Ethnobotany

in the

Northern Peruvian Andes

Local Knowledge on Medicinal Plant Use

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Front cover: *Brugmansia sanguínea* (Solanaceae), Cochabamba. Local healers collecting medicinal plants, Cerro Crestón, Lagoon Huarmicocha. All pictures taken by the author in northern Peru.

Contents

Abstract

This ethnobotanical field study documents local knowledge on medicinal plant use in two localities on different altitudes in the northern Peruvian Andes. The research area in the biologically diverse yet scarcely investigated Marañón valley shows a variety of vegetation forms, ranging from inter-Andean dry forest to Andean cloud forest and tropical high altitude grassland. Local populations consist of mestizo communities with partial cultural heritage from the Chachapoya, a pre-Inca Amerindian ethnic group with a long and elaborate healing tradition. Semi-structured interviews with 120 informants, from whom 21 were considered as local healers, yielded a total of 3035 use reports. In all, 279 medicinal plant species were collected and identified, and their local names, medicinal uses and applications recorded. The highest number of use reports referred to gastrointestinal diseases, nerves, urological and respiratory problems; the most often used botanical families included Asteraceae, Fabaceae, Solanaceae, Lamiaceae and Rutaceae. About one third of the medicinal plant species were not native to the Andes, among them many Lamiaceae, Fabaceae and Rutaceae. Three of the six most often used plants were introduced species, namely eucalyptus, chamomile, and aloe vera. The most frequently used native ethnospecies were *Cola de Caballo* (*Equisetum giganteum* and *E. bogotense*), *Pie de Perro* (*Desmodium molliculum*), and *Matico* (*Piper* spp.). In the majority of cases, aerial parts of medicinal plants were applied orally, as infusions or decoctions. Topical applications included cataplasms or rubbing with plant material; in some cases, plants were used for ritual healing ceremonies (*limpias*). Local use of many of the medicinal plant species is supported by ethnopharmacological data. The two localities differ in medicinal plant use regarding the most frequently used species; this may be explained mainly by differences in availability due to different vegetation zones. The underlying cultural concepts for the use of local plant medicine include Andean cosmological beliefs in evil winds (*aire*), loss of soul or spirit through fright (*susto*), harms due to witchcraft (*brujería*) or envy of other people (*envidia*). Further, the hot-cold dichotomy of diseases and remedies suppositionally based on western humoral pathology is applied. Knowledge on medicinal plant use is distributed along a continuum within the communities, with some persons of middle and old age salient by more extensive knowledge. However, many young individuals knew only few medicinal plant species; and generally a loss of knowledge was perceived by the majority of community members. Rapid changes in the societies presumably lead to erosion of local knowledge about medicinal plants; its valuation and documentation through the present work may contribute to its preservation.

1. Introduction

1.1. History and scope of ethnobotany

Human life has always been connected with plants. As part of a complex environment with thousands of potentially poisonous plants, our ancestors selected beneficial species and further adapted them to human needs by domestication processes. Constant interaction with plant chemicals, in turn, shaped our genetic and biochemical makeup (Johns, 1996:7).

The emphasis of ethnobotanical research lies in elucidating the direct interrelations between people and plants, and their evolutionary consequences (Johns, 1996:10). The empirical wisdom that evolved during thousands of years of human interactions with the environment forms part of our human heritage (Johns, 1996:2); the attempt to prevent it from being lost is a basic goal of the discipline. This is particularly important regarding the loss of biodiversity and the loss of culture humankind is facing today (Kaua'i Declaration, 2007). Ethnobotany provides a means towards understanding of human approaches to diverse environments. It aims to preserve the manifold knowledge which can be of help in the effort towards a more sustainable use of ecosystems (Kaua'i Declaration, 2007).

Interactions between plants and people began when our species came into existence, and were probably since the rise of human intellectual capacities accompanied by symbolism and rituals. This early ethnobotanical knowledge was preserved in the form of songs and poems before the evolution of writing. Later, it was passed on through generations embedded in the Indian Vedas and early Chinese herbals. These early writings have preserved ancient ethnobotanical beliefs through the centuries. Similarly, Greek and Egyptian writers collected and put down beliefs about medicinal plants. The idea of each plant having a psyche or soul, established by Greek authors as Aristotle, persisted a long time in European thinking. Western ethnobotanical beliefs of the middle age about the efficaciousness of medicinal plants were influenced to a great extent by Greek writings (Schultes and von Reis, 1995:19-21). However, the western tradition of describing cultural groups and their uses of plants began with the discovery of the New World. While useful cultivars such as maize and tobacco were integrated in European cultures, the colonists were also interested in medicinal plants from the new continent and collected therefore observations of plant uses and herbarium specimens (Ford, 1978). The high diversity of new plant and animal species encountered eventually contributed to the development of the Linnaean taxonomic classification system in 1735 and consolidated the natural sciences. In the 19th century, ethnobotanical ventures focused primarily on the utility of plants, and classified them following the Linnaean system (Ford, 1978). These expeditions were implicitly shaped by the imperialistic search for useful species for commercial exploitation (Alcorn, 1995). In 1895, “ethnobotany” emerged as a separate field of science, when John Harshberger coined the term in North America, followed by “ethnobiology”, about 40 years later, which extended the field to include other organisms (Hunn, 2007). Around the same time, anthropologists entered the field of ethnobotanical investigation, and focused rather on the native perspective and cosmology than on scientific classification and plant utility (Ford, 1978). Their endeavour was towards a deeper

understanding of human culture and cognition by elucidating classification systems and perception of the environment by cultural groups (Clément, 1998). Hence, linguistics and cognitive psychology became central in ethnobotanical research, especially in the second half of the 20th century (Hunn, 2007). From the 1980s on, the research area extended to questions of wider interest and relevance, such as environmental issues and concern for the survival of indigenous communities. The complex of knowledge, belief and practice of a cultural group, summarized by the term "traditional ecological knowledge", came to be valorised as offering alternatives to the ecological destruction of capitalist developmental attempts (Hunn, 2007). Meanwhile, collaboration between academics and locals was deepened, and compensation to local populations for use of their knowledge and biological resources, as well as return of research findings to communities studied, became themes of high importance, as stated in the declaration of Belém in 1988 (Clément, 1998). The Convention on Biological Diversity 1992 formulated the aims of conservation of biological diversity, sustainable use of biodiversity, and fair and equitable sharing of the benefits arising from the use of biological resources (CBD, 2011). The Nagoya protocol 2010 adopted the legal framework for implementation of Access and Benefit Sharing (ABS).

Ethnobotany offers a way to gain insights into the astonishing cultural and biological diversity which is in danger of disappearance in the globalizing world (Schultes, 1994). It offers possibilities to adopt pharmacologically active compounds for benefits of modern societies (McClatchey et al., 2009) and contributes to the rational planning of developmental projects (Alcorn, 1995). Ethnobotany strengthens international and trans-cultural collaboration and exchange of knowledge and tradition and is therefore an enrichment for all people involved.

1.2. Biodiversity and ethnobotany in northern Peru

Peru is the third biggest country of South America with a surface area of 1 265216 km² (Hahold and Kroeger, 1987) and has an estimated population of 29 461933 people (INEI, 2010). It is situated on the western pacific coast of the continent, near the equator. The Andean mountain chain functions as a barrier between the hot moist air from eastern Amazonia and the cool Humboldt Current flowing up the pacific coast. It rises to an altitude of over 6700 m and leads to an immense variety and complexity of vegetation forms (Pennington, 2004:10).

Peru is one of 12 mega-diverse countries in the world, with highest biological diversity in means of species number, genetic resources and variety of ecosystems. It holds more than 17 000 known species of angiosperms and gymnosperms, and 5354 (31%) of these are endemic to Peru (Brack Egg, 1999:7). The country can be broadly divided into three major regions due to geographical, topographic and climatic differences: the Pacific coastal desert (*La Costa*), the Andean region (*La Sierra*), and the tropical rainforest in the Amazonian lowland (*La Selva*) (Pennington, 2004:10).

Northern Peru lies within a biodiversity hotspot, where low passes in the Andean chain allow easy exchange between the biota of the Amazon basin and the Pacific lowlands. The study site lies within the Bolívar province in the department of La Libertad towards the eastern slopes of the northern

Peruvian Andes, on the dryer site of the Marañón River. The study region comprises several different vegetation types, such as inter-Andean seasonally dry tropical forest, wet Andean montane forest (cloud forest), and *jalca* formations (high altitude grasslands of northern Peru).

The richness of botanical diversity in Peru is reflected in the use of plants. It is estimated that about 5000 plant species in Peru are used by the population for various purposes, such as for alimentation, medicine, ornaments, construction, fodder, dyes, toxins, and firewood, among others. Above all, rural communities depend to a great extent on plants for their sustenance (Brack Egg, 1999:7).

Northern Peru is the center of what has been called the "health axis" of the old Central Andean culture area, where the use of medicinal plants dates back more than 2000 years (Bussmann and Sharon, 2006). Whereas most ethnobotanical studies in Peru have been conducted in the Amazon (e.g. Phillips and Gentry, 1993; Jovel et al., 1996; Greene, 1998; Polesna et al., 2011), rather few studies have been done in the northern Peruvian Andes (Hammond et al., 1998; De Feo, 2003; De-La-Cruz et al., 2007).

Recent work has documented the contemporary use of plants by local healers in northern Peru, with more than 500 medicinal plant species and their uses described (Bussmann and Sharon, 2006). This study included a research area on the northwestern flanks of the Peruvian Andes down to the Pacific coast. On the northeastern flanks of the Andes, interdisciplinary research including ethnobotanical investigation concentrated on cloud forests dominated regions and pointed out the need to protect these biologically highly diverse, but overexploited habitats (Schjellerup et al., 2009). In the dryer inter-Andean valley of the Marañón River, no ethnobotanical research has been done so far. The seasonally dry tropical forests of the Marañón valley are the most biodiverse remains of these habitats throughout the Andes; botanical research indicates exceedingly high endemic species diversity and highlights the need for conservation of the already fragmented forests (Bridgewater et al., 2003; Hughes et al., 2004; Linares-Palomino, 2006; Särkinen et al., 2011).

The study area lies within the territory of the pre-Inca Chachapoya people, who were described by Hispanic chroniclers as famous for their powerful sorcerers and healers (Schjellerup, 2005:62). The region connects the Andean highlands to the Amazonian lowlands, and exchange networks existed reaching as far as to the Pacific coast. Therefore, the traditional medicine of the Chachapoya has been influenced by cultural groups not only from the nearby rainforest, but also from the coast. It has been further shaped through Inca and Spanish occupation, leading to the natural medicine (*medicina natural*) of today's mestizo communities.

1.3. Aims and research questions

Research was conducted in two districts of the province of Bolívar, department of La Libertad, in northern Peru. A long healing tradition exists in this region with medicinal plant specialists known as *curanderos*, *curiosas* or *brujos*.

The aims of this study are:

1) To document local medicinal plant knowledge and use among the inhabitants of two communities on different altitudes, and
2) To comparatively analyze the documented medicinal plant knowledge.

Main research questions include:

- What medicinal plants are known and how are they used by the local people?
- How is medicinal plant knowledge distributed within the communities?
- How is medicinal plant knowledge obtained and transmitted?
- What role do medicinal plants play in the local health care system?
- Which concepts are behind the use of specific plants?
- Are there any differences between the inhabitants of the two localities regarding medicinal plant knowledge and use?
- Is the use of the most common medicinal plants supported by pharmacological data available in scientific literature?

2. Research Area

2.1. Geographic aspects and vegetation types

Study sites

Research was conducted in the province of Bolívar, in the northeastern part of the department La Libertad, in northern Peru, in an inter-Andean valley on the east side of the Marañón River. Interviews were carried out in two localities on different altitudes: the valley at about 1400 m and the mountain area at about 2900 m. The valley includes the village Pusac (Uchumarca district) and its neighbouring village San Vicente de Paúl (Longotea district). The mountainous locality (further referred to as "mountains" for simplicity reasons) consists of the town Uchumarca, capital of the Uchumarca district (see Figures 1 and 2). Plants were collected in different localities, on an altitudinal gradient ranging from 900 to over 4000 m of altitude.

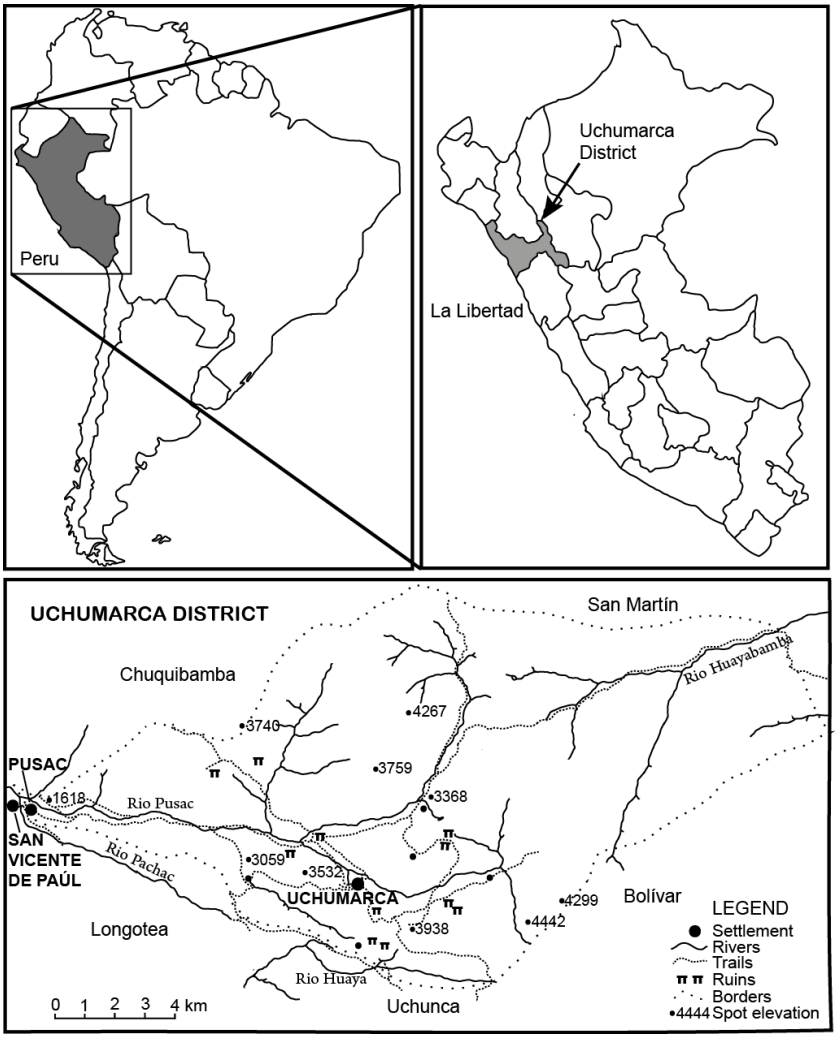

Figure1: Research area: Research was done in the villages Pusac and San Vicente de Paúl in the valley, and in Uchumarca in the mountains. Pusac and Uchumarca lie in the Uchumarca district, San Vicente de Paúl in the Longotea district in the department La Libertad in northern Peru (adapted from Brush, 1971).

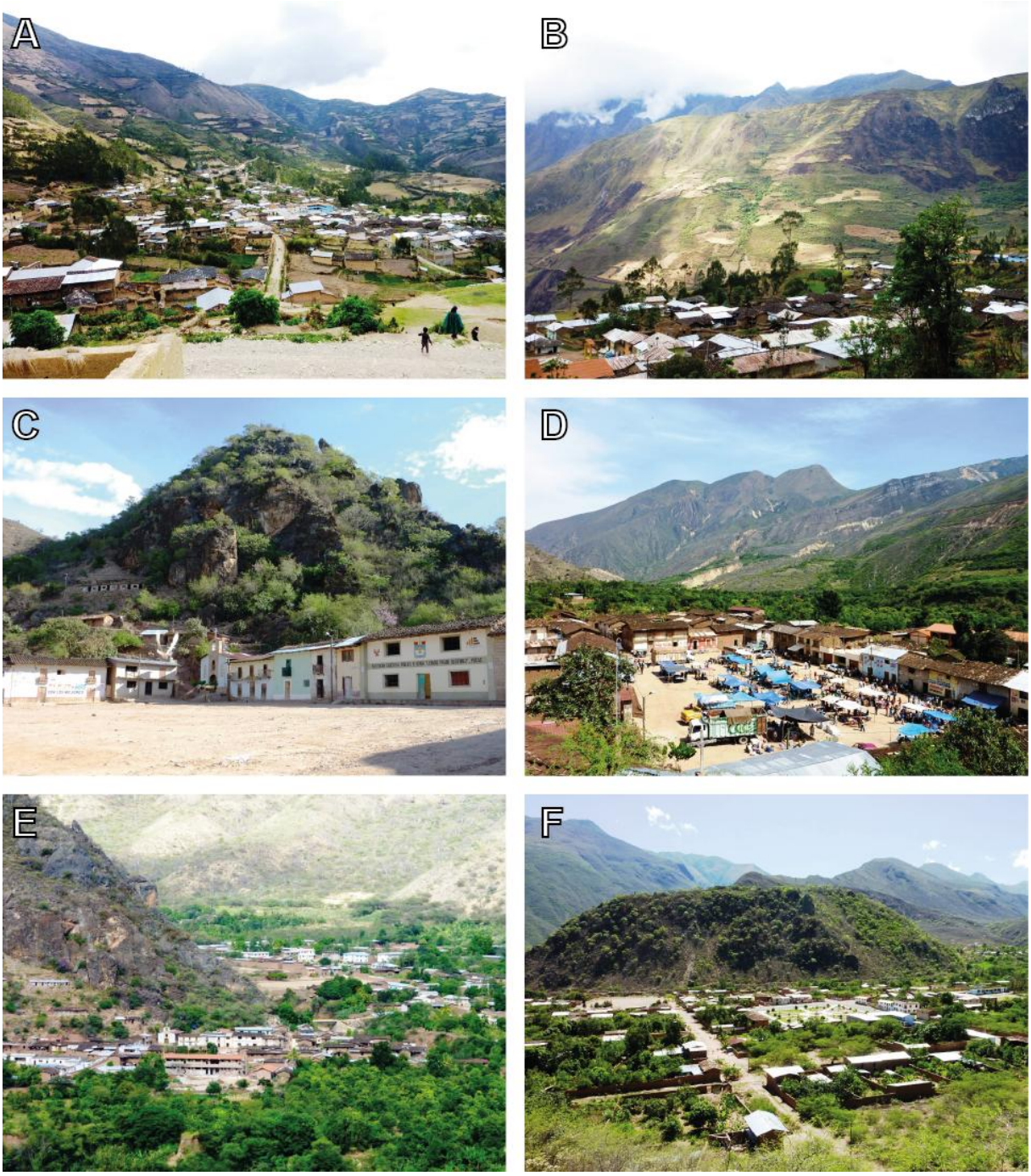

Figure 2: Study sites

A, B) The mountainous town of Uchumarca

C) Pusac, village square

D) Pusac, village square with Sunday market

E) The valley villages Pusac (in the foreground) and San Vicente de Paúl (in the background)

F) San Vicente de Paúl

Climate

The eastern slopes of the Andes are characterized by trade winds bringing moist air from the Amazon basin. The wet warm air cools down while ascending on the mountainside of the eastern Andes, leading to extensive rainfall and humidity. In combination with differences in altitude and exposition, this produces a broad variety of microclimates (Schjellerup, 2005:40). Little rainfall reaches the Upper Marañón and its tributary valleys. However, there still occur wet cloud forests in these inter-Andean valleys at appropriate heights (Dillon, 2011). This is the case for the east side of the Marañón River, where moist air from the Amazonian basin predominates due to the lower passes in the Andean chain. The valley bottoms, though, are covered by dry forests. The climate is seasonal, with a wet season from October to April (by the local population referred to as winter), and dry season (summer) the rest of the year. Extensive simultaneous flowering occurs in May and first half of June (spring). Concerning Andean vegetation it must been kept in mind that human settlement has influenced the region for at least 2000 years, converting it into a cultural landscape (Schjellerup, 2005:43). Local people distinguish three major ecological zones: *el temple*, *la quichua* and *la jalca*.

Vegetation zones

Temple – inter-Andean seasonally dry tropical forest (SDTF)

The *temple* zone ranges from 900 to 1800 m of altitude and is characterized by annual rainfall at about 400 mm (at 1550 m of altitude) and daily average temperatures between 19°C and 24°C (Schjellerup, 2005:48). It consists primarily of inter-Andean seasonally dry forest (see Figure 3). Generally, dry forest occurs in seasonal climates with a mean annual rainfall of less than 1600 mm, a long dry season, and a mean temperature above 20°C. Its deciduous trees and shrubs basically form a woody vegetation without continuous grass layer (Pennington, 2004:12). Characteristic genera for seasonally dry forest include *Prosopis* (Fabaceae) and generally high occurrence of Fabaceae genera, *Bougainvillea* (Nyctaginaceae), *Ceiba* (Malvaceae, Bombacoideae), *Jacquinia* (Primulaceae), *Loxopterygium* (Anacardiaceae), *Tecoma* (Bignoniaceae), and Cactaceae genera in areas with increasing aridity (Pennington, 2004:12). For the rather dry Marañón valley, some characteristic xerophytic dry forest species have been identified as *Bombax* sp. (Malvaceae, Bombacoideae), *Bursera graveolens* (Burseraceae), the Cactaceae *Cereus* sp., *Cephalocereus* sp. and *Opuntia ficus-indica*, and *Ochroma pyramidale* (Malvaceae, Bombacoideae; Schjellerup 2005:48). Further vegetation types among the *temple* zone are disturbed riverine forests along the rivers and cultivated fields and gardens. The fertile valleys of the Marañón region have been cultivated since prehistoric times; important cultivars include *Manihot utilissima* (Euphorbiaceae), *Carica papaya* (Caricaceae), *Arachis* sp. (Fabaceae), *Persea americana* (Lauraceae), *Lucuma bifera* (Sapotaceae), *Capsicum* spp. (Solanaceae), *Erythroxylum coca* (Erythroxylaceae), *Gossypium barbadense* (Malvaceae), *Ochroma pyramidale* (Malvaceae, Bombacoideae), *Psidium guajava* (Myrtaceae), *Inga feuillei* (Fabaceae), *Theobroma cacao* (Malvaceae), and the introduced *Saccharum officinarum* (Poaceae), *Citrus aurantium, C. limon, C. aurantiifolia, C. reticulata* (Rutaceae), *Coffea arabica* (Rubiaceae), *Musa paradisiaca* (Musaceae),

Mangifera indica (Anacardiaceae) and *Tamarindus indica* (Fabaceae; Schjellerup 2005:48-49). Furthermore, *Medicago sativa* (Fabaceae) is cultivated as fodder for livestock. The study site in the valley, i.e. the two villages Pusac and San Vicente de Paúl, are situated in the *temple* zone.

