要的？）你觉得人能不能用或者拿重要远的药？
2. Who should the garden mainly be build for? (For local people (families, school classes, or medicinal plant users) for domestic tourists or for foreign tourists?) Please explain your answer.
   你 觉得 为 什么 人 建 重要 远 最 好?（为 当地（为 家庭 还是 为 学校 还是 为 用 重要 人）还是 为 外地 人 还是 为 外国 人？）你 为什么 这么想?
3. What do you think is an appropriate location for the garden? (Please bear in my mind that there is no money available for renting or buying land.)
   你 觉得 中药 园 建 在 什么 地方 好？（问题 是：没有 钱 租 或者 买 土地!）
4. For this location, could you think of anyone who could maintain the garden and control the access to it?
   你 说 的 这个 地方， 你 觉得 什么 看管 中药 远 和 查 票?
5. Do you think there should be an entrance fee, a donation box, or should the entrance be completely free? How much money do you consider appropriate?
   你 觉得 参观 中药 园 要 买 门票 还是 捐献 钱 还是 可以 免费 参观? 你 觉得 多少 钱 合适?
6. Do you think the garden should be designed rather for leisure or for learning?
   你 觉得 中药 园 应该 设计 成 什么 方式？ 休闲 型 还是 教育型？
7. Which plants should be planted?
   中药 园 种 什么 植物 好？
8. In your opinion, how many different plants should the garden contain?
   你 觉得 中药 园 种 多少 种 好？
9. How many individuals per species should be planted?
   你 觉得 每一 中 植物 因该 种几 棵？
10. Should poisonous plants (e.g. *Aconitum*) be planted in the garden? How is the toxicity best declared to avoid abuse/accidents? 你 觉得 可 不 可以 种 有毒 的 植物 （比如 说 附子）？ 怎么 标记 有毒 的 植物？
11. How do you think the local community should be informed of the ongoing project?
    怎么 关照 公众？
12. Do you think anyone could be opposed to/offended by the construction of this garden?
    你 觉得 会 不 会 有 人 不 喜欢 我们 在 沙溪 建 中药 园？
13. What sort of information should be presented to the visitors?
    中药 园 因该 给 人们 哪 方面 的 知识？
14. Do you think anything besides medicinal plants should be exhibited?
    你 觉得 除了 中药 还 有 什么东西 可以 在 中药 园 展出？

Tourists' opinions and ideas on creating a medicinal plant garden

1. Would you be interested in visiting such a garden?
   你 有 兴趣 参观 这样 的 中药 园 吗?
2. Would you be willing to pay an entrance fee or give a donation? What sum would you consider appropriate?
   你 愿意 买 票 吗? 或者 捐 一 点 钱 吗? 你 觉得 多少 钱合适?
3. Would you be interested in buying local medicine after the visit?
   参观 完 以后, 你 有 兴趣 买 一 点 本地 药材 吗?
4. What sort of information would you like to find in the garden?
   在 中药 园 你 想 得到 什么信息?
5. Would you like to see illustrations/pictures of the exhibited plants?
   你 想 看 展出 植物 的 说明 和 照片 吗?
6. Do you think aesthetic or informative aspects would be more important?
   你 觉得 美观 和 知识 性 哪 方面 更 重要?
7. Would you be willing to go a certain distance outside of *Sideng* (Shaxi's main town) for the visit? How far as a maximum?
   如果 中药 园 在 沙溪 外面 你 愿意 去 参观 吗? 多 远 你 可以 去?
8. Do you think such a garden fits the tourism concept for Shaxi?
   你 觉得 这样 的 中药 园 适合 沙溪 的 旅游 吗?
9. Beside medicinal plants, what else would you like to see in the garden?
   除了中药 你 还 想 看 什么?
10. Do you have any additional ideas or recommendations?
    对 中药 园 你 还 有 什么 高见?

Common ailments and herbal remedies

Villagers

1. Do you use herbal medicine yourself? If yes how often?
   你 自己 用 中药 吗? 一年 多少 次?
2. Which species do you use, when you use herbal medicine at home?
   用 中药 的时候 你 用 哪些?
3. What ailments do you use these medicinal plants for? Can you think of any other disease that you treated with herbal medicine? If yes what did you use for the treatment?
   那些 药 是 为了 什么 病 吃的? 除了那些 病 还有 别的 你 吃 中药 吗? 吃 什么?

Medical experts

1. What are the locally most common diseases?
   哪 些 病症 是 沙溪 最 频繁 的 ?
2. What are the most common locally used herbal medicines?
   在 沙溪 最 常 用 的 草药 是 哪 些?
3. Are there any differences between TCM and traditional Bai medicine? If yes, what are they?
   中药 和 百药 有 什么 不 一样?
4. Do the local people depend on medicinal plants? If yes, financially or for their own health?
   当地 人 依靠 药用 植物 吗? 为了 自己 用 还是 为了 卖?

Insights into local gardening practices and concepts

1. What is the purpose of your own garden? (Is it rather practical or aesthetic?) Do you think the same is true for most of the gardens in Shaxi?
   你 建 自己 的 花园 是 什么目的？你 建 花园 是 为了 好看 还是 为了 别的 什么？你 觉得 别人 在 沙溪 也 是 这样 吗？
2. Do you think the gardens here are traditional Chinese or rather local Bai? If Bai, where do you see differences?
   你 认为 沙溪 花园 的 方式 是 当地 白族 的 还是 什么？白族 的 花园 有 什么 特点？
3. What are common local gardening plants? How do people choose which ones to plant? Where do they come from?
   沙溪 的 花园 常常 种 哪些 植物？你 怎么 决定 种 哪 一些 好？ 植物 是从 哪里 来 的？
4. How do you (or local gardeners in general) determine the plants' planting positions? How do local people know what sort of soil, moisture, and light conditions they require? Are there any plants that should be planted in a special position?
   你 怎么 决定 什么 样 的 植物 放 在 什么 地方 好？人们 怎么 知道 植物 因该 用 什么 土，多少 阳光，水 什么的？有 没 有 一些 植物 要 放 特别 的 地方？
5. What do you think are the most important aspects one needs to consider when building a garden?
   如果 建 花园 你 因该 注意 什么 是？
6. Are there any plants that carry a particular meaning (in gardening)?
   对 你 来 说，一些 植物 有 他们 的 含义？
7. Are there any particular temple plants? Do temples traditionally also contain medicinal plants?
   在 寺庙 里 有 什么 特别 的 植物？以前 寺庙 里 也 有 药用 植物 吗？
8. Beside plants, what are important things to have in a garden? Should these also be contained in the medicinal plant garden?
   你 觉得 除了 植物 花园 里 还 因该 有 什么？在 中药 园 里 呢？

A.2.2. Paired comparison of locations for the garden

Procedure:
For each of the 15 pairs every informant, was asked, which of the two options he or she preferred. For each time the informant chose a location, the respective location was credited with one point. Thus, for each informant a preference ranking was compiled. Using the data from all 29 informants, the average rank of each location was calculated, by adding up all the 29 ranks for each location and dividing this number by 29.

Table 4: Detailed result of the paired comparison task performed with 29 randomly selected informants.