Quichua – Andean montane forest (cloud forest)

The *quichua* zone extends between 1800 and 3200 m of altitude, and is characterized by daily average temperatures between 14°C and 19°C and high humidity (Schjellerup, 2005:47). It is widely covered by Andean montane or cloud forest (see Figure 4). These forests occur from 1500 to 3500 m of altitude, mostly on the Amazonian slopes of the Andes, but also throughout the inter-Andean valleys wherever there is sufficient humidity. They are characterized by frequent cloud cover. This favours epiphytic growth, especially in higher altitudes. Important tree families of these evergreen forests include Araliaceae, Asteraceae, Lauraceae, Melastomataceae, Myrsinaceae, Myrtaceae, Rubiaceae, and Solanaceae (Pennington, 2004:13). Some characteristic genera and species in the *quichua* zone include *Alnus acuminata* (Betulaceae), *Cedrela* spp. (Meliaceae), *Oreopanax* sp. (Araliaceae), *Brugmansia* spp. (Solanaceae), *Baccharis* spp. (Asteraceae), and *Rubus* sp. (Rosaceae; Schjellerup, 2005:47). However, the cloud forests in the zone have been widely deforested for farming and cultivation. In the higher regions surrounding the town Uchumarca, *Eucalyptus globulus* (Myrtaceae) is the most common tree. It has been introduced in the early 20th century (Schjellerup, 2005:48) and widely cultivated for timber production. Other important cultivars are some fruit trees, such as *Annona cherimolia* (Annonaceae), and *Passiflora ligularis* (Passifloraceae). However, the *quichua* zone is the most suitable ecological zone for cereal production: important crops are *Zea mays, Triticum aestivum,* and *Hordeum vulgare*. Further common crops are the Amaranthaceae *Chenopodium quinoa* and *Amaranthus caudatus*, the Fabaceae *Lupinus mutabilis, Phaseolus vulgaris, Pisum sativum* and *Lens culinaris*, the tubers *Manihot utilissima* (Euphorbiaceae), *Ipomoea batatas* (Convolvulaceae), *Solanum tuberosum* (Solanaceae) and some *Cucurbita* species (Schjellerup, 2005:48). The study site in the mountains, i.e. the town Uchumarca, is situated on the upper part of the *quichua* ecological zone, in close proximity to the *jalca* zone.

Jalca – Andean high altitude grasslands

Jalca formations are specialized tropical high altitude environments in northern Peru, drier than the *páramo* to the north and wetter than the *puna* to the south (Dillon, 2011). The average temperature is about 8°C at 3500 m of altitude, with high air humidity (Schjellerup 2005:45). Whereas *jalca* vegetation characterizes most of the landscape above the tree line at about 3500 m, there are scattered plots of *Polylepis* (Rosaceae) woodland up to 4200 m, sometimes associated with *Buddleja* species (Loganiaceae), known as *Polylepis* forests (Pennington, 2004:12). The *jalca* zone itself consists of grassland and scattered shrub vegetation (see Figure 5). The grasslands are dominated by the Poaceae genera *Calamagrostis, Festuca* and *Stipa*; and herbal genera such as *Alchemilla* (Rosaceae), *Gentianella* (Gentianaceae), *Hypochaeris* (Asteraceae), *Plantago* (Plantaginaceae), and *Werneria*

(Asteraceae). Some of the characteristic shrubs are *Ageratina* (Asteraceae), *Arcytophyllum* (Rubiaceae), *Baccharis* (Asteraceae), *Brachyotum* (Melastomataceae), *Chuquiraga* (Asteraceae), and *Valeriana* (Valerianaceae; Luteyn, 1999; Schjellerup, 2005). The *jalca* ecosystems have been shaped by human actions, such as burnings, deforestation, and cattle grazing, and the actual tree line is due to human utilization of the environment (Schjellerup, 2005:45-46). Burning is done for acquisition of new grasslands for farming and cultivation, and annual burnings serve to provide more nutrient-rich fodder for cattle. This functions as short term management, but will lead to ecosystem degradation and loss of species diversity on the long term (Luteyn, 1999). In pre-Inca times, cultivation on *jalca* ecosystems has been conducted in an extensive way; nowadays, it is done on a much smaller scale (Schjellerup, 2005:46-47). Cultivation consists of tubers as food crops, such as *Oxalis tuberosa* (Oxalidaceae), *Ullucus tuberosus* (Basellaceae), *Tropaeolum tuberosum* (Tropaeolaceae), and different varieties of *Solanum tuberosum* (Solanaceae). Furthermore, medicinal plant species are cultivated on the fields, and collected in the wild *jalca* regions.

Figure 3: *Temple* ecological zone – inter-Andean seasonally dry tropical forest

A) *Eriotheca discolor* / *Pate* (Malvaceae)

B) *Jacaranda acutifolia* / *Arabisco* (Bignoniaceae)

C) *Hura crepitans* / *Habilla* (Euphorbiaceae) in San Vicente de Paúl

D) *Bombax* sp.

E) Irrigated valley bottom (view from the road from Pusac to Uchumarca)

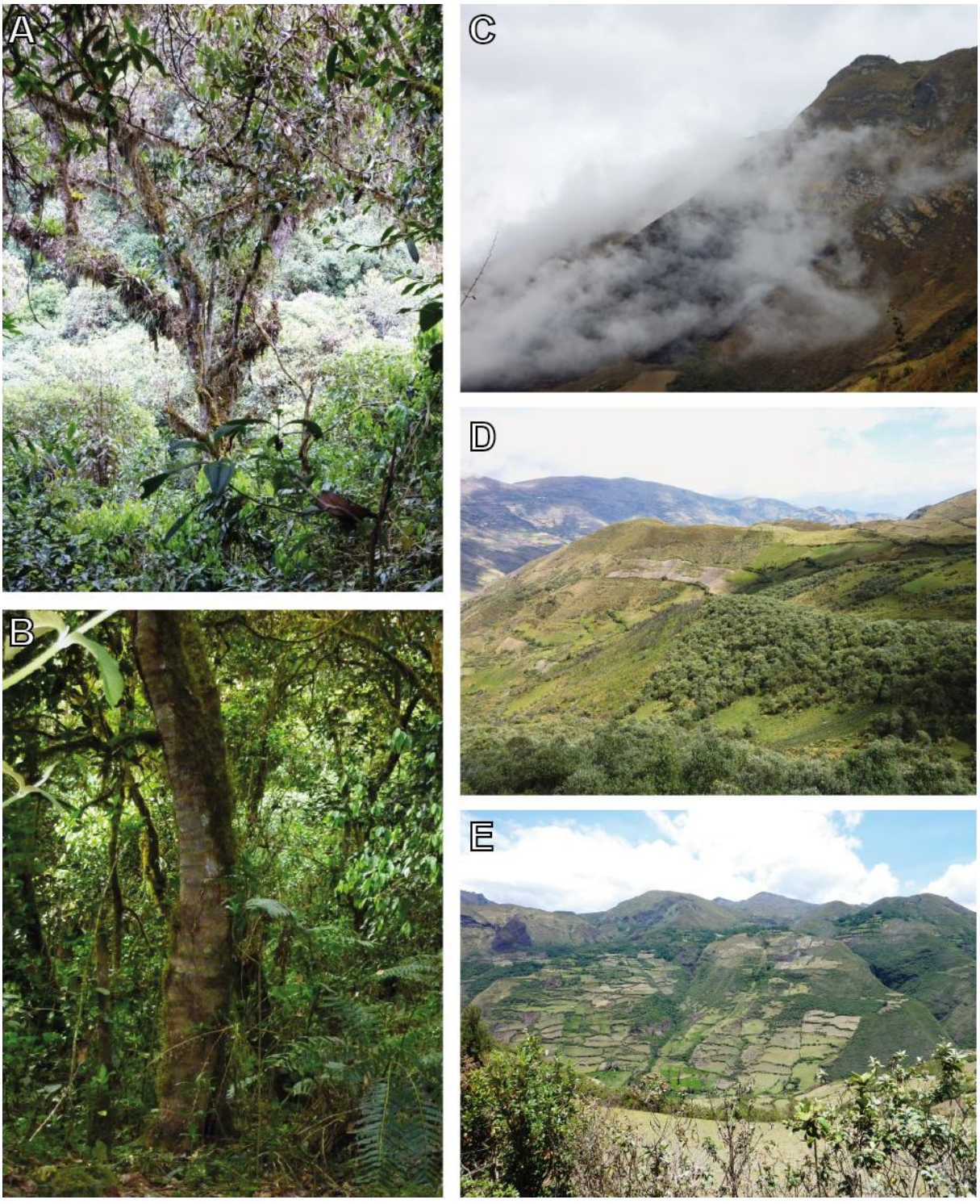

Figure 4: *Quichua* ecological zone – Andean cloud forest

A, B) Cloud forest vegetation with epiphytic growth and ferns

C) Cloud cover on the way from Pusac to Uchumarca

D) Cloud forest vegetation fragmented by anthropogenic influence

E) Agricultural fields in the *Quichua* zone

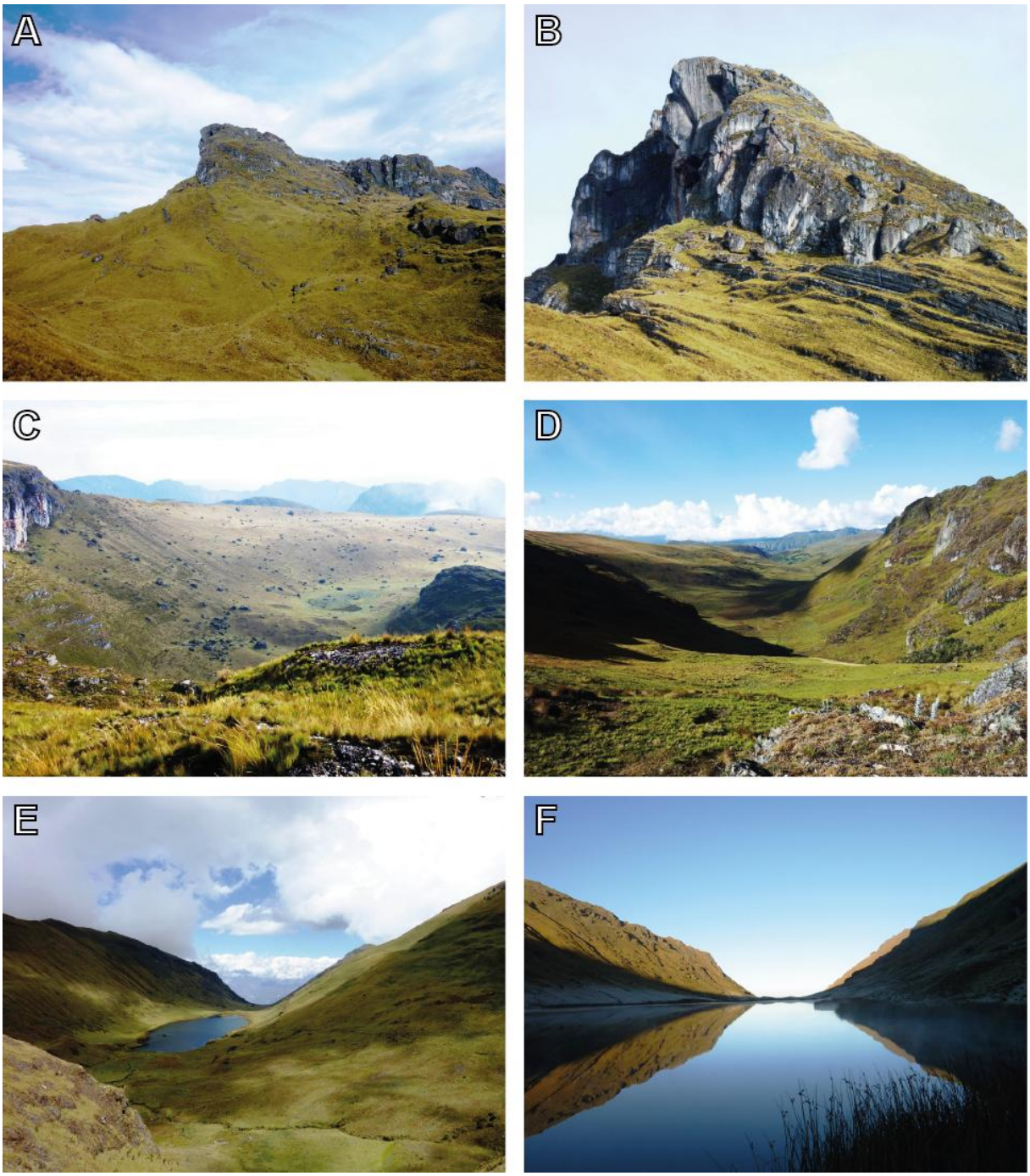

Figure 5: *Jalca* ecological zone – tropical high altitude grassland

A, B) Summit of Kummullka, near Uchumarca (4300 m)

C, D) *Jalca* vegetation, grassland with scattered shrubs

E, F) Lagoons Holccococha and Huarmicocha (Leymebamba district, department Amazonas; 3700 m)

2.2. Ethnographic background

The local population

The population in the research area consists of Spanish speaking mestizos, being partly descendants of the Chachapoya ethnic group, which inhabited the zone at the time of arrival of the Spanish (for details on the Chachapoya see below; for local people see Figure 6). The mountainous town Uchumarca, capital of the Uchumarca district, has approximately 3000 inhabitants. In both Pusac and San Vicente de Paúl live about 1500 people. Although both localities are inhabited by mestizo populations, the Chachapoya descent is stronger in the mountainous town Uchumarca than in the valley, where a great proportion of the population came from outside. The villages Pusac and San Vicente de Paúl were first funded in the 1960s and 1970s, respectively, by people immigrating from neighbouring districts as well as from the other side of the Marañón River. This occurred after reducing the risk of malaria in the valley zone with the extensive use of DDT in the 1950s, and construction of a road connecting the valley with the town of Uchumarca in 1965 (Brush, 1971). However, there has been migration throughout the zone, between the mountains and the valley, and immigration into both localities from further distant places. The town of Uchumarca was funded towards the end of the 16th century as a Spanish Reduction. Before the Spanish invasion, people lived mostly on higher altitudes and cultivated mainly potatoes and quinoa and depended less on grains, especially maize. Possibly, the Spanish funded Uchumarca on an altitude which allowed almost equal access to *quichua* as well as to *jalca* ecological zones in order to facilitate both cultivation of wheat and maize, as well as animal husbandry and potato cultivation (Brush, 1971). Until construction of the road to Celendín in 1966, Uchumarca was at a distance of 30 hours on horseback to the next market place. Its isolated economy has been described as essentially not monetized in the early 1970s (Brush, 1971). There was a system of reciprocity where people shared with friends, neighbours, and – most important – relatives different harvest products and manpower (Brush, 1971). Today, the economy is monetized, and merchandise from the big coastal cities can be obtained. Still, there is exchange of goods and manpower between relatives, but the paid work of day laborers has become more usual. Still, family bonds play a very important role in daily lives, and due to the relative isolation of the region, a high degree of relatedness exists between the valley villages and the town of Uchumarca as well as within these populations. Interestingly, it has been observed that even if the degree of relatedness between two persons is not known, or even between friends, people call each other cousins or uncle and niece, aunt and nephew.

The Chachapoya

The mestizo populations in the research area are characterized by being almost exclusively Spanish speaking. The region was part of the Inca Empire only for a short period of time before the arrival of the Spanish, and the Inca language Quechua did not establish itself strong enough to persist. Some people in the region know a little Quechua, but it is not commonly used unless in a few expressions, and, interestingly, some plant names. Before the Inca occupation and the following invasion of the Spanish, however, the region was inhabited by the ethnic group of the Chachapoya Amerindians (see

Figure 7). Chachapoya (often written as Chachapoyas; probably plural form established by the Spanish) is the name of an Inca administrative province, founded around 1470, where they unified scattered settlements of people with similar cultural traits (Schjellerup, 2005; Church, 2006). The term Chachapoya is also used to refer to the ethnic group, as well as their pre-Hispanic territories, and Chachapoyas is the name of a city lying on the northern border of Chachapoya territory.

The Chachapoya inhabited a territory of approximately 25 000 km² between the Marañón and Huallaga Rivers, belonging to the modern Peruvian departments of Amazonas, San Martín, and La Libertad. It is assumed that the Chachapoya ethnic group originated in this region; archeological food remains suggest that intensive cultivation of grains on high altitudes, as quinoa, took place as early as 2000 BC (Church, 2006). Although inhabiting an isolated and remote region, the Chachapoya interacted over long distances with other groups, in the central Andes as well as in the Amazonian lowlands, since earliest times. These exchange networks remained intact through Inca occupation, and even coastal pottery (of the Chimu ethnic group) has been found in Chachapoya tombs. The Inca valued the strategic position of Chachapoya territory as entry point to eastern lowlands, which is reflected in extensive constructions (for example Cochabamba). Later, European expeditions in search of mythical El Dorado started from Chachapoyas off to lowland Amazonia (Church, 2006).

Before the Inca conquest around 1470, the Chachapoya people lived in autonomous societies, *curacazcos*, with local chiefs, *curacas*. These consisted of kinship groups, *allyus*, specific to certain settlements, or local clusters of settlements. The independent societies frequently warred upon another and built alliances only against threats from outside, such as the Inca (Church, 2006). The Chachapoya have been described as bellicose and brave people (Guamán Poma in Schjellerup, 2005:60), and the Inca had to reconquer them at least twice (Church, 2006). The unification of Chachapoya people in resistance against Inca occupation led to rapid allying with Spanish forces against them. The Inca had displaced large numbers of rebellious Chachapoya already before implementation of Spanish conquest in 1536 and introduced diseases further decreased local Chachapoya population. The demographic collapse declined the population of once 300 000 people over 90% until 1650 (Church, 2006).

Impressive archeological remains have been discovered in the dense Andean cloud forests, such as the ruins of Kuelap, a fortified urban complex with over 400 circular stone dwellings of 4 to 10 m in diameter surrounded by 20 m high massive walls. Furthermore, Chachapoya cliff tombs with stone mosaic ornaments have received world heritage status by the UNESCO (Church, 2006).

The cliff tombs reflect ancestor veneration through the kin groups. The dead were conserved as mummies and placed in sepulchers built into cliff faces overlooking the territories, where they were accessible for consultations about earthly matters. Lakes, springs, and caves were seen as places of origin of the ancestors, and ancestor spirits were embodied in natural features as mountains, rocks, and trees (Church, 2006). A cemetery above the Laguna de los Condores revealed 200 mummies with preserved textiles in 1997. Designs depict serpents, felines, other fanged creatures, and human-feline hybrids. The serpent is the most prevalent image in Chachapoya iconography and appears also in

pottery and architectural ornaments. This corresponds with Spanish chroniclers pointing at the Chachapoya's worship of serpents and condors as their principal deities (Garcilago de Vega, 1967[1609] in Schjellerup, 2005:61). The representation of human-feline hybrids presumably refers to shamanic transformation into alter egos. Historical records depict the Chachapoya as people known for powerful sorcerers and shamans (Schjellerup, 2005:62). Strikingly, contemporary mythology in the research area still contains these elements; the story of a witch which transformed into a mountain lion and killed sheep of the inhabitants of Uchumarca, and when shoot down retransformed into an injured woman before the eyes of her hunters, is still told among the people. As archaeological findings of crania suggest, Chachapoya healers attempted to apply the technique of trepanation (Schjellerup, 2005:415-416). Further evidence of historical records relates to the use of plants for healing (Arriaga 1920[1621] in Schjellerup, 2005:63). A plant named *"Espingo"* was traded to the Amazonian lowlands and used as medicine by Chachapoya healers. The plant is also depicted in pottery of the coastal Moche culture. It has further been reported to be used by the Bolivian healers Callahuaya (Wassen, 1979 in Schjellerup, 2005:63). Today, the name *Ishpingo* refers to different medicinal plants in the study area; among others, they refer to trees of the Lauraceae family (e.g. *Nectandra* sp.), with prominent dark purple, 3 cm long seeds, which are still sold on local markets. Interestingly, the Moche from the coast used *Nectandra* seeds in human sacrifice rituals, for their analgesic, narcotic, sedative and anti-coagulating properties (Carod-Artal and Vázquez-Cabrera, 2007). This example indicates possible long-term relations between healers from different regions and shows interwoven influences of Andean, Amazonian, and coastal cultures.

Andean cosmology

World view and thinking of all cultural groups are influenced by the environment of which they form part. The relation of Andean people to their environment is characterized by hard work and humility resulting from the experience that despite of the hard work the earth may not yield the vital harvest. The harsh Andean environment has taught people that life and all things are limited (Bettin, 1994).

Andean cosmology perceives the world as an entity consisting of dual, cyclic processes such as life and death, rainy and dry season, day and night, hot and cold. None of these parts of pairs could ever exist without its complementary opposite, the dualities make up the entity. The visible reality is complemented by the invisible, spiritual world (Bettin, 1994). Work, prayer, rites and celebrations aim to maintain in harmony the contradictory and complementary forces.

The duality is connected with the belief that all that comes into existence existed before and what disappears does not disappear forever; things change from one state of the cycle to its opposite state to someday reappear. And what the earth yields is limited. Therefore, goods given by the earth must be distributed to all members of a community, and everything that is obtained must be given back in some way. *Pacha Mama*, mother earth, is the main goddess Andean people worship, and she must be treated well. She is the one who gives life, but she also takes it away. Survival in the Andean environment depends on cooperation, and the perception of duality, cyclicality, and limitation of

goods determine social life of Andean people. Important rules are the principle of reciprocity and redistribution. Reciprocity is manifested in exchange of different food products and manpower between members of a society, but also in worship and donations to the earth. Disequilibrium in distribution of goods between the members of a community is believed to cause harm. Envy as consequence of such inequality is seen as a cause for disease (Bettin, 1994). Generally, in Andean cosmology, the body is seen as the domicile of animated energy, which can be lost, diminished or augmented from interference with ancestors, spirits, evil winds or the ill will of others (Allen, 1988).

Figure 6: Local people

A) Pressing sugar cane for preparation of "sugar cane honey" (*miel de caña*)

B) *Coca* leaves drying in the sun

C) Informant and two of his sons during plant collection

D) Woman with baby in *Quichua* zone

E) School children during break, village square of Pusac

F) Carlos Vega (NGO Inbia Peru) and his sister, key informant Isabel Vega

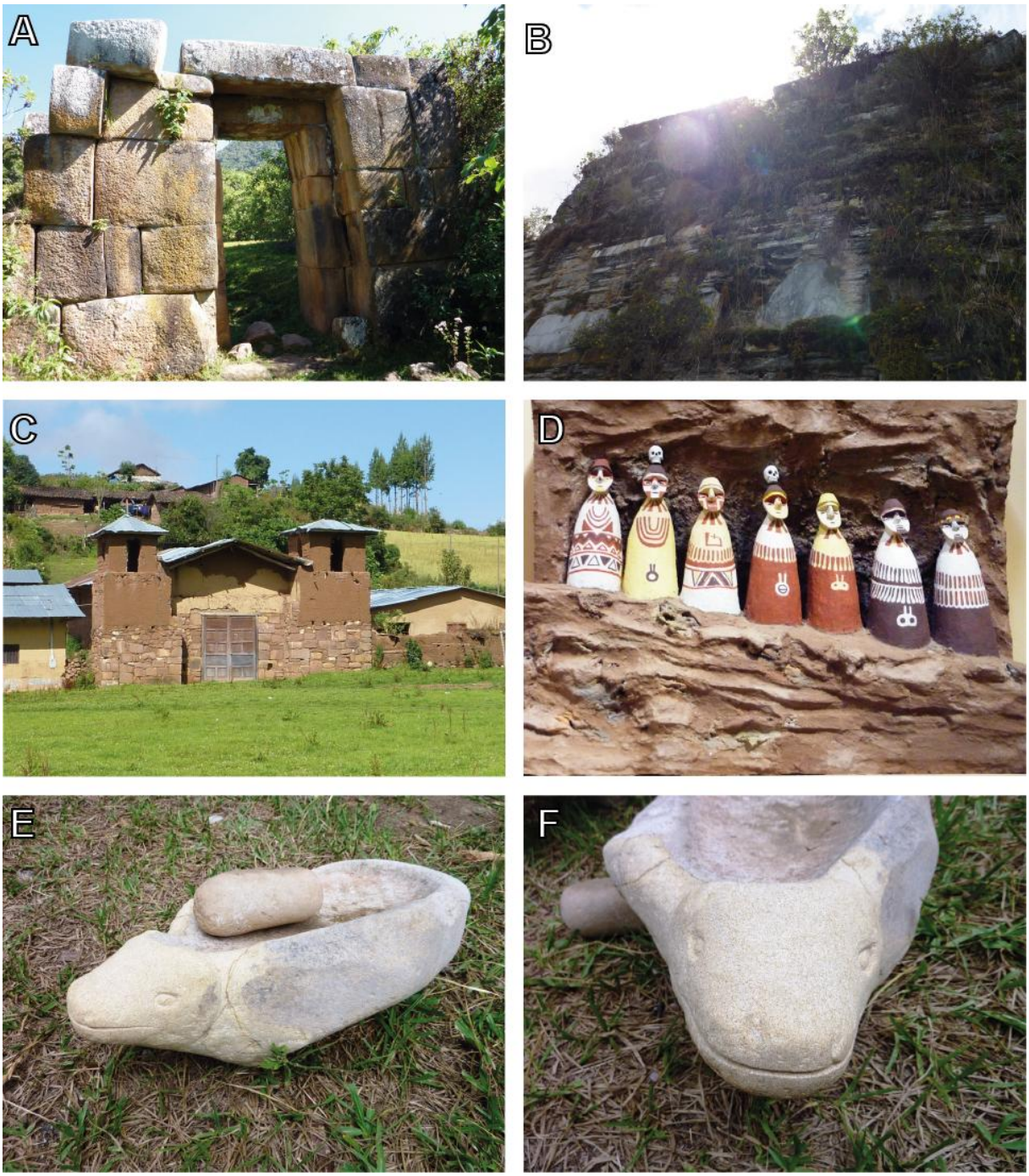

Figure 7: Inca and Chachapoya relicts

A) Inca ruin in Cochabamba (Leymebamba district, department Amazonas)

B) Inca ruin Pirca Pirca near Uchumarca

C) Church of Cochabamba, built upon Inca ruin

D) Replication of Chachapoya sarcophagi, Leymebamba museum

E, F) Chachapoya quern in form of a serpent, found near San Vicente de Paúl

3. Methods

3.1. Data collection – interviews and participant observation

Fieldwork was conducted from May to November 2010. Interviews were held in Spanish, with a total of 120 informants, of whom 21 are considered as specialists. These specialists were named by other informants as local healers or exceedingly knowledgeable persons on medicinal plant use, and therefore selected for interviewing. However, there is no clear separation line between specialists and generalists; an issue which will be discussed later. Informants were found through social and familial networks of key informants from the host family. Sampling aimed to cover different age groups, both sexes, and included similar numbers of people from the mountainous locality as from the valley. Semi-structured interviews were conducted to acquire information about medicinal plant use. These types of interviews are a useful method of getting a lot of information on the topic investigated, while leaving room for any new, interesting matter the interviewee wants to talk about (Bernard, 2006:212). They can therefore be of great help to gain insights into the person's believes and worldview. The semi-structured interviews were experienced as reasonable means for data collection, in terms of information achieved as well as regarding the interpersonal exchange. Informants were asked to list the medicinal plants they knew, their routes of administration and preparation. Furthermore, they were asked about the acquisition and transmission of medicinal plant knowledge, their actual use of plant medicine, frequent and important diseases, causes of diseases, and their use of the different parts of the medical system in case of disease (for the interview guide see Appendix 1). Many common and widely known plant names mentioned by the interviewees could easily be linked with plant species during the plant collection trips with local assistants. Other plants were collected at informants' homes and in their gardens, and identified there. Further, all plant names and uses were discussed with a key informant after collecting for cross-checking. Remaining uncertainties regarding local plant nomenclature were discussed in group interviews with specialists, using dried plant specimens as references. During the four months of stay in the village at the home of a local family, a lot of informal talks took place as well, which allowed plenty of additional information to be collected, also anecdotes and myths.

To gain insights into the local people's perception of the environment, their cosmology and believes, and the importance of plants and natural medicine in their daily lives, participant observation was adopted. Participant observation means immersing into the culture where investigation is conducted and stepping behind to intellectualize the information seen and heard (Bernard, 2006:344). It means the ongoing intent to become part of the local reality and keep sufficient distance to record about it. Thus, qualitative information about people's living and thinking was gathered by sharing their everyday life.

3.2. Plant collection, preparation and identification

Plant collections were conducted from May to October 2010, on trips of one, two, or three days, always with the assistance of a local guide and a person with broad medicinal plant knowledge (see Figure 8). Material for six herbarium specimens was collected for each plant species. The plant material collected included flowers, leaves and fruits when available; additionally, bark was also collected in the case of trees; and subterrestrial parts, if these were of special interest. Information was recorded about plant habit, color, and scent, as well as local plant names, medicinal uses, and applications. Photographs of all plants were taken, coordinates were recorded, and the habitat described. The plant material was treated with alcohol and stored in newspapers and plastic bags until return to Trujillo, where it was dried in electric plant dryers from the NGO Inbia Peru and the Herbarium Truxillense (HUT). The specimens were identified in collaboration with local botanists, Carolina Téllez from the NGO Inbia Peru, Mario Zapata from the private university Antenor Orrego, and Eric Rodríguez from the Herbarium Truxillense.

3.3. Policy – CBD and ABS, dissemination of results

The present study is part of the project "Ethnobotanical and floristic inventory of northern Peru" of the William L. Brown Center, Missouri Botanical Garden. Research was conducted according to the Convention of Biological Diversity (CBD) following the Bonn guidelines on Access and Benefit Sharing (ABS). Data collection was carried out in agreement with national and local authorities. Plant collection and export permissions were obtained from the National Institute of Natural Resources (INRENA) in collaboration with the local NGO Inbia Peru. Prior Informed Consent was given by all informants. Benefits arising from research will be shared with local people in form of a booklet which will be deposited at local schools. It will deliver the processed information to the communities in adequate form.

Figure 8: Field trips for plant collection

A) Field assistant Francisco Díaz Vega collecting *Cascarilla* leaves (n.d.; MM105)

B) Informant Saulo Velázquez Romero collecting the liana *Zarza Parilla* (n.d.; MM102)

C) Camp on Maraypata (2800 m)

D) Break for chewing *Coca* leaves, field assistant Francisco Díaz Vega (middle) and two local healers

E) Unsaddling of the pack donkey

4. Results and Discussion

4.1. Documented medicinal plant knowledge

Medicinal plants, their uses and applications

All documented medicinal plants, their uses and applications are listed in Table 1; Figure 9, Figure 10 and Figure 11 show selected plants from the different ecological zones.

Table 1. Medicinal plants used in Uchumarca and Pusac / San Vicente de Paúl, La Libertad (Peru).

Family / Scientific name (Voucher no.)	Local name	Orig./ Status	Habit	Habitat	Parts used	Way of admin.	Medicinal use	UR (loc.) specialist
ADOXACEAE								
Sambucus nigra L. subsp. *peruviana* (Kunth) Bolli (MM114)	*Sauco*	Native	Tree	Cloud forest	Flowers	Oral	Cough, cold, bronchia: decoction in milk / infusion in milk (both also mixed with *Zarza* flowers, *Ajo*)	10 (m,v) 10 (m,v)
					Fruits	Oral	Cold, flu, bronchia: decoction	3 (m)
					Leaves	Oral	Cold, bronchia, flu: infusion	3 (m)
							Prostate: infusion (with *Pie de Perro*, *Angosacha*, *Choclo* stigmatic branches, 3 times per day for 30 days)	3* (m) **s**
							Kidney inflammation: infusion *(adt)*	3 (m)
						Topical	Purgative: infusion and enema	3 (m)
							Swollen feet from the cold: rubbing with heated leaves	2* (m) **s**
					Bark	Oral	Prostate: infusion of grinded bark, 3 times per day for 8 days	2* (m)
							Purgative: infusion of grinded bark	2* (m)
AMARANTHACEAE (incl. Chenopodiaceae)								
Alternanthera peruviana (Moq.) Suess. (MM45)	*Pulmonaria*	Native (End.)	Herb	Cloud forest	Aerial parts	Oral	Stomach / intestinal / pancreas infection: infusion	3* (m) **s**
							Cold, cough, pulmonary infection: infusion	3* (m,v) **s**
Alternanthera porrigens (Jacq.) Kuntze (MM65)	*Lancetilla*	Native	Herb	Garden	Aerial parts	Oral	Heart, anger, head ache, worries, sorrow, nerves: infusion (or sap) of squeezed shoots, *adt* (mixed with *Perejil, Toronjil*, *Pimpinela*, *Claveles, Rosa*)	22 (m,v)
Alternanthera sp. (MM63)	*Abreojo*	Native	Herb	Road side	Aerial parts	Oral	Prostate, kidneys: infusion, *adt*, with *Flor de Arena*, also with *Pacunga Blanca*, *Cadillo*, *Cebada* grains	2* (v) **s**
							Vaginal discharge: infusion, with *Flor de Arena*, *Cebada* grains	1* (v) **s**
							Stomach cancer: decoction with *Flor de Arena*, *Penca Sábila*, to boil 30 minutes until the water turns red	1* (v) **s**
Amaranthus spinosus L. (MM62)	*Ataco*	Native	Shrub	Road side	Leaves, Infl.	Oral	Natural food accompanying medicinal plant treatment: eaten cooked	1* (v) **s**
Beta vulgaris var. *cicla* L. (MM314)	*Acelga (de Huerta)*	Introd. (Cult.)	Herb	Field	Leaves	Oral	Infection, fever: sap, before breakfast for 3 days	3 (m,v)
							(Fever: also sap with *Verbena*, *Achicoria*, and *Tamarindo* fruits)	1* (v) **s**
Chenopodium ambrosioides L. (MM26)	*Paico*	Native	Herb	Road side	Aerial parts	Oral	Gastrointestinal parasites: eaten in soup (*verde*, with potatoes and garlic)	6 (m,v)
							Colic, gases: infusion	3 (m)
						Topical	Skin parasites, wounds: decoction for washings	3 (v)
							Vaginal discharge : decoction for washings	1* (v) **s**
Chenopodium murale L. (MM341)	*Paico de Muerto*	Native	Herb	Field	Aerial parts	Oral	*Aire:* infusion (to bathe the head as well, and burned as incense)	5 (m,v)
						Limpia	*Aire de muerto*: *limpia* (with camphor, *Eucalipto*, *Callemanzana*)	2* (m) **s**
						Topical	Vaginal infection: decoction for washings	1* (m) **s**
							Wounds: decoction for washings	1* (v) **s**
Chenopodium sp. (MM313)	*Paico de Muerto*	Native	Herb	Field			See: *Chenopodium murale*	
AMARYLLIDACEAE								
Allium cepa L.	*Cebolla*	Introd. (Cult.)	Herb	Garden	Subterr. parts	Oral	Cough, bronchia: sap, syrup (with garlic), infusion	7 (m,v)
							For strength, defences: eaten as salad	3 (m,v)

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Family / Scientific name (Voucher no.)	Local name	Orig./ Status	Habit	Habitat	Parts used	Way of admin.	Medicinal use	UR (loc.) specialist
Allium sativum L.	*Ajo*	Introd. (Cult.)	Herb	Garden	Subterr. parts	Oral	Cough, bronchia, cold: syrup (with onion), or in milk	15 (m,v)
							Parasites: eaten in soup (*verde*, with *Paico* and potatoes), or raw in onion salad	4 (m,v)
ANACARDIACEAE								
Mangifera indica L. (MM310)	*Mango*	Introd. (Cult.)	Tree	Field	Bark	Oral	Gastrointestinal infections, constipation, diarrhoea: decoction of bark	1* (v)
							Bronchia, cough: decoction of bark	1* (v)
					Fruits	Oral	Tonic: fruits eaten raw	2* (v)
					Seeds	Oral	Intestinal parasites: seeds in cow or goat milk with *Paico*, *Ruda*, *Hierba Buena*, and seeds of *Naranja* (roasted), *Papaya*, *Palta*	1* (m) **s**
Mauria heterophylla Kunth (MM146)	*Huiso*, *Guiso*, *Shimer*, *Shimir*, *Trinidad*, *Tres Hojas*	Native	Tree	Cloud forest	Leaves	Topical	Wounds, skin infection: decoction for washings	25 (m,v)
							Vaginal infection: decoction for washings	3 (m,v)
						Oral	Stomach inflammation, diarrhoea, colic, gastritis: infusion or decoction (also as *adt*, with *Cola de Caballo*, *Pie de Perro*, *Linaza* seeds, *Cebada* grains)	10 (m,v)
							Internal wounds, infection: infusion	4 (m,v)
Schinus molle L. (MM81)	*Molle*	Native	Tree	Dry forest	Leaves	Topical	*Aire:* decoction to bathe the head	4 (m,v)
							Bone pain: to rub with infusion or alcoholic extract or heated leaves	5 (v)
						Oral	Cold, flu: infusion	3 (v)
							Cold, flu: infusion, and inhalation with decoction, with *Eucalipto, Ciprés*	1* (v)
						Limpia	*Susto*, *aire*: *limpia*, (also mixed with *Añashquero*, *Camotillo*, *Hierba del Shingo*, *Palo Santo*, *Romero*, *Ruda*, and floral perfume, camphor, sugar cane spirit)	3 (v)
Spondias purpurea L. (MM387)	*Ciruela*	Introd. (Cult.)	Tree	Field	Fruits	Oral	Stomach infection: decoction	3 (v)
					Bark	Oral	Dysentery: decoction of barks of *Ciruela*, *Palta*, *Guayaba*, *Granada*	1* (v)
ANNONACEAE								
Annona cherimola Mill. (MM160)	*Chirimoya*	Native (Cult.)	Tree	Garden	Leaves	Topical	Bronchia: cataplasm	1* (v) **s**
							Back pain, kidney pain: to rub with heated leaves and cacao butter	1 (v)
Annona muricata L. (MM240)	*Guanábana*, *Cashacushma*	Native (Cult.)	Tree	Garden	Leaves	Oral	Cancer, cancer prevention: infusion, *adt*	15 (v)
							Kidneys, prostate, urinary tract: infusion, *adt* (also with *Cola de Caballo*, *Pie de Perro*, *Achiote*, *Cebada* grains)	15 (v)
							Infection, inflammation: infusion, *adt*	6 (v)
							Everything, many diseases: infusion, *adt*	3 (v)
Rollinia mucosa (Jacq.) Baill. (MM231)	*Annona*	Native (Cult.)	Tree	Garden	Leaves	Oral	Cancer: infusion, *adt*	1* (v)
APIACEAE								
Apium graveolens L. (MM373)	*Apio*	Introd. (Cult.)	Herb	Field	Aerial parts	Oral	Stomach infection, colic, gases: infusion	5 (m,v)
							Nerves, anger: infusion	3 (m,v)
							Menstrual cramps: infusion, with *Culantrillo*	1* (v) **s**
Coriandrum sativum L. (MM401)	*Cilantro*, *Culantro*	Introd. (Cult.)	Herb	Field	Seeds	*Limpia* Incense	Bewitchment through *duende* (white female river ghost): *limpia* with goat beard, *Ruda* and *Cilantro* seeds; and burning *Hierba Buena* as incense with 2 *Maguey* slices as tinder	1* (m) **s**
Daucus carota L. (MM321)	*Zanahoria*	Introd. (Cult.)	Herb	Field	Subterr. parts	Oral	Gastritis: once a day half a glass of sap for 7 days	1* (v) s
							Vision: infusion, with *Alfalfa*	1* (m)

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Family / Scientific name (Voucher no.)	Local name	Orig./ Status	Habit	Habitat	Parts used	Way of admin.	Medicinal use	UR (loc.) specialist
Petroselinum crispum (Mill.) Fuss (MM300)	*Perejil*	Introd.	Herb	Field	Aerial parts	Oral	Anger, head ache, nerves: infusion or sap, also with *Lancetilla*, *Toronjil*, *Claveles*,	20 (m,v)
						Topical	*Pimpinela*, and sap in warm water to bathe the head	6 (m,v)
					Subterr. parts		Heart, high blood pressure: infusion, sap, decoction, also with *Lancetilla*, *Toronjil*	14 (m,v)
						Oral	Heart, high blood pressure: sap of grinded roots, in warm water	3 (m,v)
APOCYNACEAE								
Asclepias curassavica L. (MM390)	*Laurel (de Temple)*	Native	Herb	Road side	Latex	Oral	Stomach pain, purgative: to take 1 (not more!) drop of latex in water	2* (m,v)
Himatanthus sp. (MM147)	*Guarauya*	Native	Tree	Dry forest	Flowers	Topical	Vaginal infection: decoction for washings	3 (m)
							Wounds: decoction for washings	2* (v)
							Anticonceptive	1* (v)
ARALIACEAE								
Oreopanax sp. (MM164)	*Mano de Oso*, *Maqui Maqui*	Native	Tree	Cloud forest	Leaves	Oral	Indigestion, kidneys: infusion	2* (m,v)
						Topical	Vaginal infection: decoction for washings	2* (v) **s**
ARECACEAE								
Cocos nucifera L. (MM388)	*Coco*, *Uayaquil*	Introd. (Cult.)	Tree	Garden	Fruits	Oral	Heart, high blood pressure: to drink the water inside the fruit, continuously	2* (v)
							kidney infection: to drink the water inside the fruit	1* (v)
					Bark	Topical	Vaginal infection: decoction for washings, with *Flor Blanca*, *Rataña*	1* (v)
ARISTOLOCHIACEAE								
Aristolochia sp. (MM80)	*Camotillo*	Native	Vine	Dry forest	Aerial parts	Topical	*Susto*, *aire:* to bathe with decoction, with *Molle*	4 (v)
						Incense	*Susto:* to burn as incense, with *Ruda del Shingo*	1* (v)
						Limpia	*Susto: limpia* with *Añashquero*, *Palo Santo*, *Ruda*, *Hierba del Shingo*, *Romero*, and floral perfume, camphor, sugar cane spirit	1* (v)
ASPARAGACEAE								
Agave americana L. (MM324)	*Maguey*	Introd.	Succ.	Dry forest	Stem	Incense	Bewitchment through *duende* (white female river ghost): *limpia* with goat beard, *Ruda* and *Cilantro* seeds; and burning *Hierba Buena* as incense with 2 *Maguey* slices as tinder	1* (m) **s**
							Aire: to burn as incense and spread the smoke over the head	1* (v) **s**
ASTERACEAE								
Achillea millefolium L. (MM395)	*Milenrama*	Introd. (Cult.)	Herb	Garden	Aerial parts	Oral	Gastritis: infusion	1* (v) **s**
							Aphrodisiac, love spell: to give the person secretly	1* (v) **s**
						Topical	Haemorrhoids: sitz bath, with *Cola de Caballo*, *Llantén*	1* (m)
Achyrocline alata (Kunth) DC. (MM393)	*Ishpingo*, *Ishpingo Blanco*	Native	Herb	Garden	Aerial parts	*Limpia*	*Susto: limpia* (also with alum, *Eucalipto*, *Capulí*, *Hierba Buena*)	3 (m,v)
						Topical	*Susto*: bath with decoction, with *Tento Azúl*, *Tento Verde*, *Tento Dulce*, *Pushmote*, *Añashquero*, *Quishuar Blanco*, 3 times on Tuesday, Friday, Tuesday	1* (v)
Achyrocline sp. (MM293)	*Ishpingo*, *Ishpingo Verde*	Native	Herb	Road side			See *Achyrocline alata*	
Ageratum sp. (MM339)	*Huarmi Huarmi*	Native	Herb	Garden	Subterr. parts	Oral	Dysentery, diarrhoea: infusion or decoction of grinded roots	2* (m) **s**
Ambrosia peruviana Willd. (MM129)	*Marco*, *Marcos*	Native	Herb	Field	Aerial parts	Topical	*Aire*, *susto*, nerves: to rub with heated shoots	2* (v) **s**
							Cold: decoction to bathe, with *Hierba Santa*, *Verbena*, *Hierba Mora*	1* (v)

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Family / Scientific name (Voucher no.)	Local name	Orig./ Status	Habit	Habitat	Parts used	Way of admin.	Medicinal use	UR (loc.) specialist
Artemisia absinthium L. (MM101)	*Ajenco*	Introd. (Cult.)	Herb	Garden	Aerial parts	Oral	Colic: infusion (also with *Manzanilla*, lemon drops, sugar)	14 (m,v)
							Menstrual cramps: infusion	3 (m,v)
							Liver inflammation: infusion	2* (v) **s**
							Malaria: infusion	2* (v)
Baccharis genistelloides (Lam.) Pers. (MM120)	*Carqueja*, *Carqueja Grande*, *Carqueja Macho*	Native	Herb	Dry forest	Aerial parts	Oral	Liver: decoction or infusion (only a few days, more affects vision)	15 (m,v)
							Blood purification: infusion	3 (m,v)
							Kidneys: infusion	3 (m)
						Topical	Wounds: decoction for washings	5 (m,v)
Baccharis genistelloides (Lam.) Pers. (MM304)	*Carqueja*, *Carqueja Pequeña*	Native	Herb	Dry forest			See *Carqueja Grande* / *Carqueja Macho* (*Baccharis genistelloides*; MM120)	
Baccaris sp. 1 (MM74)	*Chilca*, *Chilca Negra*	Native	Shrub	Dry forest	Leaves	Topical	Wounds, haematoma, white swellings: decoction for washings or cataplasm of heated leaves	8 (m,v)
							Bone pain, fractures: cataplasm of heated leaves	4 (m,v)
						Limpia	*Aire*: decoction to bathe the head or *limpia*	3 (m,v)
Baccharis sp. 2 (MM184)	*Tayanga*	Native	Shrub	Cloud forest	Bran-ches	Oral	*Aire*, head ache, tooth ache: infusion	3 (m,v)
						Topical	*Chucaque* (head ache caused by shame): to rub with branches	1* (m) **s**
Baccharis sp. 3 (MM216)	*Tayanga de Cerro*	Native	Shrub	*Jalca*			See *Baccharis* sp. 2	
Bidens pilosa L. (MM25)	*Cadillo*, *Amor Seco*	Native	Herb	Road side	Aerial parts	Oral	Kidneys, bladder: infusion (also with *Abreojo*, *Flor Blanca*, *Flor de Arena*, *Pacunga Blanca*)	8 (m,v)
							Liver: infusion or decoction	3 (m,v)
							Stomach, constipation: infusion or decoction	3 (m,v)
						Topical	Wounds, skin infection: infusion for washings	5 (m,v)
Chromolaena sp. (MM166)	*Tayanga*	Native	Shrub	Cloud forest			See *Baccharis* sp. 2	
Chrysactinium sp. (MM137)	*Achicoria*	Native	Herb	Dry forest			See *Taraxacum officinale*	
Chrysanthemum sp. 1 (MM338)	*Callemanzana*	Introd. (Cult.)	Herb	Garden	Aerial parts	Oral	Cold, flu: infusion (with lemon drops)	3 (m)
						Topical	Cold, flu, fever: decoction for bathing with heated sugar cane spirit (also with *Eucalipto*, *Hierba Mora*, *Hierba Santa*, hot urine, salt)	10 (m)
						Limpia	*Aire:* to rub with shoots, or *limpia*, with *Eucalipto*, *Paico de Muerto*, *Romero de Castilla*, *Ruda*; and burning as incense	5 (m)
Chrysanthemum sp. 2 (MM389)	*Crisantemo*	Introd. (Cult.)	Herb	Garden	Aerial parts	Oral	Heart: infusion, with *Lima* flowers	1* (v) **s**
						Topical	Blood purification: steam bath with *Ajenco*, *Calendula*, *Eucalipto*, *Molle*, *Romero*	1* (v) **s**
							Aire: to rub	
Chuquiraga jussieui J.F. Gmel. (MM218)	*Ámaro*	Native	Shrub	*Jalca*	Bran-ches	Oral	Liver: infusion	4 (m,v)
							Blood: infusion	3 (m,v)
Ferreyranthus sp. (MM350)	*Chilca Blanca*	Native	Shrub	Cloud forest	Leaves	Topical	Children who urinate into the bed: to rub the legs with boiled *Chilca Blanca* and *Molle*	1* (v)