Informant	**TS[1]**	**TC[2]**	**HSC[3]**	**HSV[4]**	**HCC[5]**	**HCV[6]**
1	3	2	4	6	1	5
2	3	1	3	2	3	6
3	2	4	1	4	2	6
4	4	3	1	1	4	6
5	4	2	4	3	1	4
6	3	1	5	6	2	4
7	5	2	2	4	1	6
8	5	4	3	1	2	6
9	4	2	4	1	2	6
10	4	2	3	6	1	5
11	5	4	1	2	3	6
12	1	4	2	3	5	6
13	3	6	3	1	2	3
14	2	1	4	6	2	4
15	4	5	3	2	1	6
16	1	3	1	4	4	6
17	6	5	1	3	1	3
18	3	1	4	6	1	4
19	3	3	1	2	3	6
20	6	1	4	3	5	2
21	5	1	6	3	2	4
22	3	1	5	2	3	5
23	6	1	5	4	2	3
24	3	2	6	3	1	3
25	3	1	4	6	2	5
26	3	1	5	4	2	6
27	2	1	4	5	3	6
28	6	1	2	2	5	2
29	6	1	4	5	2	3
Total	108	66	95	100	68	137
Average	3,72	2,28	3,28	3,45	2,34	4,72

[1-6]Ranks of the respective locations; [1]Temple in *Sideng*; [2]Temple in *Changle*; [3]Private house in *Sideng*, cultivation for usage; [4] Private house in *Sideng*, for visiting and learning; [5] Private house in *Changle*, cultivation for usage; [6] Private house in *Changle*, for visiting and learning

A.2.3. Choice of herbal medicine to be planted

A total of 122 local medicinal plant species were ranked according to their local popularity, using a variation of the freelist task. The result is hown in table 4.

Table 5: Detailed results of the local preference ranking of medicnal plants compiled in accordance to the freelist taks performed with a total of 30 randomly chosen informants.

Species	Should be planted	Does not know this species	Should not be planted	Number of points	Score	Number of informants asked
Gastrodia elata	9	1	0	38	0,95	10
Lagerstoemia indica	9	0	1	36	0,9	10
Prunella hispida	9	0	1	36	0,9	10
Angelica sinensis	8	1	1	34	0,85	10
Anisodus acutangulus	8	1	1	34	0,85	10
Cardiocrinum giganteum	7	3	0	34	0,85	10
Cimicifuga yunnanensis	8	1	1	34	0,85	10
Isatis tinctoria	8	1	1	34	0,85	10
Osmanthus fragrans	8	1	1	34	0,85	10
Alcea rosea	7	2	1	32	0,8	10
Arisaema yunnanense	8	0	2	32	0,8	10
Erigeron breviscapus	8	0	2	32	0,8	10
Eryobotria japonica	8	0	2	32	0,8	10
Gynura japonica	7	2	1	32	0,8	10
Hosta plantaginea	6	4	0	32	0,8	10
Hibiscus syriacus	7	2	1	32	0,8	10
Leonurus japonica	8	0	2	32	0,8	10
Lycium chinense	8	0	2	32	0,8	10
Nothopanax delavayi	8	0	2	32	0,8	10
Paris polyphylla	8	0	2	32	0,8	10
Reineckea carnea	7	2	1	32	0,8	10
Gingko biloba	13	5	2	31	0,775	20
Dahlia pinnata	7	1	2	30	0,75	10
Psammosilene tunicoides	7	1	2	30	0,75	10
Schisandra cf. *neglecta*	7	1	2	30	0,75	10
Schizonepeta tenuifolia	6	3	1	30	0,75	10
Sprianthes sinensis	9	11	0	29	0,725	20
Aconitum carmichaelii	6	2	2	28	0,7	10
Berberis pruinosa	7	0	3	28	0,7	10
Bletilla striata	6	2	2	28	0,7	10
Fallopia dentatoalata	6	2	2	28	0,7	10
Gentiana cephalantha	7	0	3	28	0,7	10
Lonicera japonica	14	0	6	28	0,7	20
Phytolacca acinosa	5	4	1	28	0,7	10
Triplostegia grandiflora	4	6	0	28	0,7	10
Wisteria sinensis	7	0	3	28	0,7	10
Cynanchum cf. *otophyllum*	13	1	6	27	0,675	20
Anemone vitifolia	4	5	1	26	0,65	10
Arisaema cf. *erubescens*	6	1	3	26	0,65	10
Arisaema elephas	5	3	2	26	0,65	10
Bupleurum marginatum	6	1	3	26	0,65	10
Geranium stricticeps	6	1	3	26	0,65	10
Lilium davidi	13	0	7	26	0,65	20
Lycopodium japonicum	6	1	3	26	0,65	10
Onosma paniculatum	5	3	2	26	0,65	10
Potentilla fulgens	5	3	2	26	0,65	10

Species	Should be planted	Does not know this species	Should not be planted	Number of points	Score	Number of informants asked
Pteris nervosa	6	1	3	26	0,65	10
Rosa spp.	6	1	3	26	0,65	10
Tropaeolum majus	6	1	3	26	0,65	10
Zanthoxylum nitidum	5	3	2	26	0,65	10
Dianthus chinensis	8	9	3	25	0,625	20
Chaenomeles speciosa	6	0	4	24	0,6	10
Origanum vulgare	9	6	5	24	0,6	20
Rhodobyrum giganteum	3	6	1	24	0,6	10
Rodgersia pinnata	7	10	3	24	0,6	20
Salvia yunnanensis	9	6	5	24	0,6	20
Senecio scandens	9	6	5	24	0,6	20
Arctium lappa	10	3	7	23	0,575	20
Campylotropis hirtella	7	9	4	23	0,575	20
Hemerocallis plicata	5	13	2	23	0,575	20
Pimpinella candolleana	7	9	4	23	0,575	20
Ligusticum sinense cv. *chuanxiong*	10	2	8	22	0,55	20
Liriope spicata	4	3	3	22	0,55	10
Ophiopogon japonicus	7	8	5	22	0,55	20
Polygonum palaecum	9	4	7	22	0,55	20
Punica granatum	11	0	9	22	0,55	20
Dipsacus asper	10	1	9	21	0,525	20
Peucedanum rubricaule	10	1	9	21	0,525	20
Cannabis sativa	5	0	5	20	0,5	10
Cymbopogon sp。	2	6	2	20	0,5	10
Dicrocephala chrysantemifolia	8	4	8	20	0,5	20
Fagopyrum dibotrys	8	4	8	20	0,5	20
Houttuynia cordata	10	0	10	20	0,5	20
Mentha cf. *rotundifolia*	5	0	5	20	0,5	10
Selaginella pulvinata	3	4	3	20	0,5	10
Thalictrum delavayi	6	8	6	20	0,5	20
Artemisia cf. *cappilaris*	3	3	4	18	0,45	10
Drosera peltata	2	5	3	18	0,45	10
Hypericum bellum	9	0	11	18	0,45	20
Kochia scoparia	1	7	2	18	0,45	10
Mirabilis jalapa	9	0	11	18	0,45	20
Vaccinium fragile	0	9	1	18	0,45	10
Clematis petereae	7	3	10	17	0,425	20
Geranium nepalense	5	7	8	17	0,425	20
Sambucus adnata	6	5	9	17	0,425	20
Acorus calamus	2	4	4	16	0,4	10
Apium graveolens	3	2	5	16	0,4	10
Perilla frutescens	4	0	6	16	0,4	10
Pueraria lobata	4	0	6	16	0,4	10
Impatiens uliginosa	7	1	12	15	0,375	20
Cirsium chlorolepis	3	1	6	14	0,35	10
Corallodiscus lanuginosus	3	1	6	14	0,35	10
Inula helianthus-aquatilis	7	0	13	14	0,35	20
Sanguisorba officinalis	0	7	3	14	0,35	10
Scuttelaria amoena	3	1	6	14	0,35	10
Agrimonia pilosa	2	2	6	12	0,3	10
Amorphophallus rivieri	3	0	7	12	0,3	10
Anemone rivularis	2	2	6	12	0,3	10
Castanea mollis	3	0	7	12	0,3	10
Commelina communis	2	2	6	12	0,3	10