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Family / Scientific name (Voucher no.)	Local name	Orig./ Status	Habit	Habitat	Parts used	Way of admin.	Medicinal use	UR (loc.) specialist
Galinsoga sp. (MM130)	*Pacunga Blanca*, *Pacunga Negra*	Native	Herb	Field	Aerial parts	Oral	Nerves, anger, stroke: infusion (with *Perejil*, *Chulco*, *Lancetilla*, *Apio*, *Menta*)	3* (v) **s**
							Kidneys: infusion (with *Cadillo*, *Abreojo*, *Flor de Arena*)	1* (v)
Lasiocephalus sp. (MM217)	*Valeriana*	Cosm.	Herb	*Jalca*			See *Valeriana* sp. 1	
Loricaria ferruginea (Ruiz & Pav.) Wedd. (MM205)	*Abanico*, *Lap Lap*	Native (End.)	Shrub	*Jalca*	Bran-ches	Oral	Stomach: infusion	1* (m)
Matricaria recutita L. (MM15)	*Manzanilla*	Introd. (Cult.)	Herb	Garden	Aerial parts	Oral	Stomach pain, colic: infusion or decoction	41 (m,v)
							Calmative, nerves, head ache, anger: infusion	7 (m,v)
							Cold, flu, cough: infusion	4 (m,v)
						Topical	Laxative: enema	4 (m,v)
							Vision: infusion for bathing the eyes	9 (m,v)
							Wounds: infusion for washings	4 (m,v)
Perezia multiflora (Bonpl.) Less. (MM383)	*Escorsionera*	Native	Herb	*Jalca*	Aerial parts	Oral	Cough, bronchia, tuberculosis: infusion	3 (m,v)
Polymnia sonchifolia Poepp. (MM352)	*Yacón*	Introd. (Cult.)	Herb	Garden	Leaves	Oral	Cancer: infusion	1* (v) s
							Diabetes: infusion	1* (v)
Porophyllum ruderale (Jacq.) Cass. (MM234)	*Ruda* / *Hierba del Shingo*	Native	Herb	Dry forest	Aerial parts	*Limpia* Topical	*Susto*: *limpia* (also with *Camotillo*, *Molle*, *Añashquero*, *Palo Santo*, *Ruda*, *Romero*, and floral perfume, camphor, sugar cane spirit) or rubbing	3 (v)
Schkuhria pinnata (Lam.) Kuntze ex Thell. (MM144)	*Canchalagua*	Native	Herb	Cloud forest	Aerial parts	Oral	Liver, kidneys: infusion (with *Ámaro*, *Andacushma*, *Cadillo*, *Caña Fistula*, *Carqueja*, *Agujillas*, *Cardón*, *Ron del Pastor*, *Paja Blanca*)	3* (m,v) **s**
							Infection: infusion (with *Pájaro Bobo*, *Cola de Caballo*)	2* (m) **s**
Senecio canescens (Bonpl.) Cuatrec. (MM303)	*Vira Vira*	Native	Herb	*Jalca*	Leaves	Oral	Cough: infusion	5 (m)
						Topical	*Envidia*: bath of alcoholic extract, with *Trencilla*, *Añashquero*, *Palo Santo*, *Pagra Pagra*, and drink a sip of the macerate	1* (m) **s**
Senecio sp. 1 (MM122)	*Añashquero*	Cosm.	Herb	Dry forest	Aerial parts	*Limpia*	*Susto*: *limpia* (also with *Camotillo*, *Palo Santo*, *Ruda*, *Hierba del Shingo*, *Romero*, and floral perfume, camphor, sugar cane spirit)	1* (v)
						Topical	*Susto*, *aire*: bath with decoction (with *Ishpingo*, *Tento Azúl*, *Tento Verde*, *Tento Dulce*, *Pushmote*, *Quishuar Blanco*, 3 times on Tuesday, Friday, Tuesday)	5 (m,v)
							head ache : cataplasm of heated leaves	2* (m) **s**
						(Oral)	*Envidia*: bath of alcoholic extract, with *Vira Vira*, *Trencilla*, *Añashquero*, *Palo Santo*, *Pagra Pagra* and drink a sip	1* (m) **s**
Senecio sp. 2 (MM185)	*Llollobi*	Cosm.	Herb	Cloud forest	Aerial parts	Topical	*Susto*, *aire*: bath (also with *Mutuy*, *Cedro*, *Pushmote*, *Guarauya*)	4 (m,v)
Senecio sp. 3 (MM191)	*Oreja de Conejo*	Cosm.	Herb	Cloud forest	Aerial parts	Topical	*Susto*: *limpia*	1* (m)
Senecio sp. 4 (MM204)	*Romero Amarillo* / *de Jalca* / *Dulce*	Cosm.	Shrub	*Jalca*	Bran-ches	Oral	*Aire*, head ache: infusion (also with *Valeriana*)	2* (m)
						Topical Incense	*Aire*, head ache: decoction for bathing and burning as incense	2* (m,v) **s**
Smallanthus sp. (MM269)	*Tshult*	Native	Shrub	*Jalca*	Bran-ches	Topical	Bone pain: to rub	1* (m)

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Sonchus oleraceus L. (MM88)	*Cerraja*	Introd.	Herb	Road side	Aerial parts	Oral	Anger, head ache: infusion of grinded plant material	4 (m,v)
							Fever: sap	1* (v) **s**
Stevia sp. (MM48)	*Estevia*	Native	Herb	Cloud forest	Leaves	Oral	Diabetes: used as sweetener instead of sugar	3 (v)
Tagetes erecta L. (MM96)	*Calendula, Flor de Muerto*	Introd.	Herb	Garden	Aerial parts	Oral	*Aire, aire de muerto*: infusion and rubbing with shoots	1* (v) **s**
						Topical	Blood purification: steam bath with *Romero, Molle, Eucalipto, Ajenco, Crisantemo*	1* (v) **s**
Taraxacum officinale F.H. Wigg. (MM153)	*Achicoria, Chicoria, Diente de León, Amargón*	Introd.	Herb	Cloud forest	Leaves	Oral	Liver: sap of squeezed leaves in warm water, infusion, decoction	12 (m,v)
							Stomach infection, colic: sap of squeezed leaves, with water	4 (m,v)
							Fever, malaria: sap, with warm water (grinded, also with *Acelga, Verbena, Tamarindo* fruits) and enema (with the same preparation)	6 (m,v)
						Topical		1* (m)
							Constipation: enema, with *Mala Hierba, Sauce* bark (grinded)	1* (v) **s**
					Subterr. parts	Oral	Liver: infusion of grinded roots	6 (m,v)
							Laxative: infusion of grinded roots, taken once, in the morning	1* (m)
Tessaria integrifolia Ruiz & Pav. (MM67)	*Pájaro Bobo*	Native	Tree	Riverine forest	Leaves	Oral	Kidneys: decoction, infusion, *adt* (also with *Cola de Caballo, Pie de Perro, Achiote, Guanábana, Choclo* stigmatic branches, *Chibito, Cebada* grains, *Linaza* seeds, *Flor Blanca, Pay Pay*)	9 (m,v)
							Liver: infusion (also with *Canchalagua*)	3 (v)
Trixis sp. (MM412)	*Coca de Gentil*	Native	Shrub	Dry forest	Leaves	Topical	Tooth ache: to chew the leaves	3 (m,v)
Werneria nubigena Kunth (MM211)	*Lirio*	Native	Herb	*Jalca*	Aerial parts	Oral	Liver: infusion	1* (m)
Werneria sp. (MM212*)*	*Lirio*	Native	Herb	*Jalca*			See *Werneria nubigena*	
Xenophyllum humile (Kunth) V.A. Funk (MM224)	*Hierba del Bien y del Mal*	Cosm.	Herb	*Jalca*	Whole plant	*Seguro*	Magic, to carry the *seguro* with one for well-being	1* (v) **s**
BETULACEAE								
Alnus acuminata Kunth (MM113)	*Aliso, Aliso Blanco, Aliso Colorado*	Native	Tree	Cloud forest	Leaves	Topical	Cold, cough, bronchia: cataplasm of heated leaves (also with *Eucalipto*, and Vick Vaporub, or chicken fat)	3* (m)
							Distortion: cataplasm of leaves (also with chicken fat) and bandage	3* (m)
							Infected wounds: decoction for washings, with *Llantén*	1* (v) **s**
							Sun burn: cataplasm of heated leaves, with sugar cane spirit	1* (m)
							Belly infection, kidney infection: cataplasm with butter, lard or oil	2* (m) **s**
BIGNONIACEAE								
Bixa orellana L. (MM11)	*Achiote*	Native (Cult.)	Tree	Garden	Leaves	Oral	Kidneys, prostate, bladder inflammation: infusion or decoction, *adt*, (also mixed with Cola *de Caballo*, *Guanábana*, *Pie de Perro*, or *Flor Blanca, Chibito Pájaro Bobo, Choclo* stigmatic branches, *Linaza* seeds, roasted *Cebada* grains, *Pay Pay*)	29 (m,v)
Jacaranda acutifolia Bonpl. (MM38)	*Arabisco, Arabisca*	Native (End.)	Tree	Dry forest	Flowers	Topical	Wounds: infusion for washings	1* (v) **s**
					Seeds	Oral	For bewitched persons: to take 3 pairs and 1 as a strong purgative, but followed by a tranquilizer the next day, otherwise it may be deadly	1* (v) **s**

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N.d. (MM76)	*Perlilla*, *Agracejo*		Shrub	Dry forest	Leaves	Oral	Diabetes: sap of squeezed leaves, with water, before breakfast for 15 days	4 (v)
							Blood purification, high cholesterol: sap	2* (v) **s**
							Fever: sap	2* (v) **s**
							Liver, kidneys: infusion, *adt*, for 1 month	4* (v) **s**
						Topical	Purgative: sap, and enema (boiled with barks of *Pate*, *Sauce*, and oil)	3 (v) **s**
					Bark	Oral	Liver, kidneys: infusion or decoction of root	5 * (v) **s**
BORAGINACEAE								
Cordia lutea Lam. (MM172)	*Flor de Overo*, *Hieri*	Native	Shrub	Dry forest	Flowers	Oral	Liver: infusion, *adt*, (also with *Linaza* seeds, roasted *Cebada* grains)	3 (v)
							Yellow fever: infusion, *adt*, for 3 days	1* (v) **s**
Tiquilia paronychioides (Phil.) A.T. Richardson (MM64)	*Flor de Arena*	Native	Herb	Road side	Aerial parts	Oral	Kidneys, prostate, urinary tract: infusion or decoction, *adt*, with *Abreojo*, *Flor Blanca*, *Cadillo*, or *Pay Pay*, *Pie de Perro*, *Cebada* grains, *Chanca Piedra*, *Linaza*	9 (v)
							Malaria: infusion	1* (v) **s**
							Stomach cancer: decoction with *Abreojo*, *Penca Sábila*, boil 30 minutes until the water turns red	1* (v) **s**
							Ovary inflammation, vaginal infection, after birth care: infusion with *Abreojo, Flor*	4 (v)
						Topical	*Blanca*, *Pay Pay*, and vaginal washings with decoction or infusion, with *Flor Blanca*, *Rataña*, *Pay Pay*	4 (v)
BRASSICACEAE								
Capsella bursa-pastoris (L.) Medik. (MM355)	*Bolsa de Pastor*, *Bolsilla*, *Ron del Pastor*	Introd.	Herb	Field		Oral	Kidneys, bladder inflammation, urinary detention: infusion (also with *Achiote*)	3 (m)
							Menstrual cramps, ovary inflammation: infusion (also with *Limoncillo*)	3 (m)
							Liver: infusion (also *with Cadillo, Cardón, Andacushma, Paja Blanca, Carqueja, Ámaro, Canchalagua, Caña Fistula, Agujillas)*	2* (m) **s**
Capsella sp. (MM236)							See *Capsella bursa-pastoris*	
Rorippa nasturtium-aquaticum (L.) Hayek (MM66)	*Berros*	Introd.	Herb	Riverine forest	Leaves	Oral	Kidneys: sap	6 (m,v)
							Liver: sap, or eaten as salad	5 (m,v)
							Bronchia, lungs: sap of squeezed leaves with bee honey	4 (m,v)
Rorippa sp. (MM201)	*Chanche*, *Chanchillo*		Herb	Cloud forest	Whole plant	Oral	Lung cancer: eaten as salad, every morning	1* (v) s
							Anaemia: sap	1* (m)
BURSERACEAE								
Bursera graveolens (Kunth) Triana & Planch. (MM326)	*Palo Santo*	Native	Tree	Dry forest	Bran-ches	Topical	*Susto*, *aire*: to rub	3 (v)
							Envidia: bath of alcoholic extract, with *Vira Vira*, *Trencilla*, *Añashquero*, *Pagra pagra* and drink a sip	1* (m) s
						(Oral)		
						Incense	Nerves: to burn as incense, with olibanum	1* (v)
							Cold: to burn as incense, with olibanum, or use for bathing	3 (v)
							To get rid of insects: to burn as incense inside the house	3 (v)
CACTACEAE								
Opuntia ficus-indica (L.) Mill. (MM320)	*Tuna*	Introd.	Succ.	Dry forest	Leaves	Oral	Colic, gastritis, constipation: to peel the leaves and eat the gel with bee honey	4 (m,v)
					Fruits	Oral	Stomach: eaten	1* (m) **s**
					Subterr. parts	Oral	Diarrhoea: decoction of *Tuna* subterr. parts with *Granada* fruits	1* (v)

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CAMPANULACEAE								
Siphocampylus platysiphon Lammers (MM196)	*Condor*, *Condor Cimuri*	Native (End.)	Herb	*Jalca*	Aerial parts	Oral	Against bewitchment: sap of grinded *Trencillas*, *Condor*, *Rima Rima*, *Cebada*, *Habilla*, half a glass, 2 or 3 times	1* (m) **s**
								1* (v) **s**
							Magic, *aire*: *limpia*	1* (v) **s**
CARICACEAE								
Carica papaya L. (MM381)	*Papaya*	Native (Cult.)	Tree	Field	Seeds	Oral	Intestinal parasites, purgative: infusion of grinded seeds or in cow or goat milk with *Paico*, *Ruda*, *Hierba Buena*, and seeds of *Naranja*, *Zapallo*, *Palta*, *Mango*	3 (m,v)
					Fruits	Oral	Liver: fresh juice mixed with *Penca Sábila* leaf gel (after 24h in water), before breakfast for 15 days or 1-2 months	2* (v)
					Leaves	Oral	Tapeworms: decoction of leaves, add 15 drops of "latex" of green fruit for children, 30 for adults	1* (v) **s**
CARYOPHYLLACEAE								
Dianthus caryophyllus L. (MM391)	*Clavel*, *Clavel Blanco*	Introd. (Cult.)	Herb	Garden	Flowers	Oral	Heart: infusion, *adt*, with *Perejil*, *Lancetilla*, *Pimpinela*, *Toronjil*, with flowers of *Naranja*, *Lima*, *Limón*, or *Mandarine* (also combined with pills for the heart)	6 (m,v)
							Sorrow, worries, anger, head ache, pity: infusion, *adt*, with *Perejil*, *Lancetilla*, *Toronjil*, flowers of *Naranja*, *Lima*,*Limón*, or *Mandarine*	5 (m)
Drymaria sp. (MM356)	*Berros de Jalca*	Native	Herb	*Jalca*	Leaves	Oral	Lungs, bronchia: infusion	1* (m)
CRASSULACEAE								
Echeveria peruviana Meyen (MM330)	*Siempreviva (de Huerta)*	Native (Cult.)	Succ.	Garden	Leaves	Oral	Heart: infusion of squeezed leaves or alcoholic extract with flowers of *Naranja*, *Lima*, *Limón*, or *Mandarine*	2* (m,v) **s**
						Topical	Ear pain: to apply drops of sap of heated leaves into the ears	2* (m,v)
							Cataract, vision: sap of heated leaves for washings	2* (m) **s**
CUCURBITACEAE								
Cucumis dipsaceus Ehrenb. (MM150)	*Pepinillo*, *Cochecito*	Introd.	Vine	Road side	Fruits	Topical	Warts, skin parasites: to rub with the heated, opened fruit	2* (v)
Cucurbita maxima Duchesne (MM396)	*Zapallo*	Native (Cult.)	Vine	Garden	Seeds	Oral	Worms, intestinal parasites: sap of grinded seeds or in cow or goat milk with *Paico*, *Ruda*, *Hierba Buena*, and seeds of *Naranja*, *Papaya*, *Palta*, *Mango*	3 (m,v)
Cyclanthera pedata (L.) Schrad. (MM358)	*Caigua*	Native (Cult.)	Vine	Field	Fruits, leaves	Oral	High colesterol: eaten	2* (m,v) **s**
Sicana odorifera (Vell.) Naudin (MM308)	*Secana*	Native (Cult.)	Vine	Garden	Fruits	Oral	Haemorrhages, vaginal discharge: decoction, with *Rataña*, and *Palta* seeds, twice a	2* (m,v) **s**
						Topical	day, for 1-2 months, and decoction for vaginal washings	1* (m) **s**
CUPRESSACEAE								
Cupressus sempervirens L. (MM152)	*Ciprés*	Introd.	Tree	Cloud forest	Leaves	Oral	Bronchia, cough: infusion	2* (m) **s**
						Topical	Flu: decoction of *Molle*, *Eucalipto*, *Ciprés*, with Vick Vaporub for inhalations	1* (v)
DIPSACACEAE								
Dipsacus fullonum L. (MM376)	*Cardón*	Introd.	Herb	Garden	Leaves	Oral	Liver, kidneys: infusion (with *Ámaro*, *Andacushma*, *Cadillo*, *Caña Fistula*, *Carqueja*, *Agujillas*, *Cardón*, *Ron del Pastor*, *Paja Blanca*)	1* (m) **s**
							Vaginal discharge: decoction	1* (m) **s**
							Haematoma: decoction, with *Cedro*	1* (v) **s**
							Vision: infusion for washings	1* (v) **s**

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DRYOPTERIDACEAE								
Elaphoglossum sp. (MM111)	*Calaguala*	Native	Herb	Cloud forest	Leaves	Oral	Stomach: decoction of leaves	3 (v)
					Subterr.	Oral	Prostate, urinary detention: sap of grinded subterr. parts, with warm water	1* (m)
EPHEDRACEAE								
Ephedra americana Humb. & Bonpl. ex Willd. (MM141)	*Diego López, Sándalo*	Native	Shrub	Cloud forest	Aerial parts	Topical	Distortion, sprains: cataplasm of heated shoots	4 (m,v)
						Oral	Infection: decoction	1* (v) **s**
EQUISETACEAE								
Equisetum bogotense Kunth (MM134)	*Cola de Caballo*	Native	Herb	Riverine forest	Aerial parts	Oral	Kidneys: decoction or infusion, *adt* (with *Pie de Perro*, or also *Achiote*, *Chanca Piedra*, *Pájaro Bobo*, *Llantén*, *Choclo* stigmatic branches, *Guanábana*, *Pay Pay Linaza* seeds, *Cebada* grains)	46 (m,v)
							Internal inflammations, infections: infusion or decoction, *adt*, with *Pie de Perro*	12 (m,v)
							Liver: decoction, *adt*, with *Pie de Perro*	6 (m,v)
							Stomach inflammation, intestinal infection: decoction	11 (m,v)
							Vaginal infection, ovary inflammation, after birth care: infusion or decoction with	10 (m,v)
						Topical	*Pie de Perro*, and vaginal washings	3 (m,v)
							Wounds: infusion or decoction for washings	5 (m,v)
Equisetum giganteum L. (MM8)	*Cola de Caballo*	Native	Herb	Riverine forest			See *Equisetum bogotense*	
ERYTHROXYLACEAE								
Erythroxylum coca Lam. (MM79)	*Coca*	Native (Cult.)	Shrub	Field	Leaves	Oral	Stomach pain, colic (from the cold): infusion or decoction	11 (m,v)
							Cold, cough, flu: infusion (inhalation, with *Manzanilla*)	7 (m,v)
						Limpia	*Susto*, *antimonia*: *limpia* (also with alum)	3 (m,v)
						Incense	and burning as incense *Coca*, *Romero Silvestre*, *Ruda*, *Tabacco*	1* (v)
						Topical	Stimulative, pain killer to extract teeth: chewing of *Coca* leaves	3 (m,v)
EUPHORBIACEAE								
Croton alnifolius Lam. (MM2)	*Tonga*	Native (Cult.)	Shrub	Dry forest	Latex	Topical	To remove spines: to apply drops of the latex on the affected part	2* (v) **s**
							To drop catarrh: to apply drops of the latex into the nares	1* (v) **s**
Croton sp. (MM78)	*Sangre de Grado*	Native	Tree	Field	Latex	Topical	Wounds, haemorrhoids: to wash with *Huiso* and drops of *Sangre de Grado*, or apply the drops (also with liquid from *Plátano* leaf sheaths) on the wound	6 (m,v)
						Oral	Gastritis, ulcers: to drink the liquid of *Plátano* leaf sheaths with drops of *Sangre de Grado*, before breakfast, for 3-4 months	3 (v)
Hura crepitans L. (MM83)	*Habilla*	Native (Cult.)	Tree	Road side	Seeds	Oral	Purgative: eaten. Against bewitchment: sap of grinded *Trencillas*, *Condor*, *Rima Rima*, *Cebada*, *Habilla*, half a glass, 2 or 3 times	2* (v) **s** 1* (m) **s**
Jatropha curcas L. (MM77)	*Piñón*, *Piñones*	Native	Tree	Cloud forest	Seeds	Oral	Purgative: eaten, 2 pairs and 1, or 3 pairs and 1 (odd numbers)	3 (v)
					Latex	Topical	Wounds, haemorrhoids: to apply the latex on the affected part	1* (v)
Jatropha sp. (MM98)	*Huanarpo*, *Guanarpo*	Native	Shrub	Dry forest	Subterr. parts	Oral	Aphrodisiac: to add to wine or sugar cane spirit of the person one desires to seduce	3 (v)
						Topical	Artritis: to rub with warm alcoholic extract of *Molle* and *Huanarpo*	1* (v)
Jatropha sp. (MM99)	*Cholito Sacha*, *Chinita Sacha*		Tree	Dry forest	Seeds	Oral	To give birth to a baby girl or a baby boy: decoction	2* (v) **s**

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Plukenetia volubilis L. (MM309)	*Sacha Inchi*	Native	Vine	Garden	Seeds	Oral	Diabetes: eaten	1* (v)
					Leaves	Oral	Colic: infusion	1* (v) **s**
Ricinus communis L. (MM84)	*Higuerilla, Higuerilla Roja, Higuerilla Blanca, Higrilla*	Introd.	Shrub	Road side	Seeds	Oral	Purgative: to take 1 teaspoonful of seed oil	2* (v)
						Topical	Wounds (also of animals), haematoma: to apply warm seed oil	4 (m,v)
							Indigestion: cataplasm of leaves with warm oil or fat on the stomach	2* (v) **s**
							Inflammation, distortion: to rub with warm seed oil	1* (m) **s**
FABACEAE								
Acacia macracantha Humb. & Bonpl. ex Willd. (MM312)	*Hualango*	Introd.	Tree	Dry forest	Infl.	Oral	Stomach: infusion	1* (v)
Bauhinia sp. (MM175)	*Coca del Inca, Coca del Indio*	Native	Shrub	Cloud forest	Leaves	Topical	Tooth ache: to chew the leaves	3 (m,v)
Caesalpinia paipai Ruiz & Pav. (MM127)	*Pay Pay*	Native (End.)	Tree	Dry forest	Leaves	Oral	Kidneys, kidney stones: infusion (or decoction) with *Cola de Caballo, Pie de Perro, Achiote, Choclo* stigmatic branches, *Pájaro Bobo, Linaza* seeds	8 (v)
						Topical	Ovary inflammation, vaginal infection, after birth care: infusion (or decoction) and vaginal washings, with *Retaña, Flor Blanca, Flor de Arena, Andacushma, Chibito*	7 (v)
Caesalpinia spinosa (Molina) Kuntze (MM58)	*Taya, Tara*	Native (End.)	Tree	Dry forest	Fruits	Topical	Tonsil infection, sore throat: decoction to gargle	7 (m,v)
							Wounds: cataplasm of dried and grinded fruits	4 (m,v)
							Belly / vaginal infection: decoction for vaginal washings	4 (m,v)
							Haemorrhoids: decoction for washings	1* (m) **s**
Cassia fistula L. (MM384)	*Caña Fistula*	Introd. (Cult.)	Tree	Field	Seeds	Oral	Fever, laxative: sap of grinded seeds and *Tamarindo* fruits, with warm water	1* (v) **s**
					Leaves	Oral	Liver, kidney, intestinal infection: infusion, 30 minutes, with *Cadillo, Paja Blanca, Cardón, Andacushma, Carqueja, Ámaro, Canchalagua, Agujillas, Ron del pastor Aire*: infusion of leaves or alcoholic extract of bark	1* (m) **s**
					Bark			2* (v) **s**
Dalea sp. (MM139)	*Mishquina*	Native	Cree-per	Road side	Leaves	Oral	To give birth, painkiller: infusion or decoction (also with *Coca*)	2* (v) **s**
					Seeds	*Seguro*	Against witchcraft, protection against *envidia*: *seguro*	2* (v) **s**
Desmodium molliculum (Kunth) DC. (MM121)	*Pie de Perro*	Native	Vine	Cloud forest	Aerial parts	Oral	Kidney / urinary tract inflammation: decoction or infusion, *adt*, with *Cola de Caballo*, also mixed with *Pay Pay, Guanábana, Linaza* seeds, *Cebada* grains, *Pájaro Bobo, Choclo* stigmatic branches, *Chanca Piedra, Uña de Gato*	39 (m,v)
							Infection, inflammation: infusion or decoction (mixture: see above)	12 (m,v)
							Stomach inflammation: infusion or decoction	10 (m,v)
							Ovary / vaginal inflammation: decoction or infusion, with *Cola de Caballo, Flor Blanca, Retaña, Llantén*, and vaginal washings	9 (m,v)
								6 (m,v)
							Wounds: decoction for washings, with *Cola de Caballo*	7 (m,v)
							Liver inflammation: decoction, *adt*, with *Carqueja, Cola de Caballo, Cebada* grains	4 (m,v)
Desmodium sp. (MM171)	*Orosuso*	Native	Vine	Cloud forest	Aerial parts	Oral	Cough, cold, bronchia: infusion, *adt*	2* (m)
Erythrina edulis Triana ex Micheli (MM177)	*Pajuro*	Native	Tree	Dry forest	Bark	Oral	Kidneys: infusion or decoction, *adt*	2* (m) **s**

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Glycine soja Siebold & Zucc. (MM317)	*Soya*	Introd. (Cult.)	Vine	Field	Seeds	Oral	Anaemia, high cholesterol, after birth care: *Soya* milk	1* (v) **s**
Inga feuillei DC. (MM244)	*Guavo*, *Pacay*	Native (Cult.)	Tree	Dry forest	Leaves Fruit	Topical Oral	Delay of menstruation: decoction for bathing, with *Lima*, *Carrizo*, and salt Aphrodisiac: alcoholic extract, fermented with pisco or wine, bee honey, pollen	1* (v) **s** 1* (v) **s**
Medicago sativa L. (MM126)	*Alfalfa*	Introd. (Cult.)	Herb	Field	Aerial parts	Oral	Anaemia, haemorrhages, nose bleeding, tonic, against weakness: sap, mixed with fresh orange juice, *algarrobina* (syrup of *Algarrobo* fruits), bee honey	6 (m,v)
Mimosa sp. (MM40)	*Uña de Gato (de la Sierra)*	Native	Shrub	Dry forest	Bran-ches	Oral Topical	Kidneys, prostate, inflammation: decoction or infusion, *adt* Women's infection: infusion and vaginal washings Cancer: infusion, *adt*, and vaginal washings	10 (m,v) 3 (m) 2* (m,v) **s**
Otholobium pubescens (Poir.) J.W. Grimes (MM162)	*Culén*	Native	Herb	Cloud forest	Bran-ches	Oral	Colic, constipation, indigestion, laxative, stomach function, stomach purification: decoction or infusion, with oil, before breakfast	15 (m,v)
Prosopis pallida (Humb. & Bonpl. ex Willd.) Kunth (MM123)	*Algarrobo*	Native	Tree	Aerial parts	Fruits Leaves	Oral Topical	To sleep, against weakness: to prepare honey by cooking the fruits: *algarrobina* Cataract: decoction for washings, and apply fine powder of shadow-dried leaves on the eyes, every 7 days	1* (v) **s** 2* (v) **s**
Senna sp. (MM336)	*Mutuy*	Native	Tree	Garden	Flowers	Topical	*Susto*: bath, with *Llollobi*, *Cedro*, *Pushmote*, *Guarauya*	1* (m) **s**
Spartium junceum L. (MM286)	*Retama*	Introd.	Shrub	Garden	Flowers	Topical	Head ache, vision: washings Yellow fever: decoction for bathing	1* (m) **s** 1* (m)
Tamarindus indica L. (MM82)	*Tamarindo*	Introd. (Cult.)	Tree	Garden	Fruits	Oral	Fever: decoction or sap of grinded fruits in warm water, (also enema) Laxative, to cleanse the stomach: sap of grinded fruits, with water	11 (m,v) 9 (m,v)
Trifolium repens L. (MM392)	*Trébol*	Introd.	Herb	Garden	Aerial parts	Oral	Stomach: infusion	1 (m)
GENTIANACEAE								
Gentianella chamuchui (Reimers) Fabris (MM154)	*Corpus Huay*, *Corpus Huayta*	Native	Herb	*Jalca*	Aerial parts	Oral	Blood, haemorrhages: decoction, with bee honey Liver colic, bile, kidney stones, urinary detention: decoction	3 (m,v) 6 (m,v)
Gentianella sp. 1 (MM182)	*Corpus Huay(ta)*	Native	Herb	*Jalca*			See *Gentianella chamuchui*	
Gentianella sp. 2 (MM207)	*Corpus Huay(ta)*	Native	Herb	*Jalca*			See *Gentianella chamuchui*	
Gentianella sp. 3 (MM250)	*Corpus Huay(ta)*	Native	Herb	*Jalca*			See *Gentianella chamuchui*	
Gentianella sp. 4 (MM183)	*Canchalagua*	Native	Herb	*Jalca*			See *Schkuhria pinnata*	
Gentianella sp. 5 (MM249)	*Hierba del Sol Morada*	Native	Herb	*Jalca*	Aerial parts	Topical	Vision: decoction for washings	1* (m)
Gentianella sp. 6 (MM252)	*Flor del Sol*, *Hierba del Sol*	Native	Herb	Field	Aerial parts	Topical Oral	Vision: decoction for washings Colic: infusion	2* (m) 1* (m)
GERANIACEAE								
Erodium moschatum (L.) L'Hér. ex Aiton (MM328)	*Agujillas*	Native	Herb	Field	Aerial parts	Oral	Liver, kidney, intestinal infection: infusion, 30 minutes, with *Cadillo*, *Bolsilla*, *Andacushma*, *Cardón*, *Paja Blanca*, *Carqueja*, *Ámaro*, *Canchalagua*, *Agujillas*	1* (m) **s**
Geranium roseum L. (MM278)	*Geranio*		Shrub	Garden	Stems	Oral	Blood in the urine, prostate, kidney, liver: infusion of grinded stems Nose bleeding, vaginal bleeding: infusion of grinded stems	4* (m) **s** 4* (m,v)
Geranium sp. (MM109)	*Andacushma*	Cosm.	Cree-per	Cloud forest	Aerial parts	Topical	To disinfect wounds: decoction for washings	3 (v)

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Geranium sp. (MM258)	*Titusha*	Cosm.	Cree-per	Cloud forest	Aerial parts	Oral	Ovary infection, women's infection: infusion	3 (m)
JUGLANDACEAE								
Juglans neotropica Diels (MM133)	*Nogal*	Native	Tree	Dry forest	Leaves	Oral	Bronchia, cough, lungs: infusion, *adt*, with lemon drops	4 (m,v)
KRAMERIACEAE								
Krameria lappacea (Dombey) Burdet & B.B. Simpson (MM97)	*Rataña*, *Retaña*	Native	Shrub	Dry forest	Aerial parts	Oral Topical	After birth care, women's inflammation, ovary infection, uterus infection, vaginal discharge, vaginal bleeding: infusion or decoction, and vaginal washings (with *Flor Blanca*, *Pay Pay*)	15 (m,v)
LAMIACEAE								
Hyptis sp. (MM325)	*Tento de Burro*	Native	Herb	Dry forest	Leaves	Topical	Ear pain: to apply the chewed leaves into the ear	1* (v) **s**
Salvia sp. (MM189)	*Tento Azul*	Native	Shrub	Cloud forest	Bran-ches	Topical	*Susto:* bath with decoction, with *Tento Verde*, *Tento Dulce*, *Ishpingo*, *Pushmote*, *Añashquero*, *Quishuar Blanco*, 3 times on Tuesday, Friday, Tuesday	1* (v)
Melissa officinalis L. (MM288)	*Toronjil*	Introd.	Herb	Garden	Aerial parts	Oral	Nerves, head ache, anger: infusion Heart: infusion or sap, with *Perejil*, *Pimpinela*, *Claveles*, *Lancetilla* Colic, diarrhoea: infusion	10 (m,v) 9 (m,v) 4 (m,v)
Mentha spicata L. (MM124)	*Menta*	Introd.	Herb	Garden	Aerial parts	Oral	Colic, stomach pain, nausea: infusion Bronchia, cold, cough: infusion	15 (m,v) 5 (m,v)
Minthostachys mollis (Kunth) Griseb. (MM21)	*Tento*, *Tinto*, *Muña*, *Tento Dulce* / *de Sal*, *Champca*	Native	Shrub	Cloud forest	Bran-ches	Oral Topical Incense	*Aire*, *susto*: infusion, and rubbing with the plant, and burning as incense Colic, stomach pain, intestinal parasites: infusion Cold (*frio*): infusion and rubbing with the plant	17 (m,v) 15 (m,v) 5 (m)
Minthostachys sp. (MM170)	*Tento Verde*	Native	Shrub	Cloud forest	Bran-ches	Topical	*Susto*: bath with decoction, with *Tento Azul*, *Tento Dulce*, *Ishpingo*, *Pushmote*, *Añashquero*, *Quishuar Blanco*, 3 times on Tuesday, Friday, Tuesday	1* (v)
N.d. (MM287)	*Hierba Buena*, *Hierba Buena Blanca*		Herb	Garden	Aerial parts	Oral *Limpia*	Parasites, stomach pain: in boiled milk, or as infusion *Susto*, nerves: infusion, decoction, and *limpia* *Envidia* of animals: to add to fodder Bewitchment through *duende* (white female river ghost): *limpia* with goat beard, *Ruda* and *Cilantro* seeds; and burn *Hierba Buena* as incense with 2 *Maguey* slices	4 (m,v) 4 (m,v) 3 (m,v) 1* (m) **s**
Ocimum basilicum L. (MM173)	*Albahaca*	Introd.	Herb	Field	Aerial parts	Oral	For better sleep, head ache, nerves: decoction	5 (m,v)
Origanum vulgare L. (MM363)	*Oregano*	Introd.	Herb	Garden	Aerial parts	Oral	Menstrual cramps, regulation of menstrual bleeding: infusion Indigestion, stomach: infusion	13 (m,v) 5 (m,v)
Rosmarinus officinalis L. (MM241)	*Romero de Castilla*	Introd.	Shrub	Garden	Bran-ches	Oral *Limpia* Incense	*Aire*: infusion, and burning as incense, *limpia* Gases, stomach inflammation: infusion *Envidia*: to burn as incense, with *Eucalipto*	12 (m,v) 4 (m,v) 1* (m)
Salvia macrophylla Benth (MM167)	*Salvia*	Native	Shrub	Cloud forest	Leaves	Oral Topical	Bronchia, flu: infusion, bathing, cataplasm on the chest of heated leaves with chicken fat Colic, indigestion: infusion	3 (m,v) 4 (m,v)

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Satureja sericea (C. Presl ex Benth.) Briq. (MM29)	*Romero, Romero Silvestre, Romero de Campo*	Native	Shrub	Cloud forest	Bran-ches	Oral Topical *Limpia* Incense	*Aire, susto*, nerves: infusion, *limpia* with *Chinchin, Ruda, Ajo*, steam bath with *Eucalipto*, rubbing the front, arms, legs Colic, stomach pain: infusion Bronchia, cold: infusion, steam bath, with *Eucalipto*	10 (m,v) 4 (m,v) 3 (m,v)
Stachys sp. (MM364)	*Supikegua (de Jalca), Subsik*		Herb	*Jalca*	Aerial parts	Oral	Colic, gases, swollen stomach: infusion	4 (m,v)
LAURACEAE								
Nectandra sp. (MM103)	*Ishpingo*	Native	Tree	Cloud forest	Seeds	*Limpia*	*Antimonia*: *limpia* Cold (*frio*): *limpia*	1* (m) **s** 1* (v)
Ocotea sp. (MM323)	*Jonjolí*	Native	Tree	Dry forest	Bark Fruits	Oral Topical	Constipation: decoction, 10 minutes Hernia: cataplasm of peel, with sebum	2* (v) 1* (v)
Persea americana Mill. (MM232)	*Palta*	Introd. (Cult.)	Tree	Field	Seeds	Oral	Diarrhoea, colic, ulcers: infusion or decoction of grinded seeds Urinary tract infection, prostate: decoction of grinded seeds Inflammation, general infection: decoction, adt, with *Cola de Caballo, Pie de Perro, Salta Perico, Cadillo, Cebada* grains and *Linaza* seeds	11 (m,v) 3 (v) 3 (v)
LINACEAE								
Linum usitatissimum L. (MM394)	*Linaza*	Introd. (Cult.)	Herb	Field	Seeds	Oral	Kidneys, urinary tract: decoction, infusion, *adt*, with *Cola de Caballo*, *Pie de Perro*, *Achiote*, *Guanábana*, *Cebada* grains Indigestion, stomach: to let the seeds in water over night and eat the gel Liver: decoction, with *Carqueja*, or *Cebada* grains and lemon	23 (m,v) 8 (m,v) 8 (m,v)
LOASACEAE								
Nasa sp. (MM275)	*Ishanga*	Native	Herb	Cloud forest			See *Urtica urens*	
LYCOPODIACEAE								
Huperzia sellifolia B. Øllg. (MM228)	*Trencilla*	Native	Herb	*Jalca*	Aerial parts	*Limpia* Oral Topical *Seguro*	*Aire, susto, antimonia*: *limpia* *Envidia*, defense against witchcraft: alcoholic extract with *Vira Vira*, *Añashquero*, *Palo Santo*, *Pagra Pagra*, and bathing, or *limpia* Against diabolic spirits, magic, to tie up the marriage: *seguro*	9 (m,v) 4 (m,v) 5 (m,v)
Huperzia sp. 1 (MM227)	*Trencilla*	Native	Herb	*Jalca*			See *Huperzia sellifolia*	
Huperzia sp. 2 (MM284)	*Trencilla*	Native	Herb	Cloud forest			See *Huperzia selliforlia*	
Huperzia sp. 3 (MM268)	*Trencilla*	Native	Herb	*Jalca*			See *Huperzia sellifolia*	
LYTHRACEAE								
Cuphea sp. (MM112)	*Hierba del Toro*	Native	Herb	Cloud forest	Aerial parts	Oral	Menopause, vaginal discharge: infusion Liver, colic: infusion	2* (m,v) **s** 1* (v**) s**
Punica granatum L. (MM85)	*Granada*	Introd. (Cult.)	Tree	Garden	Bark Fruits	Oral Oral	Kidney pain, urinary tract inflammation: decoction Dysentery: decoction with barks of *Palta* and *Ciruela* Diarrhoea: decoction of fruit or fruit peel	1* (v) **s** 1* (v) 4 (v)

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MALVACEAE								
Eriotheca discolor (Kunth) A. Robyns (MM39)	*Pate*	Native	Tree	Dry forest	Bark Subterr. Part	Topical Oral	Intestinal fever: enema of grinded *Pate* bark, *Sauce* leaves, *Manzanilla*, *Perlilla*, boil for 5 minutes, half a cup with 1 spoonful of oil, and 1 of soap, warm water Against thirst: to peel and eat, not too much, leads to sterility	1* (v) **s** 2* (v) **s**
Fuertesimalva sp. (MM35)	*Diego Alonso*	Native	Herb	Cloud forest	Aerial parts	Topical	Constipation: enema Skin inflammation: washings	1* (v) **s** 1* (v) **s**
Gossypium barbadense L. (MM1)	*Algodón*	Native	Shrub	Dry forest	Flowers Seeds	Oral Topical	Constipation, intestinal fever: infusion, with *Oregano* Ear: to apply cooked and grinded seeds into the ear	2* (v) **s** 1* (v)
Malva sp. 1 (MM297)	*Malva*, *Malva Blanca*		Tree	Garden	Flowers, Leaves	Oral Topical	Laxative, colic, intestinal infection: decoction or infusion, and enema (with oil) To disinfect wounds: washings	7 (m,v) 3 (m,v)
Malva sp. 2 (MM322)	*Malva*		Cree-per	Garden			See *Malva* sp. 1	
Ochroma pyramidale (Cav. ex Lam.) Urb. (MM385)	*Palo de Balsa*	Native	Tree	Dry forest	Leaves	Oral Topical	To induce labour: decoction Prostate: genital washings	1* (v) **s** 1* (v) **s**
Theobroma cacao L. (MM305)	*Cacao*	Native (Cult.)	Tree	Field	Fruits	Topical	Back pain: to rub the back with heated *Chirimoya* leaves and cacao butter Laxative: to drink infusion of *Culén* with 2 spoons of oil, the juice of half an orange, a little sugar, and rub the stomach with cacao butter	1* (v) 1* (m)
MELASTOMATACEAE								
Brachyotum sp. (MM225)	*Bulduco*	Native	Shrub	*Jalca*	Leaves	Topical	Vaginal infection: decoction for vaginal washings	1* (v) **s**
MELIACEAE								
Cedrela odorata L. (MM104)	*Cedro*	Introd.	Tree	Cloud forest	Leaves	Oral Topical	*Aire*: infusion Haematoma: decoction with *Cardón* Indigestion: infusion *Susto*: bath, with *Llollobi*, *Mutuy*, *Cedro*, *Pushmote*, *Guarauya*	1* (v) **s** 1* (v) **s** 1* (v) **s** 1* (m)
MORACEAE								
Artocarpus altilis (Parkinson) Fosberg (MM92)	*Pan de Árbol*, *Árbol del Pan*	Introd.	Tree	Field	Latex	Topical	Hernia: to apply a towel soaked with latex on the hernia, 3 times per day, after pressing the hernia down	1* (v) **s**
Ficus sp. (MM132)	*Higuerón*		Tree	Dry forest	Latex Leaves	Topical	Hernia: to apply the latex on the affected part Distortion: to apply the latex and the leaves on the affected part	1* (v) **s** 1* (v) **s**
Morus sp. (MM302)	*Morero*		Tree	Riverine forest	Latex	Topical	Tooth ache: to apply the latex on the affected tooth	3 (v)
MUSACEAE								
Musa paradisiaca L. (MM380)	*Plátano*	Introd. (Cult.)	Herb	Field	Fruits Leaves	Oral	Dysentery, gastritis, ulcers: sap of grinded fruit or decoction of peel Wounds, cicatrising: to apply some drops of liquid from leaf sheaths on the wound Gastritis, ulcers: drink the liquid with drops of *Sangre de Grado* latex, bee honey	3 (m,v) 5 (v) 6 (m,v)
MYRICACEAE								
Myrica pubescens Humb. & Bonpl. ex Willd (MM180)	*Laurél*	Native	Tree	Cloud forest	Leaves	Incense Oral	*Aire*: to burn as incense Stomach: infusion, with *Lima* Cough: infusion	2* (m) 1* (m) **s** 1* (m)