Species	Should be planted	Does not know this species	Should not be planted	Number of points	Score	Number of informants asked
Cynoglossum amabile	3	0	7	12	0,3	10
Juncus setchuensis	3	0	7	12	0,3	10
Ligusticum sinense	2	2	6	12	0,3	10
Cyperus cyperoides	3	0	7	12	0,3	10
Nicandra physalodes	3	0	7	12	0,3	10
Rubia yunnanensis	2	2	6	12	0,3	10
Rumex nepalensis	3	0	7	12	0,3	10
Taraxacum spp.	3	0	7	12	0,3	10
Viola betonicifolia	2	2	6	12	0,3	10
Bidens cf. *pilosa*	1	3	6	10	0,25	10
Malva verticillata	2	1	7	10	0,25	10
Foeniculum vulgare	2	0	8	8	0,2	10
Sagittaria trifolia	2	0	8	8	0,2	10
Leontopodium anderssonii	1	1	8	6	0,15	10
Datura stramonium	1	0	9	4	0,1	10
Pharbitis purpurea	1	0	9	4	0,1	10
Plantago major	1	0	9	4	0,1	10
Urtica atrichocaulis	1	0	9	4	0,1	10
Verbena officinalis	1	0	9	4	0,1	10
Polygonum hydropiper	0	1	9	2	0,05	10
Artemisia cf. *dubia*	0	0	10	0	0	10
Artemisia cf. *kanashiroi*	0	0	10	0	0	10

The plants used in the freelist tasks were subsequently subdivided into categories according to their use categories. Species, which received an average score of 0.6 or higher, were then compared to species, wich received a score below 0.6 in the rnaking based on the freelist tasks. The result is shown in table 5.

Table 6: Result of the analyisis of the prevalence of uses for specific ailments among the 122 plants used in the preference ranking (table 4)

Use category	Number of species in use category, with a score ≥ 0.6 (n=58)[1]	Percentage of species with a score ≥ 0.6 in use category[1]	Number of species in use category, with a score < 0.6 (n=64)[1]	Percentage of species with a score ≥ 0.6 in use category[1]
Bites	3	5,26	7	10,77
Circulatory system disorders	6	10,53	3	4,62
Cold	14	24,56	11	16,92
Cough	9	15,79	12	18,46
Digestive system disorders	11	19,30	23	35,38
Eye disorders	3	5,26	2	3,08
Fever	3	5,26	4	6,15
Flu	2	3,51	0	0,00
Genito-urinary disorders	5	8,77	7	10,77
Haemostatic	6	10,53	9	13,85
Inflammations	7	12,28	11	16,92
Injuries	7	12,28	13	20,00
Internal cold	1	1,75	1	1,54
Internal heat	7	12,28	5	7,69
Muscular- skeletal disorders	4	7,02	5	7,69
Nerval system disorders	1	1,75	2	3,08
Pain	21	36,84	22	33,85
Parasites	1	1,75	2	3,08

Use category	**Number of species in use category, with a score ≥ 0.6 (n=58)[1]**	**Percentage of species with a score ≥ 0.6 in use category[1]**	**Number of species in use category, with a score < 0.6 (n=64)[1]**	**Percentage of species with a score ≥ 0.6 in use category[1]**
Respiratory system disorders	14	24,56	19	29,23
Rheumatism	6	10,53	6	9,23
Skin disorders	7	12,28	5	7,69
Tonic	8	14,04	2	3,08
Toxins	3	5,26	3	4,62
Veterinary uses	1	1,75	1	1,54
Womens' ailments	5	8,77	5	7,69

[1]The majority of species was grouped into more than one use category.

A.3.3. Information presented in the garden

Below all the signs posted in the garden are shown.

Fig. A1: Sign at the entrance of the garden, showing a map with the different sections of medicinal plants cultivated and giving an introduction to the garden and Chines medicine.

Fig. A2: Sign introducing the cultivated plants section.

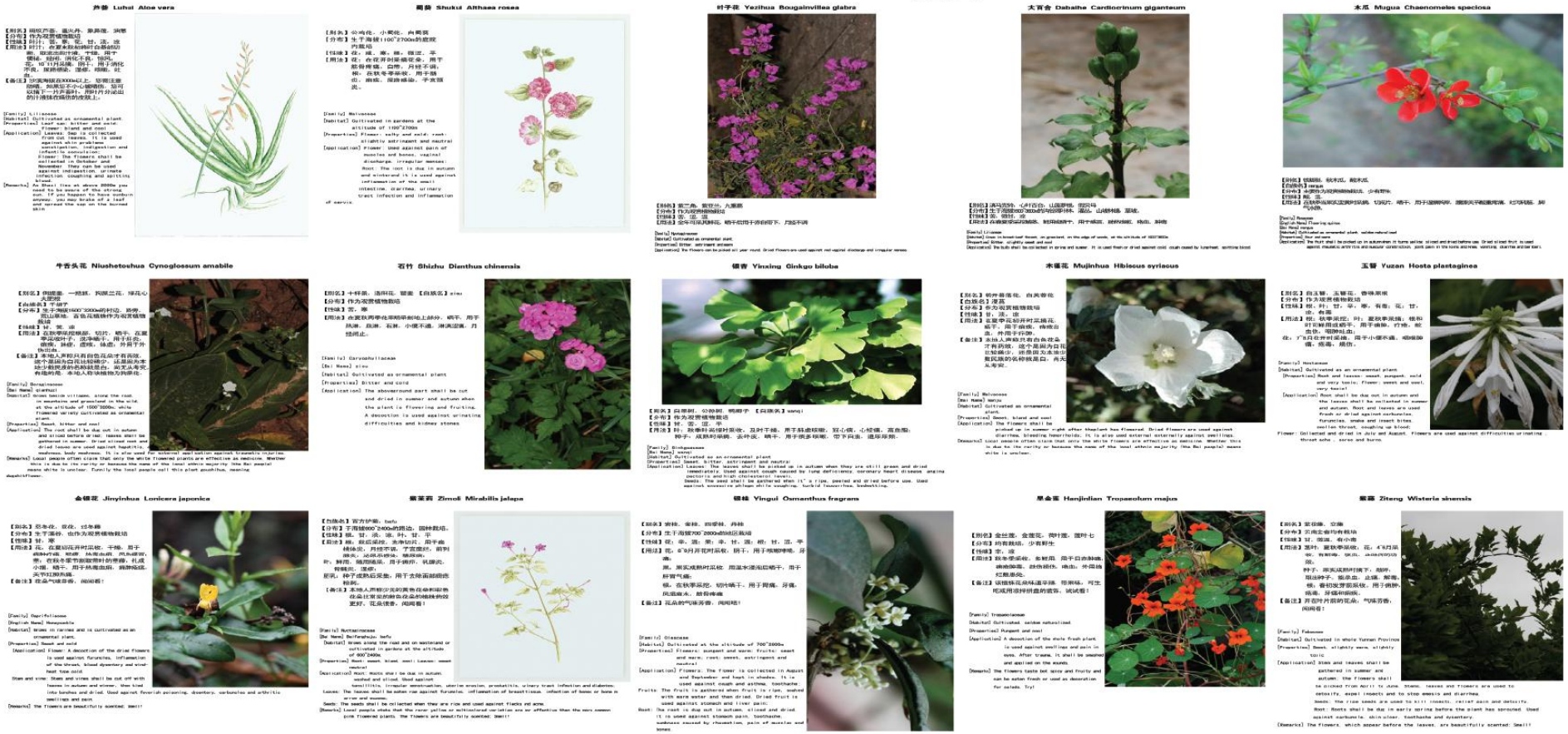

Fig. A3: Sign introducing the flower medicine section.