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MYRTACEAE	.							
Eucalyptus globulus Labill. (MM117)	*Eucalipto*	Introd.	Tree	Cloud forest	Leaves	Oral	Bronchia, cold, cough, flu: infusion or decoction, inhalation, bath, steam bath, cataplasm of heated leaves	64 (m,v)
						Topical *Limpia*	*Aire*: infusion, bath, *limpia*, burning as incense	16 (m,v)
						Incense	Fever: decoction for bathing or rubbing with heated leaves	5 (m)
							Bone pain, rheumatism: decoction for bathing or rubbing with heated leaves	5 (m,v)
Psidium guajava L. (MM72)	*Guayaba*	Native (Cult.)	Tree	Dry forest	Bark	Oral	Diarrhoea, dysentery, gastritis: decoction of grinded bark	5 (v)
					Leaves	Oral	Gastritis, ulcers, constipation: decoction of leaves	4 (v)
OXALIDACEAE								
Oxalis sp. 1 (MM32)	*Chulco*	Native	Herb	Cloud forest	Leaves	Oral	Fever: sap of grinded leaves with warm water and sugar	3 (m,v)
Oxalis sp. 2 (MM273)	*Chulco*	Native	Herb	*Jalca*			See *Oxalis* sp. 1	
PAPAVERACEAE								
Bocconia integrifolia Bonpl. (MM55)	*Mic Mic*	Native	Tree	Cloud forest	Fruits	Topical	Pimples: decoction for washings	2* (v) **s**
PASSIFLORACEAE								
Passiflora edulis Sims (MM10)	*Maracuyá*	Introd. (Cult.)	Vine	Field	Fruits	Oral	High blood pressure: fresh juice	3 (v)
Passiflora ligularis Juss. (MM140)	*Granadilla*	Native	Tree	Garden	Leaves	Oral	Liver: sap of squeezed leaves	5 (v)
Passiflora quadrangularis L. (MM246)	*Tumbo*	Native	Vine	Riverine forest	Leaves	Oral	Malaria: sap of squeezed leaves, 2 or 3 little glasses before breakfast, for 9 days	1* (v) **s**
					Fruits		Medicinal food	1* (v) **s**
Passiflora tripartita (Juss.) Poir. (MM334)	*Poro Poro*	Native	Vine	Garden	Leaves	Topical	Bone pain, distortion, fractures: cataplasm of heated leaves, with chicken fat, and bandage	4 (m)
PHYLLANTHACEAE								
Phyllanthus urinaria L. (MM254)	*Chanca Piedra*	Introd.	Herb	*Jalca*	Aerial parts	Oral	Kidneys, diuretic, kidney inflammation: decoction, *adt*, pure or with *Cola de Caballo*, *Pie de Perro*, *Achiote*, *Linaza* seeds	8 (m,v)
							Liver, liver inflammation: infusion or decoction, *adt*	5 (m,v)
PINACEAE								
Pinus radiata D. Don (MM347)	*Pino*	Introd.	Tree	Cloud forest	Leaves	Oral	Cough, flu, fever: infusion	6 (m)
PIPERACEAE								
Peperomia sp. 1 (MM242)	*Congona (de Temple)*	Native	Succ.	Dry forest	Flowers	Topical *Limpia*	Genital infection: genital washings	1* (v) **s**
							Aire, *antimonia*: *limpia*	1* (m) **s**
Peperomia sp. 2 (MM298)	*Congona*	Native	Succ.	Garden			See *Peperomia* sp. 1	
Peperomia sp. 3 (MM280)	*Siempreviva (de Jalca)*	Native	Succ.	*Jalca*			See *Echeveria peruviana*	
Piper aduncum L. (MM61)	*Matico*	Native	Shrub	Riverine forest	Leaves	Oral	Bronchia, cold, cough, flu: infusion or decoction, 3 times per day or as *adt*	55 (m,v)
						Topical	Wounds, skin infection: decoction for washings, and cataplasm of heated leaves	12 (m,v)
							Women's infection: decoction for vaginal washings	3 (v)

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Piper sp. 1 (MM44)	*Matico*	Native	Shrub	Cloud forest			See *Piper aduncum*	
Piper sp. 2 (MM346)	*Matico*	Native		Cloud forest			See *Piper aduncum*	
Piper sp. 3 (MM276)	*Matico*	Native	Shrub	Cloud forest			See *Piper aduncum*	
Piper sp. 4 (MM168)	*Muco Muco*, *Mucu Mucu*, *Matico de Jalca*	Native	Tree	Cloud forest	Leaves	Oral	Dysentery, diarrhoea, stomach pain: infusion	6 (m,v)
PLANTAGINACEAE								
Plantago lanceolata L. (MM19)	*Llantén*	Introd.	Herb	Road side	Leaves	Topical	(Infected) wounds, haematoma: decoction for washings, cataplasm of boiled leaves	27 (m,v)
						Oral	Kidney infection / inflammation: infusion or decoction, *adt*	8 (m,v)
							Stomach pain, stomach infection, antibiotic: infusion or decoction, *adt*	6 (v)
Plantago major L. (MM89)	*Llantén*, *Llantén Suave*	Introd.	Herb	Road side	Leaves	Topical	Vaginal infection, uterus infection: vaginal washings: to boil *Palta* seeds, add *Llantén Suave*	3 (m,v)
							Wounds, mosquito bites: to apply powder of dried leaves on the affected part	2* (v) **s**
Plantago linearis Kunth (MM409)	*Paja Blanca*	Native	Herb	*Jalca*	Leaves	Oral Topical	Vaginal discharge, vaginal infection: decoction, *adt*, with *Flor Blanca*, and vaginal washings, with *Huiso*, *Andacushma*, *Mano de Oso*	2* (m,v)
							Liver, kidneys: infusion (with *Ámaro*, *Andacushma*, *Cadillo*, *Caña Fistula*, *Carqueja*, *Agujillas*, *Cardón*, *Ron del Pastor*, *Canchalagua*)	1* (m) **s**
POACEAE								
Cymbopogon citratus (DC.) Stapf (MM307)	*Hierba Luisa*	Introd. (Cult.)	Herb	Garden	Leaves	Oral	Stomach, colic: infusion	4 (v)
							Anger, insomnia, nerves, calmative: infusion	4 (m,v)
Gynerium sagittatum (Aubl.) P. Beauv. (MM319)	*Carrizo*	Native	Herb	Field	Leaves	Topical	Bronchia, sinusitis, tonsil infection: decoction for bathing, with leaves of *Lima*, *Naranja*, *Limón*	2* (m,v) **s**
							Delay of menstruation: decoction for bathing, with *Guavo*, *Lima*, *Marco* leaves	2* (v) **s**
							Shampoo: decoction to wash the hair	3 (v)
Hordeum vulgare L. (MM397)	*Cebada*	Introd. (Cult.)	Herb	Field	Seeds	Oral	Kidney inflammation, kidneys, bladder: roasted *Cebada* grains, with decoction or infusion of *Cola de Caballo*, *Pie de Perro*, *Achiote*, *Guanábana*, *Linaza* seeds	23 (m,v)
							Liver: decoction of roasted *Cebada* grains and *Linaza* seeds	4 (m,v)
							Stomach pain: decoction of roasted *Cebada* grains and *Linaza* seeds	3 (m)
Saccharum officinarum L. (MM404)	*Caña*	Introd. (Cult.)	Herb	Field	Stem	Topical	Fever, *aire*: to rub with sugar cane spirit	3 (v)
							Flu: bath with sugar cane spirit, lemon and salt	2* (m,v)
							Too much sun: to bathe with *Lancetilla*, fresh juice of *Caña* and 3 lemons	1* (v) **s**
							Note: all application of plants as macerates / alcoholic extracts are prepared with sugar cane spirit (*aguardiente*)	
Zea mays L. (MM386)	*Choclo*	Introd.	Herb	Field	Fruits	Oral	Kidneys, diuretic, urinary detention: decoction or infusion of *Choclo* stigmatic branches, with *Cola de Caballo*, *Pie de Perro*, *Achiote*, *Pay Pay*	12 (m,v)
						Topical	Women's inflammation: decoction, to drink and for vaginal washings, with *Pie de Perro*, *Cola de Caballo*	2* (m,v) **s**

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Family / Scientific name (Voucher no.)	Local name	Orig./ Status	Habit	Habitat	Parts used	Way of admin.	Medicinal use	UR (loc.) specialist
POLYGALACEAE								
Monnina polygonoides Chodat (MM148)	*Airambo*	Native	Tree	Dry forest	Leaves	*Limpia*	*Susto*: *limpia*, with alum, then with floral perfume and heated plants: *Hierba Buena Blanca*, *Hierba Buena Negra*, *Ishpingo*, *Airambo*	2* (m) **s**
Monnina sp. (MM220)	*Tupsi Chilca*	Native	Shrub	*Jalca*	Leaves	Topical	Vaginal infection: vaginal washings	3* (m,v) **s**
POLYGONACEAE								
Rumex sp. 1 (MM315)	*Mala Hierba*		Herb	Field	Aerial, subterr. parts	Topical Oral	Fever, cleansing of the stomach, constipation: enema, with *Achicoria*, *Sauce* bark Gastritis: infusion of grinded subterr. parts, before breakfast, for 9 days	2* (v) **s** 1* (v) **s**
Rumex sp. 2 (MM377)	*Mala Hierba Blanca*, *Acelga Silvestre*		Herb	Field	Aerial parts	Oral Topical	Fever, infection: sap, before breakfast, for 3 days and rubbing front with in warm water squeezed leaves	4 (m,v)
Rumex sp. 3 (MM296)	*Riubarbo (de Huerta)*		Herb	Garden	Subterr. parts Leaves	Oral	Intestinal fever, laxative: infusion of grinded roots, with bark of *Sauce*, *Chinchin* Fever: sap of *Verbena*, *Ruibarbo* subterr. parts, *Tamarindo* seeds Liver, bile, kidney stones: decoction with *Verbena*, *Achicora*, *Corpus Huay*	3 (m) 1* (m) 1* (m)
PORTULACACEAE								
Portulaca oleracea L. (MM138)	*Verdolaga*	Native	Herb	Field	Aerial parts	Oral	Parasites: in milk, with *Paico*, *Hierba Buena* Stomach ulcers, intestinal ulcers: eaten, as salad	1* (v) **s** 1* (v) **s**
PROTEACEAE								
Oreocallis grandiflora (Lam.) R. Br. (MM118)	*Salta Perico*, *Chibito*	Native	Tree	Dry forest	Flowers	Oral	Vaginal bleeding, ovary inflammation, uterus infection: decoction with *Pay Pay*, *Flor Blanca*, *Huiso*, *Andacushma*, *Rataña* Gastritis, stomach infection: infusion	3 (m,v) 2* (m,v)
PTERIDACEAE								
Adiantum sp. (MM90)	*Culantrillo*	Native	Fern	Dry forest	Leaves	Oral	Excessive menstrual bleeding, menstrual cramps, vaginal inflammation: infusion Diabetes: sap of squeezed leaves	5 (m,v) 1* (v) **s**
Cheilanthes sp. (MM239)	*Doradilla*	Native	Fern	Dry forest	Leaves	Oral	Menstruation: infusion	1* (v) **s**
RANUNCULACEAE								
Laccopetalum giganteum (Wedd.) Ulbr. (MM405)	*Pagra Pagra*	Native (End.)	Herb	*Jalca*	Leaves	Topical Oral *Limpia*	Haematoma, fractures: cataplasm of heated leaves *Envidia*, *susto*: alcoholic extract with *Trencilla*, *Vira Vira*, *Añashquero*, *Palo Santo*, drink a sip and bathing, or *limpia*	1* (m) 2* (m) **s**
Ranunculus sp. 1 (MM200)	*Valeriana*		Herb	*Jalca*			See *Valeriana* sp. 1	
Ranunculus sp. 2 (MM403)	*Rima Rima*		Herb	*Jalca*	Aerial parts	Oral	Bronchia, cough: infusion of fresh herbs, decoction of dried herbs Against bewitchment: sap of grinded *Trencillas*, *Condor*, *Rima Rima*, *Cebada*, *Habilla*, half a glass, 2 or 3 times	1* (m) **s** 1* (m) **s**
						Topical *Limpia*	*Envidia*: alcoholic extract with *Rima Rima*, *Trencilla*, *Vira Vira*, *Añashquero*, *Palo Santo*, drink a sip and bathing, or *limpia*	1* (m) **s**
ROSACEAE								
Alchemilla sp. (MM362)	*Rataña de Jalca*		Herb	*Jalca*			See *Krameria lappacea*	
Geum peruvianum (MM399)	*Valeriana*	Native	Herb	*Jalca*			See *Valeriana* sp. 1	

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Malus domestica Baumg. (MM349)	*Manzana*	Introd. (Cult.)	Tree	Garden	Fruits	Oral	Natural tonic, to stay young, chronic anaemia: decoction: to squeeze 3 kg of grapes and 2 kg of apples, boil for 30 minutes, add 1 spoonful of pollen, take a little glass before sleeping, for 8 days	4 (v)
Polylepis incana (MM283)	*Quinoa de Jalca*	Native	Tree	*Jalca*	Seeds	Topical	Stomach infection: enema, with *Manzanilla*	1* (v) **s**
Prunus serotina subsp. *capuli* (Cav.) McVaugh (MM295)	*Capulí*	Introd. (Cult.)	Shrub	Garden	Bran-ches	Topical *Limpia* Incense	*Susto*: bath (pure or with *Hierba Mora*, *Mushurungo*, *Tomate*) or *limpia* Rheumatism, bone pain: *limpia*, with *Eucalipto*, *Ishpingo*, *Ajenco* *Aire*: to burn as incense and spread the smoke over the body	3 (m) 1* (v) **s** 1* (m)
Rosa canina L. (MM290, MM342)	*Rosa*, *Chusca*, *Las Flores*	Introd. (Cult.)	Shrub	Garden	Flowers	Oral	Anger, sorrow: infusion with *Lancetilla*, *Pimpinela*, *Apio*, *Perejil* Genital infection: infusion for genital / vaginal washings Heart: alcoholic extract, with flowers of *Lima*, *Naranja*, *Limón*, *Mandarina*	3 (m) 2* (m) **s** 1* (v) **s**
Rubus robustus C. Presl (MM116)	*Zarza Mora*, *Zarza*	Native	Shrub	Cloud forest	Flowers	Oral Topical	Bronchia, cough: infusion or decoction, in goat or cow milk, with *Sauco* flowers Wounds: infusion for washings, and apply the sap or chewed young leaves on the affected part	10 (m,v) 6 (m,v)
Sanguisorba minor Scop. (MM365)	*Pimpinela*	Introd.	Herb	Garden	Aerial parts	Oral Topical	Heart: infusion, with *Perejil*, *Toronjil*, *Claveles*, *Lancetilla*, and bathe the head Anger, head ache, pity, sorrow: infusion, with *Perejil*, *Toronjil*, *Claveles*, *Lancetilla*, and bathe the head	6 (m) 6 (m)
RUBIACEAE								
Arcytophyllum sp. (MM372)	*Canlle*, *Cangly*	Native	Herb	*Jalca*	Aerial parts	Oral	Colic, indigestion: decoction or infusion	4 (m,v)
Morinda citrifolia L. (MM247)	*Noni*	Introd.	Tree	Garden	Fruits	Oral	Cancer: juice, to mix the fruits with boiled peel of *Plátano* Stomach problems, head ache, bone pain: juice, to mix fruits with *Papaya* Weight control, to stay young: juice, to let the fruits in a bottle bank for fermentation, take 1 spoonful of the liquid every morning and night	2* (v) **s** 3* (v) 1* (v)
RUTACEAE								
Citrus aurantiifolia (Christm.) Swingle (MM379)	*Lima*	Introd. (Cult.)	Tree	Field	Flowers Fruits Leaves	Oral	Heart: infusion, *adt*, (pure or with *Naranja* or *Crisantemo* flowers) Heart, anaemia: eaten, every day, fruits of *Lima*, *Limón Dulce*, *Naranja Ácida* Heart: infusion, *adt*	3 (v) 3 (v) 1* (v)
Citrus aurantium L. (MM378)	*Naranja*	Introd. (Cult.)	Tree	Field	Flowers Fruits	Oral	Heart: infusion Bronchia, cold, flu: fresh orange juice	2* (v) 8 (m,v)
Citrus limon (L.) Osbeck (MM248)	*Limón*	Introd. (Cult.)	Tree	Field	Fruits	Oral	Bronchia, cold, cough, flu: fresh juice in hot water, with sugar cane spirit and sugar Liver: fresh juice, taken in the mornings Diarrhoea, dysentery, nausea: fresh juice of the fruit, in warm water Anaemia, high cholesterol, heart, high blood pressure: eaten, in the mornings	7 (m,v) 6 (m,v) 5 (m,v) 4 (v)
Ruta graveolens L. (MM289)	*Ruda*	Introd.	Herb	Garden	Aerial parts	*Limpia* Topical Incense Oral	*Aire*, *susto*: with *Tento*, *Eucalipto*; infusion, *limpia*, or rubbing with plants, and burning as incense Protection against *envidia*: to store a bouquet in the house Against *duende* (white female river ghost): *limpia* Colic, stomach parasites, vomiting: eaten in soup (*verde*), or alcoholic extract Menstrual cramps, delay of menstruation: infusion, with *Oregano*	18 (m,v) 5 (m) 2 (m) 5 (m,v) 3 (m)

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SALICACEAE								
Salix humboldtiana Willd. (MM318)	*Sauce*	Native	Tree	Riverine forest	Bark	Topical	Constipation, laxative: enema of grinded bark, (with *Verbena* and *Manzanilla*, or *Mala Hierba* and *Achicoria*)	3 (v)
							Fever: sap of grinded bark, with warm water	1* (v)
SANTALACEAE								
Dendrophthora sp. (MM375)	*Suelda con Suelda*	Native					See *Phoradendron* sp. 1	
Phoradendron sp. 1 (MM43)	*Suelda con Suelda*	Native	Hemi-paras. shrub	Dry forest	Whole plant	Topical	Distortion, fracture, sprain: cataplasm of heated leaves, with animal fat	11 (m,v)
						Oral	Ovary infection: decoction, for drinking and for vaginal washings	2* (m,v)
							Internal inflammation, internal wounds: decoction, *adt*	2* (m)
Phoradendron sp. 2 (MM47)	*Suelda con Suelda*	Native					See *Phoradendron* sp. 1	
Phoradendron sp. 3 (MM70)	*Suelda con Suelda*	Native					See *Phoradendron* sp. 1	
SAPINDACEAE								
Dodonaea viscosa (L.) Jacq. (MM119)	*Chamana*	Cosm.	Tree	Dry forest	Aerial parts	Topical	*Aire*: bath	1* (v) **s**
							Hardening of the bones: bath	1* (v) **s**
							To bath the hips and legs of children who urinate into the bed	1* (v)
SCROPHULARIACEAE								
Buddleja utilis Kraenzl. (MM93)	*Flor Blanca*	Native	Shrub	Dry forest	Infl.	Oral Topical	Vaginal discharge, ovary inflammation, after birth care: infusion or decoction, *adt*, vaginal washings, with *Rataña*, *Flor de Arena*, *Pay Pay*	16 (m,v)
							Kidneys, urinary tract inflammation, prostate: infusion, *adt*, with *Achiote*, *Pie de Perro*, *Cola de Caballo*, *Flor de Arena*, *Pay Pay*	11 (m,v)
Buddleja sp. (MM195)	*Quishuar*	Native	Tree	Cloud forest	Leaves	Topical	*Susto*: bath with decoction, with *Tento Azúl*, *Tento Verde*, *Tento Dulce*, *Ishpingo*, *Pushmote*, *Añashquero*, 3 times on Tuesday, Friday, Tuesday	2* (m,v) **s**
						Oral	*Aire*, *susto*: infusion, with *Tuple*	2* (m,v) **s**
SIPARUNACEAE								
Siparuna sp. (MM107)	*Pushmote*	Native	Shrub	Cloud forest	Leaves	Topical	*Susto*, *aire:* decoction for bathing (pure or with *Eucalipto*, or with *Tento Azúl*, *Tento Verde*, *Tento Dulce*, *Ishpingo*, *Añashquero*, *Quishuar Blanco*, 3 times on Tuesday, Friday, Tuesday) or burning as incense	6 (m,v)
						Incense		
SOLANACEAE								
Acnistus arborescens (L.) Schltdl. (MM128)	*Tuple*	Native	Tree	Dry forest	Leaves	Oral Topical	Diarrhoea, stomach pain: infusion, with bee honey, and *Mucu Mucu*, *Coca*, and cataplasm of heated leaves, with oil	5 (v)
							Aire, *susto*: infusion (with *Quishuar*), rubbing, or *limpia*	4 (v)
Brugmansia sanguinea (Ruiz & Pav.) D. Don (MM115)	*Floripondio*, *Campanilla* (*de Bruja* / *Roja*)	Native	Tree	Cloud forest	Bark Leaves Flowers	Topical	Cicatrising, distortion: to grind, heat, and apply on the affected part	1* (m)
							Wounds: decoction for washing, with *Paico*, *Verbena*	1* (v) **s**
							Magical plant: to heal or to kill	1* (v) **s**
Brugmansia suaveolens (Humb. & Bonpl. ex Willd.) Bercht. & C. Presl	*Floripondio*, *Florpondio Blanco*	Native	Tree	Dry forest	Flowers	Topical	*Aire*, *susto*: rubbing gently with the flowers in sugar cane spirit	2* (v) **s**
							To sleep: to apply the flowers under the pillow	2* (v) **s**
							Back pain: cataplasm of flowers with sugar cane spirit	1* (v) **s**

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(MM73)								
Cestrum sp. 1 (MM60)	*Hierba Santa*, *Hierba Santa Blanca*, *Hierba Santa de Temple*	Native	Shrub	Road side	Bran-ches	Topical	Fever: to squeeze the leaves until foam develops, for bathing with hot water, add sugar cane spirit, salt, and lemon	14 (m,v)
						Oral	Stomach infection, gases, dysentery: sap of squeezed leaves, with warm water	9 (m,v)
							Bronchia, cold: decoction for bathing, with lemon drops, *Eucalipto*, *Callemanzana*	5 (m,v)
							Head ache, calmative: sap, with warm water, to bathe the head	3 (m,v)
							Liver: sap of squeezed leaves, with lemon drops	3 (m,v)
						Limpia	*Susto*: *limpia*	1* (v) **s**
Cestrum sp. 2 (MM181)	*Hierba Santa Blanca (de Quichua)*	Native	Shrub	Cloud forest			See *Cestrum* sp. 1	
Cestrum sp. 3 (MM294)	*Hierba Santa Negra*	Native	Shrub	Cloud forest	Leaves	Topical	Swellings: decoction for drinking and washing	2* (m,v)
						Oral	Stomach inflammation, stomach pain: sap, with warm water and lemon	2* (m,v)
							Fever: to drink sap and bathe with squeezed leaves in hot water	2* (m)
Datura stramonium L. (MM9)	*Chamico*, *Borrundanga*	Introd.	Shrub	Dry forest	Leaves	Topical	Facial skin infection: decoction for washing	1* (v)
					Seeds	Oral	Hallucinogen, aphrodisiac	1* (v)
							Hypochondria	1* (v)
Iochroma sp. (MM337)	*Chinchin*	Native	Shrub	Garden	Leaves	Oral	*Aire*, *aire de muerto*, *antimonia:* infusion, rubbing (with *Romero*, *Ruda*), *limpia*	9 (m)
						Limpia	(with *Tento*, *Ruda*, *Hierba Mora*, *Eucalipto*, *Paico de Muerto*, alum, agua florida)	
Jaltomata sinuosa (Miers) Mione (MM340)	*Mushurungo*	Native	Shrub	Garden	Leaves	Topical	*Susto*: decoction for bathing and *limpia*, (both with *Capulí*, *Hierba Mora*, *Tomate*)	2* (m)
						Oral	Diarrhoea: infusion	1* (m)
Jaltomata sp. (MM169)	*Angosacha*	Native	Herb	Cloud forest	Aerial parts	Oral	Infection: infusion with *Sauco*, *Choclo* stigmatic branches, *Pie de Perro*	1* (m) **s**
						Topical	Vaginal infection, ovary infection, stomach infection: decoction, and bathing	3* (m) **s**
							Kidney pain: decoction, *adt*, for 7 or 15 days	1* (m)
Nicotiana glutinosa L. (MM59)	*Tabacco*	Native	Herb	Dry forest	Leaves	*Limpia*	*Susto*: *limpia* with alum, 3 times, apply the alum in the fire and see the next day what caused the *susto* and burning as incense with *Coca*, *Romero Silvestre*, *Ruda*	3* (m,v) **s**
						Topical	*Aire*, *antimonia*: *limpia*	1* (m) **s**
							Worms: to sit 30 minutes over *Tabacco* smoke, kills the worms	1* (v) **s**
Nicotiana sp. (MM151)	*Tabacco de Gentil*	Native	Herb	Dry forest	Leaves	*Limpia*	*Susto*: *limpia* (with alum, then plants: *Tabacco de Gentil*, *Tuple*, *Hierba Mora*)	1* (v) **s**
							Aire: to rub	1* (v) **s**
						Topical	Wounds: decoction for washing	1* (v) **s**
Physalis peruviana L. (MM69)	*Tomatillo*, *Tomatito*	Native	Herb	Riverine forest	Subterr. parts	Oral	Anger, head ache: sap of grinded subterr. parts of *Tomatillo* and *Perejil*, with *Llantén* leaves and warm water	4 (v) **s**
Solanum albidum Dunal (MM145)	*San Pablo*	Native	Tree	Cloud forest	Leaves	Topical	Arthritis, distortion, fracture: decoction for bathing, cataplasm of heated leaves	3 (v)
Solanum americanum Mill. (MM357)	*Hierba Mora (de Jalca)*	Native	Shrub	Garden	Fruits	Topical	Congestion, flu: to apply the squeezed fruits into the nares and inhale,	5 (m)
							and use for bathing with *Callemanzana*, with sugar cane spirit and hot urines	4 (m)
					Leaves		Fever: to bathe (with *Hierba Santa*, *Eucalipto*, *Callemanzana*)	4 (m)
							Head ache: infusion for bathing the head	2* (m)