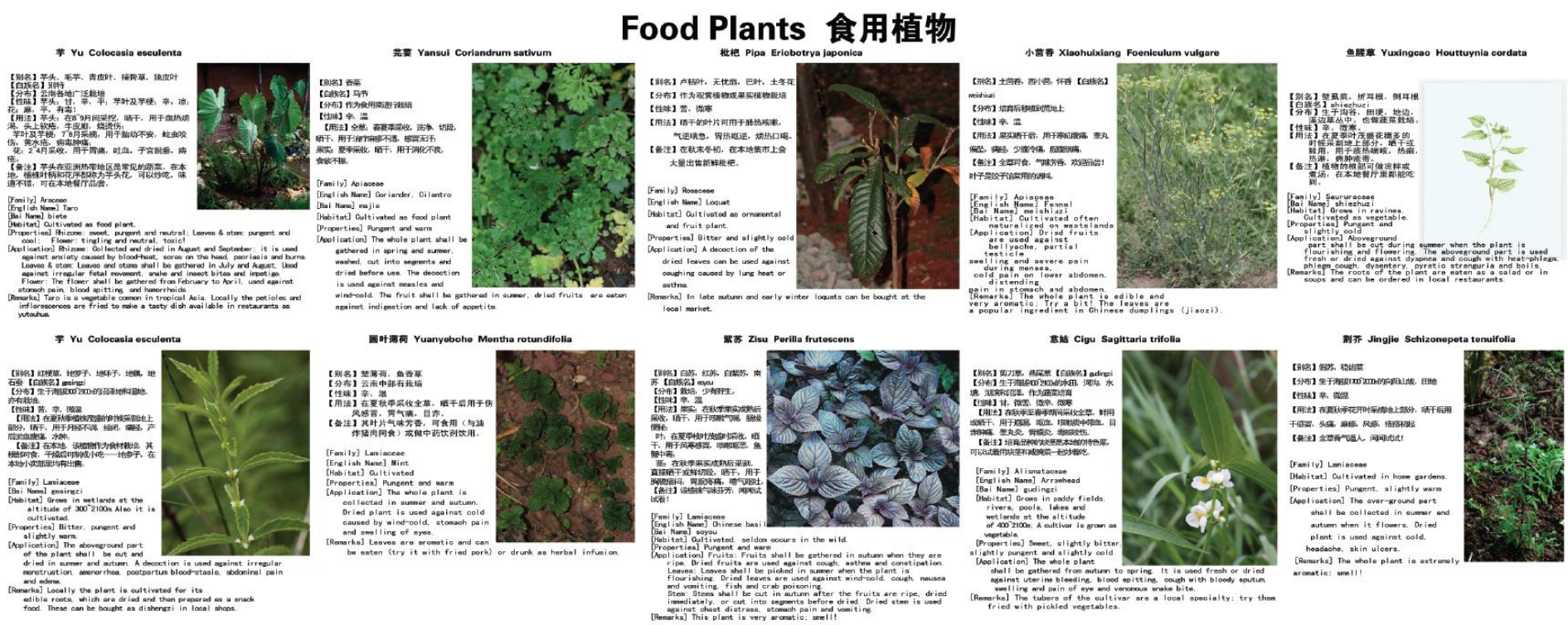

Fig. A4: Sign introducing the food plants section.

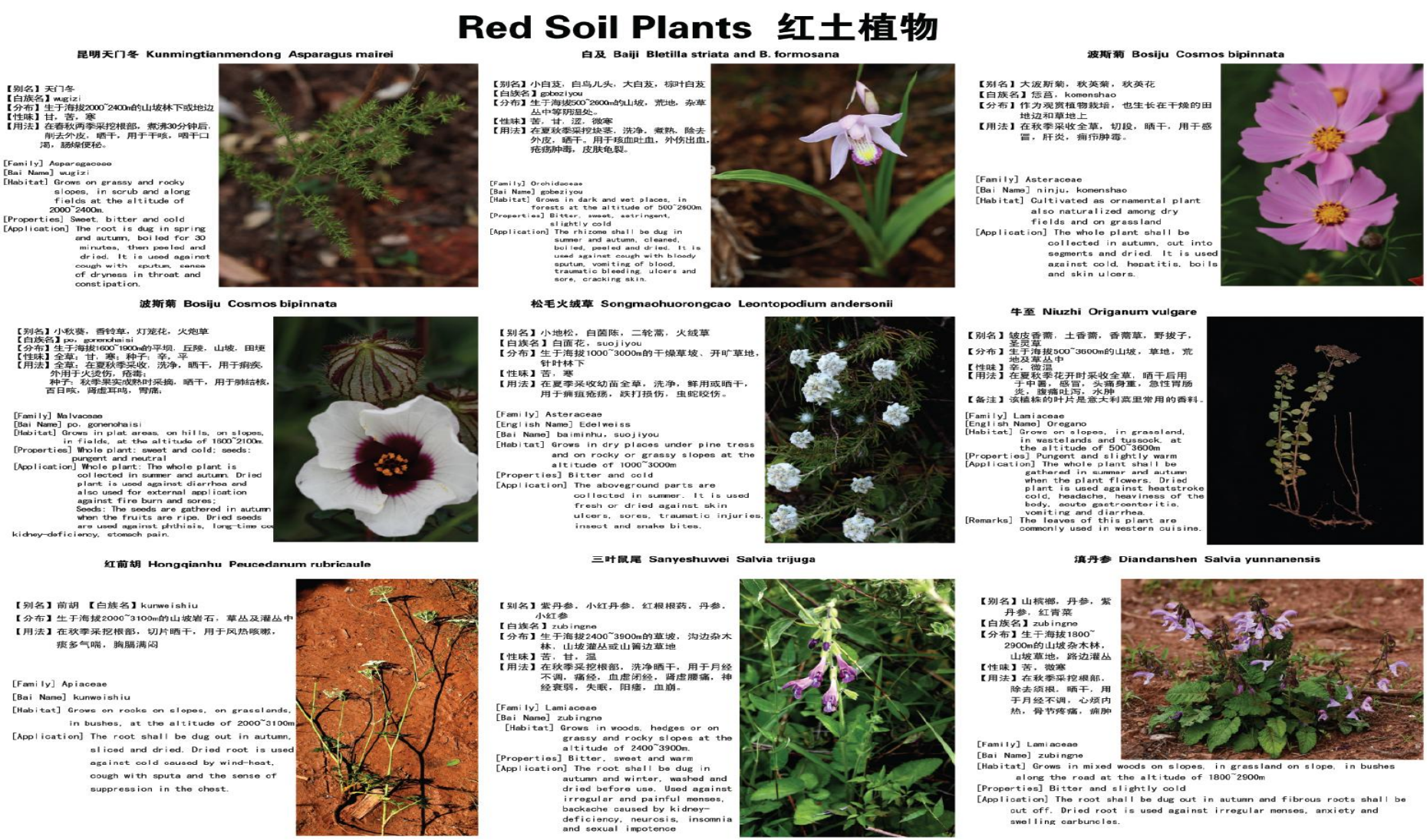

Fig. A5: Sign introducing the red soil plants section.

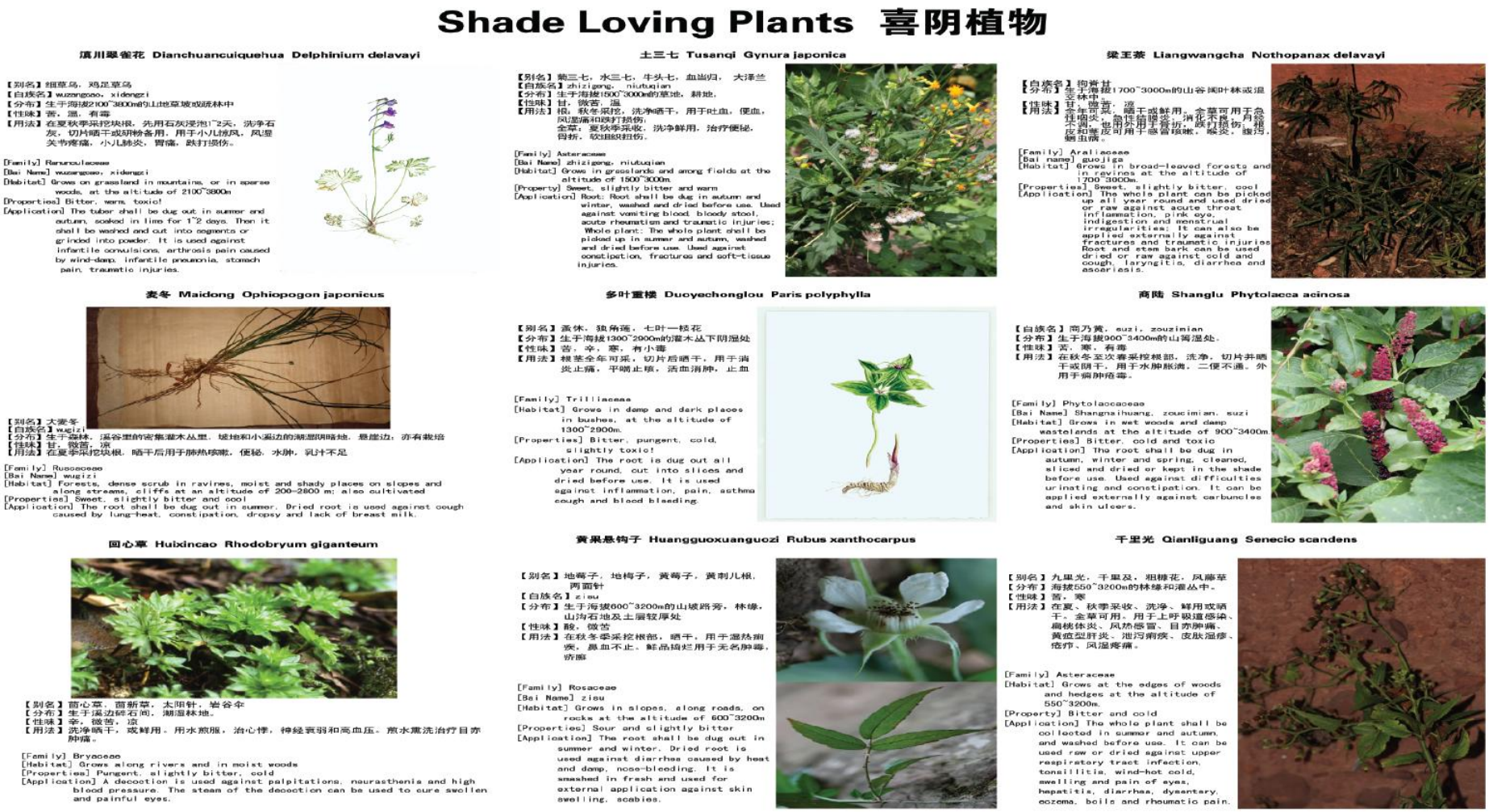

Fig. A6: Sign introcung the shade loving plants section at the nothern side of the garden.

Fig. A7: Sign introducing the shade loving plants section at the southern side of the garden.

Fig. A8: Sign introducing the water loving plants section.

Fig. A9: Sign introducing the weed medicine section.

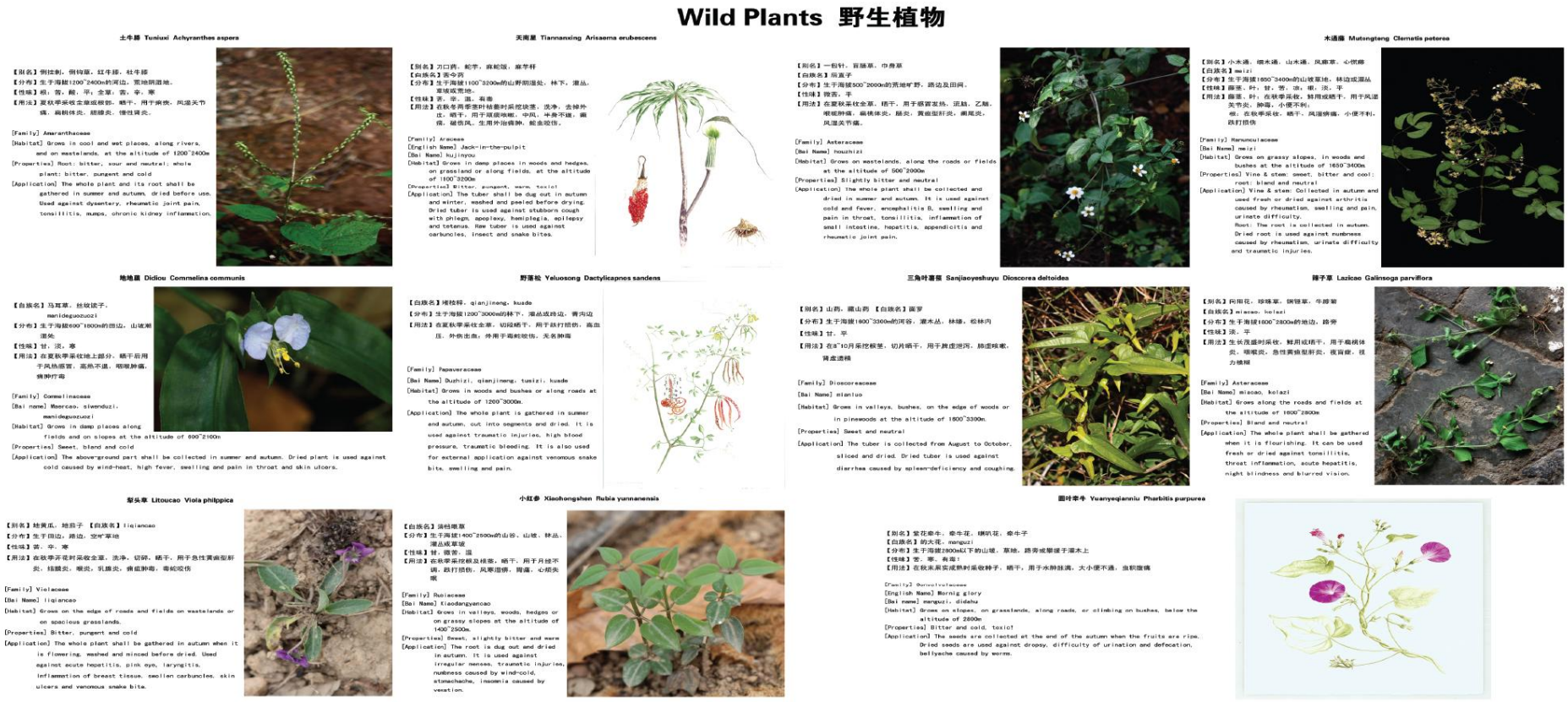

Fig. A10: Sign introducing the wild plants section.