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						Limpia	*Aire*: *limpia* with heated plants, with *Ruda, Chinchin, Eucalipto*	1* (m)
							Susto: *limpia* with *Capulí, Mushurungo, Tomate*	1* (m)
Solanum betaceum Cav. (MM402)	*Berenjena*	Native	Tree	Field	Fruits	Topical	Back pain, kidney pain: to rub the back with heated fruit halves	3 (m,v)
							Cough: sap	1* (v)
							High cholesterol: sap	1* (v) **s**
Solanum lycopersicum L. (MM316)	*Tomate*	Native	Vine	Field	Leaves	Topical	*Susto:* to bathe with *Capulí, Hierba Mora, Mushurungo*	1* (m)
Solanum nigrum L. (MM68)	*Hierba Mora (de Temple)*	Introd.	Shrub	Riverine forest	Leaves	Topical	Fever: sap for bathing, with hot water, lemon drops, *Mala Hierba, Hierba Santa,* and rub stomach and forehead	3 (v)
					Flowers Fruits		Bronchia: bathing with *Lancetilla, Hierba Santa, Mala Hierba, Carrizo,* salt, sugar cane spirit	1* (v) **s**
						Oral	Anger: decoction of fruits and flowers, with sugar cane spirit	1* (v)
							Congestion, flu: to apply the squeezed fruits into the nares and inhale	1* (v)
							Head ache: to apply grinded fruits with sugar cane spirit, salt, and wheat flour on the forehead	1* (v)
Solanum tuberosum L. (MM407)	*Papa*	Native (Cult.)	Herb	Field	Subterr. parts	Oral	Gastritis, ulcers, stomach infection: sap of peel or entire tuber	9 (m,v)
							Kidneys: decoction of peel, *adt*, with roasted *Cebada* grains, *Pie de Perro, Cola de Caballo, Achiote, Añashquero, Linaza* seeds	4 (m,v)
							Liver: sap of squeezed tuber	3 (v)
							Stomach parasites: eaten in soup (*verde*) with *Paico*	2* (v) **s**
Solanum tuberosum L. (MM410)	*Papa Blanca*	Native (Cult.)	Herb	Field	Subterr. parts	Oral Topical	Kidney stones: decoction of peel, *adt*, with roasted *Cebada* grains, *Pie de Perro, Cola de Caballo, Linaza* seeds	1* (m)
							Vaginal discharge: decoction of peel, *adt*, with *Pie de Perro, Cola de Caballo, Linaza* seeds	1* (m) **s**
URTICACEAE								
Urtica urens L. (MM411)	*Ishanga, Ortiga*	Introd.	Herb	Cloud forest	Leaves	Topical	Haematoma, wounds: cataplasm of grinded leaves	6 (m,v)
						Oral	Arthritis, rheumatism: to rub with the leaves and drink sap	3 (m)
							Bronchia, cough, flu: infusion	5 (m)
Urtica sp. (MM382)	*Ishanga Negra*	Native	Herb	*Jalca*	Aerial parts	Topical	Haematoma: cataplasm of grinded plant	2* (m)
						Oral	Rheumatism, arthritis: to beat with the plant	2* (v)
							Haematoma: sap	1* (v) **s**
							Bronchia, cough, lungs: decoction or infusion or sap	4 (m,v)
VALERIANACEAE								
Valeriana sp. 1 (MM213)	*Valeriana*	Native	Herb	*Jalca*	Subterr. parts	Oral	Insomnia, head ache, nerves: decoction or infusion of grinded subterr. parts	23 (m,v)
Valeriana sp. 2 (MM257)	*Valeriana*	Native	Herb	*Jalca*			See *Valeriana* sp. 1	
VERBENACEAE								
Aloysia triphylla Royle (MM299)	*Cedrón*	Native (Cult.)	Tree	Garden	Leaves	Oral	Colic, stomach: infusion	2* (m)
							Liver: infusion	1* (v)
							Sorrow: infusion	1* (v) **s**

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Lantana sp. 1 (MM41)	*Limoncillo*	Native	Shrub	Dry forest	Bran-ches	Oral	Colic, stomach: infusion or decoction	2* (m,v) **s**
							Belly inflammation: infusion, with *Bolsilla*	1* (m)
Lantana sp. 2 (MM30)	*Casca Rosa*	Native	Herb	Dry forest	Bran-ches	Oral	Uterus infection, vaginal discharge: decoction, with bee honey	3 (v)
Verbena litoralis Kunth (MM353)	*Verbena*	Native	Herb	Road side			See *Verbena officinalis*	
Verbena officinalis L. (MM13)	*Verbena*	Introd.	Herb	Garden	Aerial parts	Oral	Fever: sap, (also with grinded *Riubarbo* subterr. parts, *Tamarindo* fruits) and decoction with salt for rubbing front, arms and legs, and enema (with *Achicoria*, grinded *Tamarindo* fruits)	12 (m,v)
						Topical	Wounds, skin infections, herpes: decoction for washing, and cataplasm	10 (m,v)
							Intestinal fever, laxative, stomach pain, cholera: sap or infusion, and enema	9 (m,v)
							Liver: sap	6 (m,v)
							Cold, flu, pulmonary infection: decoction for bathing, with *Hierba Santa*, *Hierba Mora*, *Marcos*, or with *Eucalipto*, salt, lemon, and sugar cane spirit	4 (m,v)
							Kidneys: decoction with *Achicoria*, *Corpus Huay*, *Riubarbo*, or with *Llantén*	3 (m,v)
VITACEAE								
Cissus sp. (MM75)	*Tullimauri*, *Tullimaure*, *Víbora*, *Víboraure*	Native	Liana	Dry forest	Leaves Stems	Topical	Fracture, distortion: cataplasm of heated leaves after mending the bones, bandage	3 (v)
							Big wounds, regeneration of tissue: cataplasm of grinded, inner part of woody liana	2* (v)
XANTHORRHOEA-CEAE								
Aloe vera (L.) Burm. f. (MM95)	*Penca Sábila*	Introd.	Succ.	Dry forest	Leaves	Oral	Gastritis, stomach, ulcers: to let the leaves in water over night to get rid of the iodine and extract the gel (for all preparations), and prepare juice with *Papaya* or bee honey, for 15 or 30 days or continuously	16 (m,v)
							Liver: gel for preparation of juice, with *Papaya*, take 15 days or continuously	8 (m,v)
							A lot of diseases, everything: gel for preparation of juice, with bee honey	7 (m,v)
							Blood purification, varicose: to drink the gel with warm water and bee honey	3 (v)
							Cancer, stomach cancer, cancer prevention: to drink the gel as juice, with bee honey, for 6 months or continuously	3 (v)
						Topical	Kidneys: gel for preparation of juice, with fruits or bee honey, and cataplasm of gel	9 (m,v)
							Haematoma, pimples, wounds, to refine the skin: to apply the gel on the affected part	7 (m,v)
							Vaginal infection: to apply the gel into the vagina, in form of ovules, for 7 nights	3 (m,v)
							Contraceptive: to apply the gel into the vagina, in form of ovules, 15 minutes before sexual intercourse, from day 10 to day 16 after the first day of menstruation	1* (v) **s**
ZINGIBERACEAE								
Zingiber officinale Roscoe (MM306)	*Jinjibre*	Introd.	Herb	Garden	Subterr. parts	Topical	Oil for good skin	1* (v) **s**

Table 1. Medicinal plants used in Uchumarca and Pusac / San Vicente de Paúl, La Libertad (Peru).

Family / Scientific name (Voucher no.)	Local name	Orig./ Status	Habit	Habitat	Parts used	Way of admin.	Medicinal use	UR (loc.) specialist
UNKNOWN BOTANICAL FAMILY								
N.d. (MM102)	*Zarza Parilla*		Liana	Cloud forest	Leaves	Topical Oral	Blood purification, disinfectant, herpes, skin diseases: decoction for bathing Blood purification, circulation: infusion	2* (v) **s** 2* (v) **s**
N.d. (MM105)	*Cascarilla*		Tree	Cloud forest	Bark	Oral *Limpia*	Blood: infusion, with *Canchalagua*, *Ámaro* Cold: *limpia*, with camphor, macerate of *Ajo*, *Ruda*, *Cascarilla*, *Chuchuhuasi*, *Sangre de Grado*, *Ishpingo* seeds	1* (m) **s** 1* (m)
N.d. (MM176)	*Miski Chilca*		Shrub	Cloud forest	Flowers Leaves	Oral Topical	Heart: taken as capsules To forget heart ache: chewing the leaves	1* (v) **s** 1* (m) **s**
N.d. (MM193)	*Chillibes*		Herb	Cloud forest	Aerial parts	Topical	Skin infection: to rub with grinded leaves and sugar cane spirit Wounds: decoction for washings	1* (m) **s** 1* (m) **s**
N.d. (MM198)	*Hierba de Oso*		Li-chen	*Jalca*	Whole plant	Oral	Fear: infusion	1* (v) **s**
N.d. (MM199)	*Poña*		Li-chen	*Jalca*	Whole plant	Oral	Memory: infusion	1* (v) **s**
N.d. (MM251)	*Asma Chilca*		Herb	*Jalca*	Aerial parts	Oral	To give birth (painkiller), belly infection: infusion Bronchia, cough, sore throat: infusion Distortion: cataplasm of heated plant	2* (m) **s** 3* (m) **s** 2* (m) **s**
N.d. (MM291)	*Hierba Buena Negra*		Herb	Garden	Aerial parts	Oral	Colic, stomach parasites: eaten, as soup (*verde*) with *Paico*, *Tento*, *Ruda*, or in milk or infusion	4 (m,v)
N.d. (MM374)	*Riubarbo (de Jalca)*		Herb	*Jalca*			See *Rumex* sp. 3	

N.d.: not determined; orig.: origin; cosm.: cosmopolitan; cult.: cultivated; end.: endemic; introd.: introduced; hemi-paras.: hemi-parasitic; succ.: succulent; infl.: inflorescences; subterr.: subterrestrial; *adt*: *agua de tiempo* (drunken every time one is thirsty); UR: use reports; loc.: research locality; (m): cited in the mountains; (v): cited in the valley; (m,v): cited in both localities; *: cited by less than 3 informants; **s**: cited by specialist(s).

Figure 9: Selected plants from the *temple* ecological zone, scientific and local names:

A) *Jatropha* sp. (masculine flower) / *Chinita Sacha*, *Cholito Sacha* (Euphorbiaceae)

B) *Brugmansia suaveolens* / *Floripondio* (Solanaceae, cultivated)

C) *Eriotheca* sp. (Malvaceae)

D) *Krameria lappacea* / *Rataña* (Krameriaceae)

E) *Dalea* sp. / *Mishquina* (Fabaceae)

F) *Nicotiana* sp. / *Tabacco* (Solanaceae)

G) *Passiflora edulis* / *Maracuyá* (Passifloraceae, cultivated)

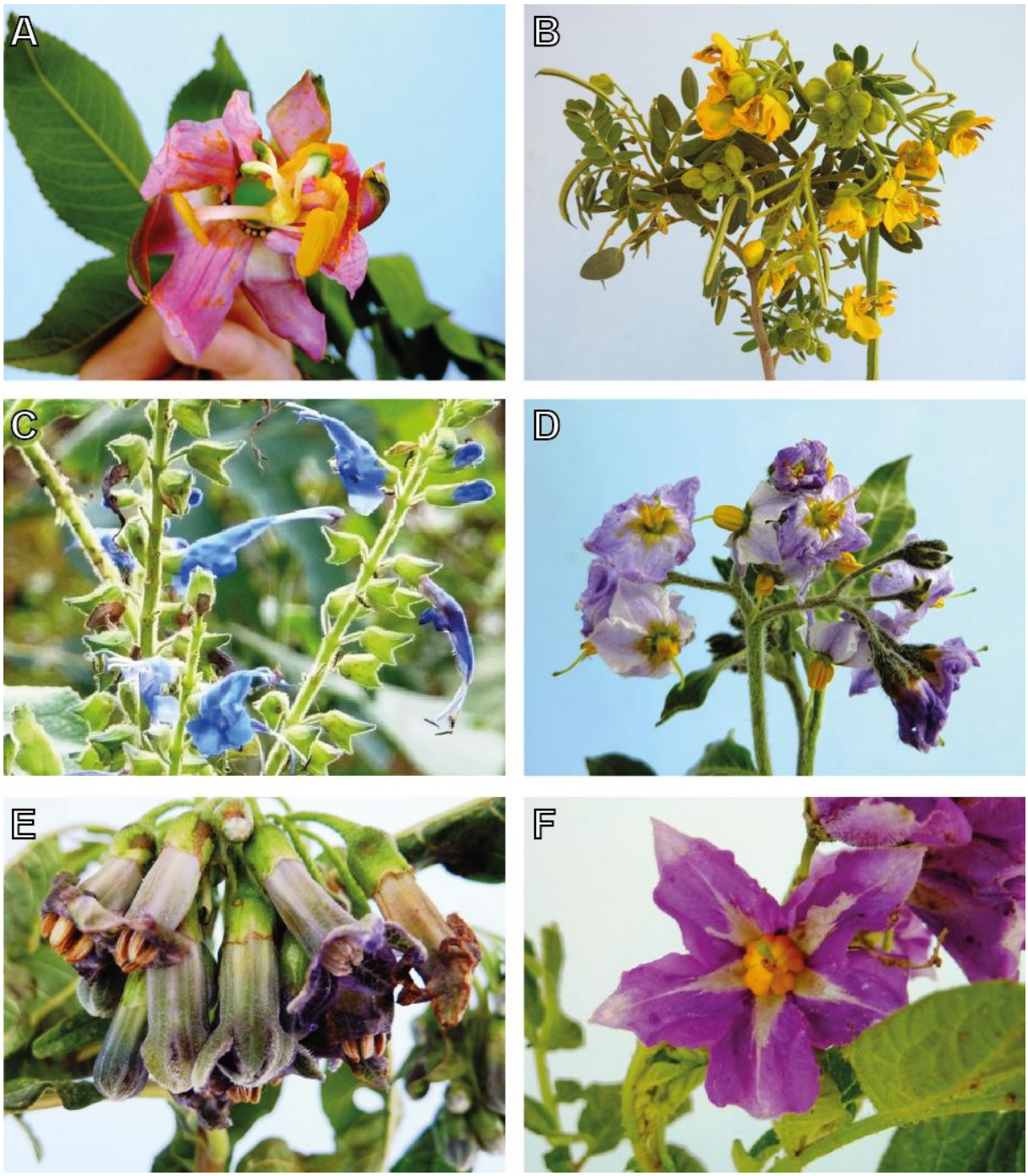

Figure 10: Selected plants from the *quichua* ecological zone, scientific and local names:

A) *Passiflora tripartita* / *Poro Poro* (Passifloraceae, cultivated)

B) *Senna* sp. / *Mutuy* (Fabaceae, cultivated)

C) *Salvia macrophylla* / *Salvia* (Lamiaceae)

D) *Solanum americanum* / *Hierba Mora* (Solanaceae)

E) *Iochroma* sp. / *Chinchin* (Solanaceae, cultivated)

F) *Solanum tuberosum* / *Papa* (Solanaceae, cultivated)

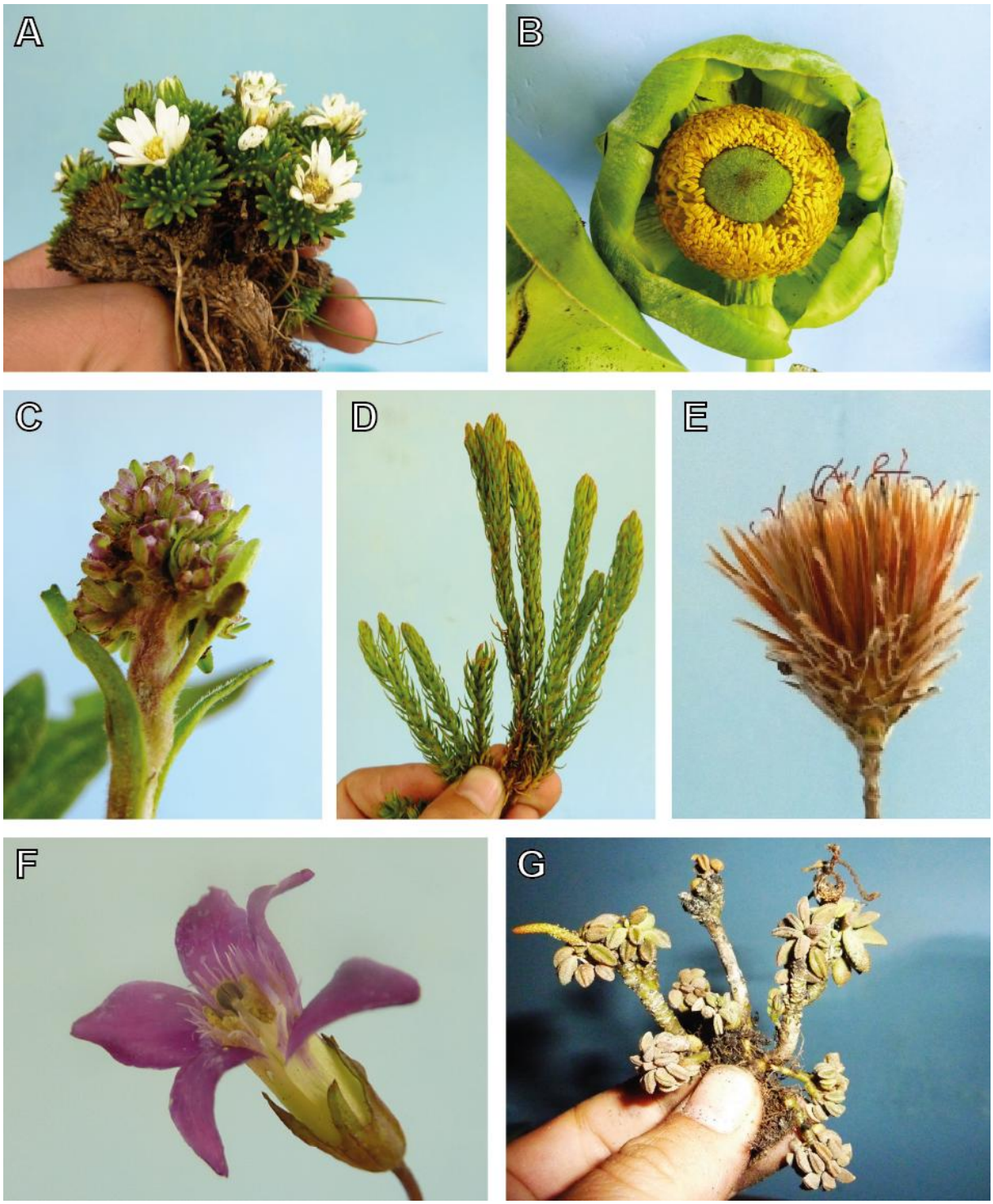

Figure 11: Selected plants from the *jalca* ecological zone, scientific and local names:

A) *Xenophyllum humile* / *Hierba del Bien y del Mal* (Asteraceae)

B) *Laccopetalum giganteum* / *Pagra Pagra* (Ranunculaceae)

C) *Valeriana* sp. / *Valeriana* (Valerianaceae)

D) *Huperzia* sp. / *Trencilla* (Lycopodiaceae)

E) *Chuquiraga jussieui* / *Ámaro* (Asteraceae)

F) *Gentianella* sp. / *Corpus Huay* (Gentianaceae)

G) *Peperomia* sp. / *Siempreviva* (Piperaceae)

Disease categories and use reports

In total, 3035 plant remedy use reports for 279 medicinal plant species were recorded: 1346 use reports for 188 medicinal plants in the mountainous town Uchumarca, and 1689 use reports for 226 species in the valley villages Pusac and San Vicente de Paúl.

The use reports were grouped into twelve categories of organ- and symptom-defined medicinal uses (disease categories), basically following Leonti's arrangement (Leonti et al., 2010). The classification is mainly based on the body parts affected by the respective ailment, with the exception of some systemic conditions such as the category "fever", and the commonly cited general infections and inflammations, which were classified as "multisystem diseases". Ailments which were said to be caused by witchcraft or malice of other persons were summarized in the category "others", as in these cases, the affected organs and symptoms were elusive and related healing rituals aimed to defang the causes. Ailments with a small number of citations (i.e. less than 40), such as cancer, ophthalmological complaints, and diabetes, were also summarized in the category of other uses. (For a detailed overview of the categories and the assigned diseases see Appendix 2.)

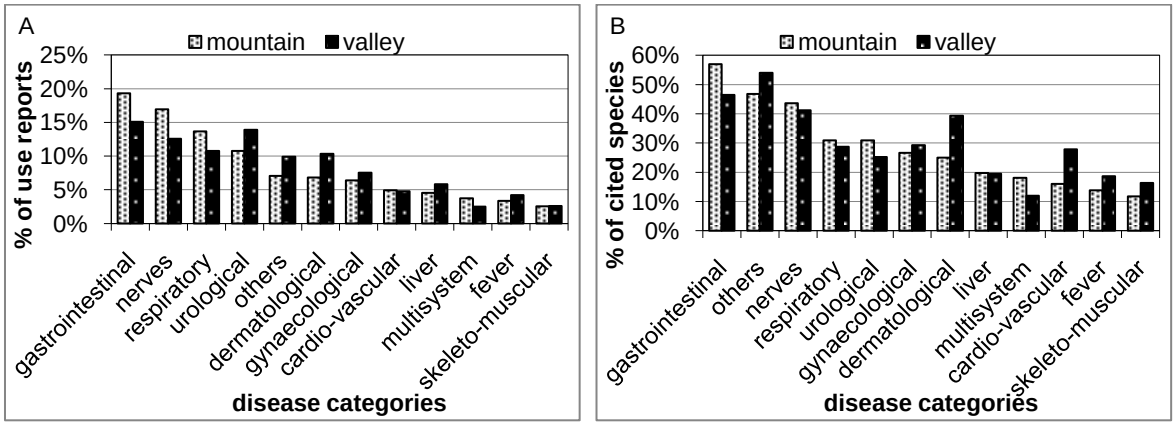

Figure 12: Percent of use reports per disease category (A) and percent of plant species per disease category (B) for the two localities (most plants have multiple uses).