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Fig. A11: Sign introducing the yellow soil and karst rock plants section.

Fig. A12: Sign introducing the yellow soil and pine fprest plants section.

A.4. Botanical illustrations

Below, scans of all 20 botanical illustrations, painted in watercolor by Caroline Frances-King are shown.

Fig A13: (A) *Aconitum carmichaelii* **(B)** *Ainsliaea yunnanensis* **(C)** *Alcea rosea* **(D)** *Aloe vera*

Fig A14: (A) *Anemone rivularis* **(B)** *Arisaema* cf. *erubescens* **(C)** *Dactylicapnos torulosa* **(D)** *Datura stramonium*

Fig A15: (A) *Delphinium* cf. *taliense* **(B)** *Erigeron breviscapus* **(C)** *Gentiana cephalantha* **(D)** *Houttuynia cordata*

Fig A16: (A) *Hypericum* cf. *bellum* **(B)** *Lycium chinense* **(C)** *Mirabilis jalapa* **(D)** *Nicandra physalodes*

Fig A17: (A) *Paris polyphylla* **(B)** *Ipomoea purpurea* **(C)** *Scuttelaria amoena* **(D)** *Spiranthes sinensis*

A.5. Additional information

A.5.1. Introduction to Chinese herbal medicine

Herbal medicine in China looks back on a long and rich history. Much of the concepts behind Chinese medicine are more than 2'000 years old and are still believed in today. Due to China's size and both ecological and cultural variety, a remarkable number of medicinal plants have been documented. The pharmacological effects of more and more of these is being investigated in the context of modern medical science (Liu et al., 2003: 1).

History

Legend has it, that 2'000 years BCE the mythical emperor *Shennong* (lit.: the divine farmer) devoted his life to the development of agriculture and among other things tried 100 medicinal plants, thus discovering their pharmaceutical properties (Liu et al., 2003: 1). The first known texts on Chinese medical practices and products, the *Mawangdui Medical Manuscripts,* date to the fourth to second century BCE (Hinrichs, 2001). These texts include, among others, recipes for therapeutic application, some of which have been integrated into the later classics of Chinese medicine (Hsu, 2000).
Most of these classics, including the *Divine Farmer's Classic of Materia Medica* (*Shennong Bencao Jing*), which contains details on one drug per day of the year, and the *Yellow Emperor's Inner Classic* (*Huangdi Nei Jing*), were compiled by the third century CE. The importance of the *Yellow Emperor's Inner Classic* mainly lies in explaining the philosophical background of medical practice. According to it, the forces controlling the universe – particularly the complementary opposites of *yin* and *yang* and the five phases[1] – are also responsible for health or illness of the human body. Thus, diseases can be cured by applying these rules to the human microcosm. The *Divine Farmer's Classic of Materia Medica,* on the other hand, focuses more on practical aspects; it describes the taste and temperature characteristics (see below) of each drug, and gives details on its preparation and application. From then on the number of officially recognized drugs has been steadily increasing. By 659 CE, in the Tang Dynasty, there were 844 entries in China's first illustrated *materia medica*, the *Tang Bencao*. And the *Classified Materia Medica* (*Zheng Lei Bencao*), composed in 1108 in the Song Dynasty, containes 1,558 substances. This development reached its preliminary peak in the Ming Dynasty, when the famous herbalist Li Shizhen compiled the *Grand Materia Medica* (*Bencao Gangmu*), which contained 1,892 medicinal substances, 1, 173 of which are derived from plants (Bensky et al., 2004: xiv-v).
By 2003 the number of traditional Chinese drugs had been raised to 12,807 (11,146 of plant[2], 1,581 of animal, and 80 of mineral origin; Liu et al., 2003: 2). The Yunnan Institute of Materia Medica (2009: ii) recognizes 6,157 medicinal plant species in Yunnan alone. Many of these represent local alternatives for the official species; thus the 2000 edition of the *Chinese Pharmacopoeia* lists a mere 544 substances (Bensky et al., 2004: xv)[3].

[1] The five phases are: earth (*tu*), fire (*huo*), metal (*jin*), water (*shui*) and wood (*mu*). Corresponding aspects can be found in virtually every aspect of life in Chinese cosmology (Glück, 1993).
[2] In Chinese classification, fungi are often included in the plant kingdom.
[3] In Chinese a distinction is made between the official species (*zhongyao*, lit.: Chinese medicine) and the local herbs (*caoyao*; The literal translation of this term is somewhat difficult, as the character 草 (*cao*) can mean grass or herb as well as weed; considering the way the term is used in Chinese, "weedmedicine" seems the most appropriate term to the author.).

Medicinal concepts underlying Chinese herbal medicine

As explained above, the concepts of Chinese medicine are deeply rooted in ancient Chinese cosmology. Thus, the human body is considered prone to diseases when the balance between the complementary forces of *yin* and *yang* is distorted. Consequently, the function of medicine is to re-establish this balance (Glück, 1993). Generally, *yin* represents all aspects that are dark, cold and passive, while *yang* stands for everything bright, warm and active. In regard to medicinal plants, the *yin* and *yang* characteristics are represented by the four temperatures: cold (*han*), cool (*liang*), warm (*wen*), and hot (*re*). Cold and cool drugs are *yin* and warm and hot drugs are *yang*. Diseases on the other hand are classified as being either cold or hot. Thus cold and cool drugs can cure hot diseases and hot and warm drugs can cure cold diseases (Liu et al., 2003: 5).

Another important aspect of Chinese cosmology are the five phases. They find their corresponding partners in organs and body structures as well as in the five taste properties of medicinal substances: bitter (*ku*), pungent (*xin*), salty (*xian*), sour (*suan*), and sweet (*gan*) (Glück, 1993). In addition, the taste of some substances may said to be bland (*dan*) or astringent (*se*) (Bensky et al., 2004: xvi). These taste characteristics are related to having specific effects on the body; pungent drugs for example have an activating effect, promoting the flow of *qi* and the circulation of blood (Liu et al., 2003: 6). The tastes are further associated with *yin* or *yang* characteristics: pungent and sweet are *yang*, while bitter, salty and sour are *yin* (Bensky et al., 2004: xvi).

In addition to this, drugs are said to be ascending and floating or descending and sinking, which indicates the inclination and direction of the action of the respective drug in the body. These characteristics are important, as they counteract pathologic actions going into opposite directions (Liu et al., 2003: 7). Further, Chinese medicine is said to enter specific channels of the body. This can be seen as way to describe what parts of the body the respective drug mainly influences. Additionally a drug entering a particular channel may help to guide other drugs of a prescription into that channel or the related organ (Bensky et al., 2004: xvi).

Considering these and other aspects (e.g.: toxicity, contra indications) and the individual condition of the patient, Chinese doctors compose complex prescription of up to 20 or more individual drugs. Some of these function as the primary active drugs, while others are mainly added to alleviate, strengthen or simply alter the effects of others or to direct the prescription into a specific channel or organ (ibid.: xix).

A.5.2. Important festivals in Shaxi

A total of ten local informants were asked to list and describe the most important festivals throughout the year. Additionnally, they were asked if plants play an important role for the traditions and practices on these festival days.What is described are the activities and theoretical background in Shaxi; these may differ for other parts of China. If not otherwise stated, plants do not play an important role for these festivals, besides as incense, which is burned at all of these occasions (see Staub, 2011).

Table 7: Calendar of important festivals in Shaxi.

Date of the Chinese lunisolar calendar[1]	**Festival**
01.01.	*Chunjie*: The Spring Festival or Chinese New Year marks the beginning of the new lunar year. For many people in Shaxi it is the most important festival throughout the year. Family members working outside the valley usually return home for the festivities. The celebrations last for one week, feasts are common and firecrackers are let off throughout the whole week. On the New Year's Dinner, almost all families eat fish, as the Chinese word for fish (鱼, yu) is pronounced the same way as the word for surplus (余). Paper-cuts in red displaying the character for good fortune (福, fu) are hung on doors and windows. Usually, at least one member of each family goes worshipping at the *Chenghuang* temple, to ask for the prosperous development of the family in the new year.
08.02	*Taizihui*: The Prince Festival is celebrated to remember the historical Buddha (*Shakyamuni*) as he was still *Prince Siddharta Gautama*, wandering through his father's lands. On this day, a Buddha statue from the *Three Religions Temple* in *Changle* is put on a palanquin and carried to the *Xingjiao* temple in *Sideng*. Thereafter, a statue is carried throughout the village and the party holds at every gate, so the prince can bless the household. Local boys are dressed up as the *Prince Siddharta* and people from throughout the valley participate in the parade. This festival is only celebrated by some Bai communities, particularly in the counties of *Jianchuan* and *Eryuan*. None of the local people knew where the tradition originated and a internet research in Chinese, conducted by the translator Shirly Huo, did non yield any results either.
106th day after *dongzhi* (winter solstice)	*Qingmingjie*: The Tomb Sweeping Day is celebrated to commemorate the family ancestors. Usually the whole family sets out for a picnic at the family's gravesite. Incense is burnt, some *sutras* sung and fresh willow branches are stuck on the graves. Children often use some willow branches to create "crowns", which they wear on their head. The history behind the festival or the usage of willow branches was not known to any local people questioned.
03.03.	*Sanyuesan*: All the local informants knew about the reason for this and related festivals (*Liuyueliu* and *Jiuyuejiu*) was, that they are Buddhist festivals celebrated because of the symbolic value of the numerals of the dates. No one considered these to be important festivals in Shaxi. Nonetheless, all three are celebrated by large crowds and *Mamahuis* from distant villages use these opportunities to visit one another. They are not however celebrated in families but only in temples, where the *Mamahuis* hold ceremonial dances and prepare food and paper figures for offerings.

Date of the Chinese lunisolar calendar[1]	**Festival**
05.05.	*Duanwujie*: The Dragonboat Festival is celebrated in Shaxi in memory of a legend, in which two beautiful girls are turned into a blue and a white snake. On this day, the evil spirits symbolized by these snakes come to haunt the living. In order to protect the family from the negative influence poplar (*Populus* sp.) twigs are stuck in the corners of the home and close to openings (doors, windows, crevices etc.) in the walls of the courtyard. These are supposed to hinder the ghosts from entering. On this day *Zongzi* (glutinous rice stuffed with various fillings and wrapped in bamboo leaves) are prepared and eaten. Further, a special soup is prepared of local herbs and drunken as a tonic by the festival participants (Staub, 2011).
06.06.	*Liuyueliu*: see *Sanyuesan*
25.06.	*Huobajie*: The Torch Festival is traditionally only celebrated by the Bai and Yi people to commemorate the heroic action of *Baijie Wangfu*, the wife of a historic regional king. The legend has it that one of the pre-*Nanzhao* regional kings invited his five competitors to a feast in a tower near *Dali*, where he locked the other kings in and set the tower on fire. This king then used the opportunity to annex the other kingdoms and founded the *Nanzhao* Dynasty. *Baijie* had been the wife of one of the murdered kings. She had somehow foreseen the events and given her husband a metal ring to wear. This enabled her to identify him after she had spent days going through the ashes of the fire, described above (Schmitt, 2007). On the festival day, on the central square of each Bai village a decorated pole is erected, on which pieces of wood are fixed in order to form a large torch. This is set on fire in the evening after traditional dances have been held. Afterwards, boys and young men walk around with a small torch and a sack full of powder, prepared from half-rotten pine stumps. The torch is held towards the legs of other people and the powder is thrown in the flame, producing a large darting flame. This is supposed to bring good luck to the "burned". Every woman, who had given birth to a child in the previous year – or a close female relative –, must walk around throughout the evening providing rice liquor, candy and sunflower seeds to the visitors. The more people take what she supplies, the more prosperous will the newborn child's development be.
14.07.	*Guijie*: The Ghost Festival actually marks the end of a two weeks period, during which the ghosts – both good and evil – were free to roam the world of the living. On the first of the lunar July, all souls are released from the underworld. Before this day, virtually all families stick branches of *Prinsepia utilis* Royle close to all openings of the courtyard to keep the ghosts outside of the home. As young children are reportedly particularly susceptible to the ghosts' influences, they are not allowed to leave the house after nightfall during the next two weeks. On the sunset of the 14th, all ghosts are called back to the underworld. In order to provide for the needs of the ancestors' souls, all families burn incense and special paper money and paper clothes. There are different clothes for deceased children, women and men. All of them have the respective ancestors name inscribed, which is read out loud by the head of the family when put into the flames. Further, a large meal is prepared and parts of each dish are also put into the flames to let the ancestors participate in the feast.
15.08.	*Zhongqiujie*: The Mid Autumn Festival is celebrated with a large feast where all family members should be present. Afterwards, a table with apples, chestnuts, pears, walnuts, water chestnuts (*Eleocharis dulcis*), other snacks and most importantly *mooncakes* (*yuebing*) is placed outside and the food is eaten while marveling at the full moon.
09.09.	*Jiuyuejiu*: see *Sanyuesan*
At the day of the Winter Solstice.	*Dongzhijie*: The Winter Solstice Festival is celebrated with the immediate family to commemorate the shortest day of the year. The only fixed ritual for this festival is to make sweet dumplings (*tangyuan*). Usually, the whole family helps to prepare the filling and then form the dumplings out of dough made of glutinous rice.

[1] While the Gregorian calendar serves as the official calendar in China, the lunisolar calendar is still used for traditional festivals and astrology.

A.5.3. Overwiew of practices and traditions regarding *Rites de passage* in Shaxi

When asked about festivals or ceremonies, marking important stages of life or the transition from one (social) status to another, all informants (n=10) mentioned the birth of a child, marriage and death. The rituals and traditions related to these events are described below. Other events (e.g. the 50th, 60th and 70th birthday) were only singularly mentioned and are therefore not further discussed. While a funeral and two wedding were visited, the information on the traditions related to the birth of a child are solely based on interviews.

Birth

The day a child is born, is not celebrated, neither are any special rituals conducted[4]. It is not until one month after the birthday, that the family invites relatives and friends (*qingke*; lit.: invite guests). The guests bring gifts (liquor, rice, brown sugar, and toys) and a feast is held. That day the child is given a name. This however, is not done by the parents, but rather by all the guests over 60 years of age.
During the first month after the birthday, the closer family should be careful not to kill any animals, as this would cast a shadow of bad luck over the child's life. Sometime after the *qingke* ceremony, the child's parents go to the village's *Benzhu* temple, to introduce the new member of the community to the patron god and ask the *Benzhu* to protect the child.

Marriage

Usually a month before the wedding, the groom, together with members of his closer family, goes to the bride's home and officially asks her father – or grandfather – for the permission to marry her. Then a feast is held and the couple is officially engaged. The date of the wedding is then fixed by an expert for *fengshui* (*fengshuixiansheng*; usually a well educated elderly man), consulting the couple's birth horoscopes.
On the day of the wedding, a feast is held at the bride's family's home, where friends and relatives are invited and usually give a monetary gift to support the newlyweds. The groom's family must bring a certain amount of monetary and non-monetary gifts (bride wealth), the value of which is usually agreed upon between the two families in advance.
Upon leaving the home of her childhood, the bride must kneel down in front of the head of the family – the oldest male member of the household – and shed tears while bidding farewell. The whole wedding party then sets out on foot, to accompany the couple to the groom's home. The way is chosen, as to pass as many temples and shrines as possible. At each of these, the respective deity is worshipped to ensure good look for the new couple. Upon reaching the groom's house, a feast is held again and the head of the groom's family ceremonially welcomes the bride. From this moment onwards, the woman is no longer part of her parents' family but a member of her husband's family.
Either on the wedding day or some time afterwards, the men of both families go to the respective village's *Benzhu* temple and offer a pig's head and a rooster to ask for permission for the relation. If the bride and groom are from different villages, the bride's family must inform the *Benzhu*, that the community has lost a member. Equally, the groom's family must ask their village's *Benzhu* to welcome the new member, as the bride would otherwise not be protected by either *Benzhu*.

[4] Fitzgerald (1941: 163) explained this, and the fact that an infant is not given a name until it has survived a certain amount of time, by the traditionally high infant mortality.

Death

After a person's death, her or his clothes are burned outside. The ghosts, which get attracted by the soul of the recently deceased, are driven away, by the male members of the deceased's family and directly neighboring houses, through throwing stones and rice into the air and yelling "go away, go away", often throughout the entire night.
The next day, a group of respected elderly men go to the village's *Benzhu* temple and the *Chenghuang* temple in *Aofeng*, where they inform the gods of the loss of a community member and pray for good luck for the soul of the deceased. The same men usually also wash the dead body and dress it in new traditional clothes. The shoes put on the deceased must be made of straw and not have any cloth or leather on them. The corpse is then laid into a wooden coffin, together with a sack, containing a piece of silver, some hair and a piece of fingernail of the deceased, and the "five grains" (*wugu*; their exact makeup varies between different regions of China, most of the informants in Shaxi mentioned: rice, barley, wheat, corn, and beans).
The coffin may not be closed until all important family members have come to say goodbye. Usually on the second day after death, friends are invited to bid farewell; they are required to bring rice as a gift. From the time of death until the day of the funeral, all sons and daughters must sleep next to the coffin and the daughters – or daughters in law – must cry every morning before the rooster crows.
The time and date of the funeral – from two to more than ten days after the – is determined by a *fengshuixiansheng*, based on the deceased's birth horoscope.
If the deceased was a member of a religious association, all members gather the day before the funeral to sing *sutras* and eat the traditional *badawan* (lit.: eight big bowls; the same is eaten again with more guests after the burial) with the family. Also on this day, some blood of the eldest son is used to write a special pattern[5] on a little wooden panel (*lingpai*), which is then placed on the family's ancestor shrine.
On the day of the funeral, the sons and daughters dress up in simple white mourning clothes and the female members of the funeral party wear special white headdresses. Before setting out to the burial site, the coffin is brought to a central place of the village. Here, incense – only green sticks, as red ones are reserved for joyful occasions – is burned and fruits are offered on a desk next to the coffin. The head of a local lay religious association directs everyone to kneel down and cry, while the association's members sing *sutras.*
The coffin is then carried, by young married men with children, to the burial site. Whenever a bridge is passed, the oldest son must lie down on his face and the coffin be carried over his body. A living rooster is brought to the burial site, where it is sacrificed. After the coffin is placed in the grave, a grass (*Imperata cylindrica* (L.) Raeuschel) is planted on top of the grave, to support the prosperous development of the family (Staub, 2011).
Afterwards, a large funeral feast is held.
For three weeks after the death, the sons and daughters shall neither wash nor shave. During the first week after the burial, they must daily visit the gravesite, to offer some food and burn incense. They may stop doing so once birds have begun to eat the offered food, which indicates that the soul of the deceased has left[6]. This notwithstanding, they must return for the same purpose on the 14th, 21st and 100th day after the funeral. One year after the funeral, the

[5] None of the informants was aware of a particular meaning of the pattern. Some (four) informants mentioned, that this could be related to ancient written characters of the Bai language.
[6] If the offered food is not eaten at all, it is a bad omen indicating that soon another member of the community will die. Equally if the grass planted on the grave dies, it symbolizes bad luck for the family.

whole family visits the gravesite and holds a picnic. The same happens again at the funeral's thrid anniversary, when all friends and relatives are invited and mourning clothes are worn again. Afterwards, the deceased is remembered together with all other ancestors at the *Qingmingjie* and on the 14th of the seventh lunar month.

These examples show the importance of rituals for the local population. It is noteworthy however, that none of the informants considered any part of these rituals to be a specific Bai tradition, but rather stated that these are part of general Chinese culture.

A.5.4. Tourism in Shaxi

Besides the sights and events usually visited by tourist in Shaxi, there is quite a number of interesting locations and activities that have potential for tourism but are not promoted. Examples are:

- Treks into the surrounding hills. These could include mushroom collecting, botanical excursions and overnight stays in mountain villages. Of particular interest for the latter would be home stays in Yi villages and in the Bai village *Mapingguan*,
- Education travels, introducing in depth the local culture and history (SRP, 2009; Mitchell, 2007). This is particular reasonable in combination with extended visits to cultural sites or festivals.
- The traditional farming villages and the various different temples throughout the valley. These could be visited during tours on bicycles or horseback.
- The *Guanyin* grottoes at the southern end of the valley, below *Bailongtan*. Here, a traditional temple and ancient sculptures can be visited next to a beautiful part of the *Heihui* river.

The problem is, that many tourists are not aware of these possibilities and some of theses sights are rather difficult to access. Thus a better information system for the tourists in Shaxi is required, including detailed maps of the valley (SRP, 2009). Further, a system of trails for hiking, bicycling and horse riding needs to be developed and particularly interesting parts of the cultural and architectural heritage identified and protected (ibid.). A major problem of the existent tourism infrastructure in Shaxi is, that it is not connected to the rest of the local economy, besides by hiring workers (ibid.). Thus, very little of the incoming money reaches the local population, as the majority of tourist facilities are run by non-local Chinese. This situation may be improving, as more and more local people see the financial opportunities of tourism and open shops or guesthouses themselves. However, as most of these people have been farmers all of their lives, their knowledge on what tourists could want and how to operate a successful business is limited. Therefore, the majority of the newly opened shops in *Sideng* offer exactly the same products and few innovative ideas are observable. These issues could be overcome, by goal oriented education and training (ibid.; Mitchell, 2007). During such courses, interested villagers could learn how to operate small businesses and to specialize on certain niche products and trained as guides. This latter point should include building an increased awareness for Shaxi's cultural heritage and natural beauty and how to teach tourists about these, as well as basic English skills (ibid.).
The goal should not be mass tourism in Shaxi, but rather a sustainable ecological tourism, focusing on the pastoral idyll and cultural heritage (ibid.). Such a "healthy" tourism could also contribute to the sustainable development of the valley and the preservation of traditional knowledge held by its inhabitants (Mitchell, 2007). If the tourism in Shaxi is better linked to other branches of the local economy, it could become a key engine for the growth of other economic sectors (SRP, 2009).