Figure 12 shows the percentage of use reports per medicinal use category, as well as the percentage of plant species used in each category for the two localities. The categories with the most use reports in the mountainous locality were gastrointestinal diseases (19%, 266 use reports), nerves (17%, 228), respiratory diseases (14%, 184), and urological diseases (11%, 145). Also in the valley, these were the most frequently mentioned disease categories, with gastrointestinal diseases (15%, 257), followed by urological diseases (14%, 235), nerves (13%, 212), respiratory diseases (11%, 182), and dermatological diseases (10%, 175). In the mountains, these categories also contained the highest percentage of medicinal plant species (apart from the very diverse category "others", which contains a broad variety of plants: 88 species). In the valley, the most conspicuous difference concerned the category of dermatological diseases, for which a remarkable broad range of plants was mentioned. About 40% of all plant species cited in the valley were used for dermatological ailments, and the number of use reports (10%, 175) was considerably higher than in the mountains (7%, 92). This may reflect the higher exposure to insects such as mosquitoes, and the higher risk of wounds to get infected

by parasites in the lower and warmer area. Other ethnobotanical studies also revealed high occurrence of dermatological problems and related plant uses in tropical (Frei et al., 1998; Leonti et al., 2003b) and Andean regions (Roersch, 1994).

Routes of administration

Ways of administration for medicinal plants are depicted in Figure 13. Medicinal plants were administered orally or topically, used in *limpia* rituals, burned as incense or used for preparation of *seguros* (herbal amulets in form of a flask containing magical plants and floral perfume or sugar cane spirit).

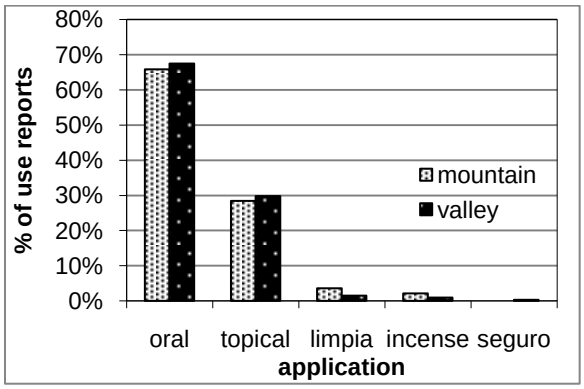

Figure 13: Application methods for medicinal plants.

In two thirds of all cases, the plants were administered orally, as infusions or decoctions, or, less frequently, as sap, sometimes with water. Around 30% of plant remedies were administered topically, in form of cataplasms or rubbing the affected body part with leaves or shoots of plants. *Limpia* rituals were conducted in 4% of all cases in the mountains and 2% in the valley. *Seguros* were mentioned in 0.3% of use reports in the valley (5 use reports). This pattern is similar to findings from Bussmann and Sharon (2006), with the difference that they reported oral administration mainly in form of decoction, whereas in the present work the main oral route of administration was infusion. In the study area, people often mentioned the belief that boiling a plant eliminates its curative properties. Fresh plant material was used whenever possible; however, dried plant material could be used instead during the dry season. But in this case, the dried plant material had to be boiled to extract its healing properties. The preferences for preparing fresh plant material as infusions correspond to the results of previous work in similar regions (Roersch, 1994; Hammond et al., 1998; De-La-Cruz et al., 2007).

Most often mentioned species

Remarkable differences between the two localities were found regarding the number of use reports of the most often cited ethnospecies (see Figure 14). The term “ethnospecies” is used to refer to local people’s perception of a plant species, which may be different from a botanical species. The local classification system may differ from botanical taxonomy in so far, as a locally recognized species may cover several botanical species or one botanical species may be locally recognized as several species. The former case was found more frequently in this study. However, in the majority of cases the ethnospecies coincides with the botanical species. Where it does not, an ethnospecies may include

closely related species; for example, the ethnospecies *Cola de Caballo* refers to *Equisetum bogotense* and *Equisetum giganteum*. Or, an ethnospecies may include distant species from different families, as in the case of *Valeriana*. Collection trips with different informants yielded five species which were recognized as *Valeriana*, two of them actually belonging to the genus *Valeriana* (Valerianaceae), one *Ranunculus* species (Ranunculaceae), one *Lasiocephalus* species (Asteraceae) and *Geum peruvianum* (Rosaceae). However, there is an important difference between the two ethnospecies *Cola de Caballo* and *Valeriana*: in case of the former, it is accepted among the population that there are two varieties of the plant which can be used interchangeably; whereas for the latter, there was disagreement about the identity of the different plants, with different people considering one or several different species as *Valeriana*, and the others not. Especially, there was a tendency of informants to either classify *Geum peruvianum* and the similarly looking *Ranunculus* sp. as *Valeriana*, or the two botanical *Valeriana* species. However, the disagreement regarding the ethnospecies Valeriana was an exception, and in most other cases people agreed about the botanical species described with a specific local name.

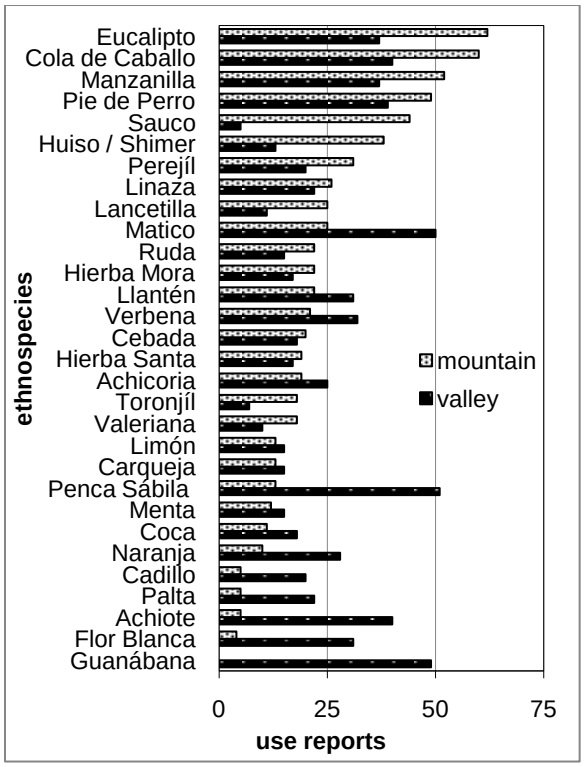

Figure 14: Most frequently cited ethnospecies in the two localities.
Eucalipto: *Eucalyptus globulus*; Cola de Caballo: *Equisetum bogotense* and *E. giganteum*; Manzanilla: *Matricaria recutita*; Pie de Perro: *Desmodium molliculum*; Sauco: *Sambucus nigra* subsp. *peruviana*; Huiso / Shimer: *Mauria heterophylla*; Perejil: *Petroselinum crispum*; Linaza: *Linum usitatissimum*; Lancetilla: *Alternanthera porrigens*; Matico: *Piper* spp. (among them *P. aduncum*); Ruda: *Ruta graveolens*; Hierba Mora: *Solanum americanum* and *S. nigrum*; Llantén: *Plantago lanceolata* and *P. major*; Verbena: *Verbena officinalis* and *V. litoralis*; Cebada: *Hordeum vulgare*; Hierba Santa: *Cestrum* spp.; Achicoria: *Taraxacum officinale*; Toronjil: *Melissa officinalis*; Valeriana: *Geum peruvianum*, *Lasiocephalum* sp., *Ranunculus* sp. and *Valeriana* spp.; Limón: *Citrus limon*; Carqueja: *Baccharis genistelloides*; Penca Sábila: *Aloe vera*; Menta: *Mentha spicata*; Coca: *Erythroxylum coca*; Naranja: *Citrus aurantium*; Cadillo: *Bidens pilosa*; Palta: *Persea americana*; Achiote: *Bixa orellana*; Flor Blanca: *Buddleja utilis*; Guanábana: *Annona muricata*.

In many cases, the differences in number of use reports of the most often mentioned ethnospecies between the two localities can be explained by different occurrences and availabilities of the species concerned. For example, *Sauco* grows in mountainous regions (Brako and Zarucchi, 1993), and is commonly cultivated in the town of Uchumarca, whereas it does not occur in the valley. Accordingly, it was predominantly used in the mountains. Although *Huiso* / *Shimer* has been found in lower altitudes (Brako and Zarucchi, 1993), it occurred mainly in higher regions in the study area, and it was used far more often there. Species which grow only in the valley include *Penca Sábila*, *Naranja*, *Palta*, *Achiote*, *Flor Blanca*, and *Guanábana*. Accordingly, they were predominantly used in the valley. Others were used in both localities, even though they occur only in the mountains, such as *Pie*

de Perro, Toronjil, Perejil, Linaza, and *Cebada*. This is explained by the commerce that exists between the localities, products from the mountains are sold on markets in the valley and vice versa. This is the case for the cultivated herbs *Toronjil* and *Perejil*, for *Linaza* seeds and *Cebada* grains, and the wild species *Pie de Perro,* which was among the most frequently used medicinal plants, so its popularity provides an incentive for collecting it in the wild and selling it on the valley market.

Even though they occur in both localities, *Eucalipto* and *Matico* show clear differences between the localities regarding the number of use reports. Whereas *Eucalipto* does occur in both localities, it is far more frequent in the mountains, where it has been broadly cultivated for commercial purposes. The good availability may partly explain the number of use reports. *Eucalipto* was reported to be used primarily for respiratory diseases and further for conditions belonging to the nervous system, such as *aire*. As *aire* is more common in the mountains than the valley, this contributes to the higher use frequency of *Eucalipto* there as well. Regarding the ethnospecies *Matico*, some of the *Piper* species to which it refers, such as *Piper aduncum*, show wider distribution in the valley. *Matico* was primarily cited to be used against respiratory diseases, and in the valley was the most often cited of all ethnospecies against respiratory diseases, before the less widespread *Eucalipto*. It was also cited frequently for dermatology, namely to disinfect wounds, a purpose for which Huiso / Shimer predominantly was cited in the higher region. In the mountains, the number of use reports of *Matico* against respiratory diseases may have been further diminished by the common citations of the widespread *Sauco* against these conditions. Apparently, according to the availability of plant species, populations from different localities developed preferences for the use of certain ethnospecies for certain diseases, such as *Eucalipto* against respiratory diseases in the mountains, and *Matico* in the valley. Generally, it seems that versatile and easy accessible medicinal plants are preferentially used.

The most often mentioned plants were the ethnospecies *Cola de Caballo* (100 use reports), *Eucalipto* (99), *Manzanilla* (89) and *Pie de Perro* (88), followed by *Matico* (75) and *Penca Sábila* (64). Pharmacological data suggests a rationale for the use of *Cola de Caballo* against urological diseases (Rodriguez et al., 1994; Wright et al., 2007), for *Eucalipto* against respiratory diseases (Hänsel and Sticher, 2007:1105), and for *Manzanilla* against gastrointestinal diseases (Hänsel and Sticher 2007:1086). Although more controversial, there is data supporting a rationale of the use of *Penca Sábila* against gastrointestinal diseases (Yusuf et al., 2004; Yusuf et al., 2006). The use of *Pie de Perro* as anti-inflammatory agent is supported by positive results in Peruvian complementary medicine (Joo, 2011). *Matico* refers to different *Piper* species and was predominantly used against respiratory diseases; the genus has been shown to possess anti-tuberculosis and anti-asthmatic activity (Wahyuono et al., 2001; Mohamad et al., 2011). Thus, the most frequently used species are likely to be effective in treating the diseases they are used for. Remarkably, three of the six most often used ethnospecies have been introduced to the Andes, namely *Eucalipto (Eucalyptus globulus), Manzanilla (Matricaria recutita)* and *Penca Sábila (Aloe vera)*. Whereas *Eucalipto* was introduced for timber production, *Penca Sábila* and *Manzanilla* assumingly were introduced for their medicinal properties.

Detailed discussion of the most often mentioned diseases and their treatment with medicinal plants

In the following, the most often mentioned diseases and the administered medicinal plants are discussed in detail, ordered according to the disease categories. Based on literature review, information on the potential pharmacological activity of the most important medicinal plants is provided.

Gastrointestinal diseases – In the mountains as well as in the valley, most use reports were recorded for diseases of the gastrointestinal tract. Gastrointestinal diseases included stomach pain and colic, gastritis, indigestion, constipation, diarrhea, parasites, dysentery, stomach infection and inflammation and, less frequently, nausea, vomiting and ulcers. Frequently cited uses also included laxatives, purgatives, or cleansing of the stomach (see also Appendix 2.A). In the mountains, stomach pain and colic, frequently told to be caused by the cold temperatures, were by far the most often cited complaints; whereas in the valley, constipation and parasites were cited with a higher relative frequency. The latter may indicate a higher prevalence of parasites in the valley, where higher temperatures provide a more favorable environment.

Generally, gastrointestinal diseases caused by bacterial, viral, or parasitic infections are widespread throughout the developing world, and are often transmitted via contaminated food or water. They globally account for 2.2 million deaths each year (World Health Organization, 2011). In Peru, diarrhea is one of the major causes of morbidity, and affects primarily children in situations of poverty (Peruvian Health Ministery, 2011). Other ethnobotanical studies in Central and South America also reported high uses of medicinal plants against gastrointestinal diseases (Roersch, 1994; Frei et al., 1998; Hammond et al., 1998; Bennett and Prance, 2000; Macia et al., 2005; De-La-Cruz et al., 2007).

Of the 136 plant species used for gastrointestinal complaints, chamomile, *Matricaria recutita* (Asteraceae) was by far the most frequently mentioned species (46 use reports). Its antiphlogistic, spasmolytic, antibacterial and antifungal effects have been experimentally proved (Hänsel and Sticher 2007:1086). Another frequently cited plant species was *Aloe vera* (Xanthorrhoeaceae) with 16 use reports. This widely used plant has been shown to possess gastroprotective effects and suppresses secretion of gastric acid (Yusuf et al., 2004; Yusuf et al., 2006). Among the Lamiaceae *Mentha spicata* and *Minthostachys mollis* were often mentioned (15 use reports each). Both genera contain essential oils such as menthone, pulegone, and carvone. Essential oils often have antibacterial, antiviral and antispasmodic properties and activate secretion of gastric juice, so they are employed as carminatives, stomachics and cholagogues, amongst others (Hänsel and Sticher, 2007:1043).The most often cited Fabaceae was *Otholobium pubescens* with 15 use reports. The genus has been shown to exert antioxidant (Guo et al., 2005), liverprotective (Cho et al., 2001), anti-inflammatory (Backhouse et al., 2001) and antimicrobial effects (Newton et al., 2002). Another often cited Asteraceae was *Artemisia absinthium* (14 use reports). It stimulates gastric and biliary secretion (Hänsel and Sticher, 2007:872).

The majority of plants used for gastrointestinal problems were applied orally; mostly as infusions (41% of total use reports), or decoctions (19%). Few of them were taken as sap, eaten in a soup, or added to boiled milk. Topical applications (12%) included enemas and cataplasms.

Nerves – The disease category nerves was cited second and third most frequently in the mountains and the valley, respectively. The high frequency of citations in this category compared to other studies is due to the classification model of the present work. Namely, we included ailments to this category which have been classified elsewhere as culture bound syndromes (Frei et al., 1998; Leonti et al., 2003a) or magical / ritual ailments (Bussmann and Sharon, 2006). This was done to keep consistency in classification, that is, to follow the organ- and symptom-based classification of medicinal uses. The two most frequently cited of these conditions, *aire / malaire* (wind / evil wind) and *susto* (fright), clearly led to symptoms which affected the nervous system (e.g. head ache, insomnia). It was thus not considered as useful to insert an additional category of culture bound syndromes.

Frequent citations in the category nerves beside *aire* / *malaire*, and *susto*, included head ache, anger, nervousness, sorrow and worries, tooth ache, insomnia, *antimonia* (deathly air from the earth's interior) and *aire de muerto* (wind from the dead; App.2.B).

The most striking differences between the two localities pertained to the conditions *aire* / *malaire*, *antimonia*, and *aire de muerto*, which were far more common in the upper location Uchumarca. They accounted together for 83 use reports, whereas in Pusac and San Vicente in the valley, only *aire / malaire* were cited, 53 times. The distinction between *aire / malaire* and *aire de muerto* was not clearly defined. *Aire* and *malaire* refer to bad or evil wind, which comes from the mountains and catches people mostly in the early morning or at night time, and causes head ache, and sometimes dizziness, fainting, ear pain, nausea, or vomiting. *Aire de muerto* also refers to wind which comes from the mountains, but more precisely from the Chachapoya tombs[1] and which can cause the same symptoms as normal *aire*. *Antimonia* is venomous air which leaves its cage inside the earth when people dug holes to extract bones, tomb treasures or metals. This air catches the person and attacks the nervous system, leading to craziness and dead. The high frequency and differentiation of these conditions in the mountainous town of Uchumarca may be due to the proximity to the mountain summits and tombs where the mummies have been found, and of biting cold winds, as compared to the valley bottom villages with their rather hot climate. *Aire* / *malaire* are predominantly treated with *limpias* and infusions.

The common condition *susto* (fright) was described as loss of a person's spirit or soul; it mainly affects children and is often caused by falling asleep in a bad, ugly or "heavy" place (*lugar pesado*), with evil energy, or by passing by such a place. When a baby or child won't stop crying and does not sleep at night, it is likely that his or her spirit has been kept in an evil place. The diagnosis is carried out by taking the pulse. *Susto* must be cured by a healer (*curandero* / *curiosa*) who performs a *limpia*,

[1] Numerous Chachapoya cliff tombs have been discovered; about 200 mummies are stored in the Leymebamba museum. The practice of enterring the dead in cliff tombs dates back 1000 years (Church, 2006).

a cleansing ritual using the mineral salt alum (*alumbre*), often also a wand, made of *Chonta* wood (*vara de Chonta*; *Bactris* spp.; see Figure 15.D), sometimes newspaper, and magical, powerful, so-called living plants (*plantas vivas*), mostly prepared as macerates on base of sugar cane spirit (*aguardiente*). There are different ways to conduct a *limpia*, but in most cases the healer prays while he rubs the patient's body first with the alum crystal and then with the *Chonta* wand or the newspaper. The alum crystal is put into the fire for a while; this way it will show the place where the patient has been frightened. Finally, the healer sprays his plant macerate over the patient's body and also rubs the patient's hand, feet and front with it, while calling the patient's name three times to make his spirit return. The patient is also given a mouthful of the macerate. The plants used for *limpias* tend to come from regions high up in the mountains, mostly from *jalca* ecosystems. Plants from the mountains (*cerros*) are believed to be the most powerful plants, and collecting them requires special knowledge and can be very dangerous. The collector must leave presents for the mountain when collecting the plants; otherwise the mountain will get angry and send bad weather, and the collector risks to get lost see also Figure 15.B). Further, as *plantas vivas* are believed to be capable of relocating themselves, the collector's success in finding these plants also depends on the goodwill of the mountain in showing them.

Further frequent conditions affecting the nervous system were head ache and anger. Head ache was more often cited in the mountains, and as causes cold and wind were frequently mentioned. Interestingly, anger (*cólera*) is seen as a condition which requires curing, otherwise it may become very dangerous. As is the case for the less frequently cited sorrow (*pena*), and worry (*preocupación*), emotional states are not separated from physiological diseases, mirroring the holistic view of Andean cultures (Baumann, 1994).

A total of 110 plant species were used for the treatment of nervous system afflictions in the mountains and the valley. Among the most frequently cited plant species were *Petroselinum crispum* (Apiaceae, 25 use reports), *Ruta graveolens* (Rutaceae, 18), *Alternanthera porrigens* (Amaranthaceae, 17), *Eucalyptus globulus* (Myrtaceae, 16) and the Lamiaceae *Minthostachys mollis* (17), *Rosmarinus officinalis* (12), *Melissa officinalis* (10) and *Satureja sericea* (10). *Petroselinum crispum*, *Ruta graveolens*, *Eucalyptus globulus* and the Lamiaceae are characterized by strong aromatic scents due to high contents of essential oils. Traditionally, essential oils have been used for the treatment of conditions related to the central nervous system in many parts of the world. They have been shown to exert measurable psychological effects (Perry and Perry, 2006). Scents perform psychodynamic effects on the central nervous system by modifying the emotional state through mechanisms involving long term memory and the strong association between scent and mood (Hänsel and Sticher, 2007:464-467). These effects explain the employment of fragrant plants in this disease category, especially regarding their usage against conditions with clearly psychological components.

Another frequently mentioned plant was the ethnospecies *Valeriana* (23 use reports), which comprises five botanical species from four botanical families (two *Valeriana* spp., one *Ranunculus* sp., one

Lasiocephalus sp., and *Geum peruvianum*). However, the informants differed in which of these species they identified as *Valeriana* (see page 60). The ethnospecies *Valeriana* was used mainly for insomnia and head ache, with a predominant usage of subterrestrial plant parts. Even though the efficacy of *Valeriana officinalis* roots against insomnia remains controversial (Bent et al., 2006; Bliwise and Ansari, 2007; Hänsel and Sticher, 2007; Talbi et al., 2009; Anderson et al., 2010), the plant has been traditionally used as a sedative in Eurasia since ancient times. This tradition has apparently spread from the old to the new world, and there, has been expanded to a variety of plant species. Why the name *Valeriana* is used among the local people to name such different species remains unknown, but obviously the use of some of them may bear risks. An old woman who had been reported to have a broad knowledge on medicinal plants said that taking the decoction of *Valeriana* roots had caused her losing her memory. Although it is not known to which botanical plant species she referred or what actually caused the weakening of her memory, this citation may indicate such risks.

Plant remedies mentioned for conditions of the nervous system were applied orally in 53% of all cases, mostly as infusions (35% of total use reports). Less common were sap (8%), alcoholic extracts (4%) and decoctions (5%). In 37% of all cases, plants were applied topically, mostly for bathing (17%), rubbing (9%), or as cataplasms (4%); whereas bathing was cited with a higher frequency in the valley than in the mountains. *Limpias* account for 16% of all use reports in this category, with the majority of them reported from the mountains (49 use reports out of 64). Plants were burnt as incense in 8% of all use reports, twice as often in the mountains as in the valley. The higher frequency of *limpias* (and burning plants as incense) in the mountains was due to the higher prevalence of the *aire* / *malaire* condition, whereas bathing was more frequent in the valley, possibly due to the higher temperatures.

Respiratory diseases – Respiratory diseases were cited third and fourth most frequently in the mountains and the valley, respectively. In the year 2000, 12% of deaths in the department La Libertad were due to acute respiratory infections (Peruvian Health Ministery, 2011). Among the respiratory diseases cough was frequently mentioned, covering 25% of total use reports, and 56 citations in the mountains and 36 in the valley. This difference can be explained by the colder temperatures and harsh winds in the mountainous region. Further prevalent complaints included colds (22%), bronchitis (19%), and influenza (17%), whereby these occurred with similar frequencies in both localities (App.2.C). As causes for these diseases, people frequently denominated changes of body temperature. Such changes were told to be caused by bathing in the cold river on hot sunny days, by eating ice cream or drinking cold drinks, as well as by changes of the weather, or the season. Further, air pollution through dust from the unpaved roads was often indicated.

The most widely mentioned plant used against respiratory diseases was *Eucalyptus globulus*, with 64 use reports. It was most often cited in the mountains (35 use reports), and second most in the valley (29 use reports). The essential oil contained in its leaves has antiseptic, secretolytic and anti-

inflammatory properties, and is widely employed in inhalations and ointments for the treatment of respiratory diseases. It has further been reported to have analgesic effects against head ache (Hänsel and Sticher, 2007:1105). *Eucalyptus globulus* leaves were applied as infusions, decoctions, inhalations, baths and steam baths, and the heated leaves were used to rub the chest and put on it as cataplasms. Also widely used was the ethnospecies *Matico*, which referred to different *Piper* species, namely *Piper aduncum* and three unidentified species. It accounted for 55 use reports and was most frequently mentioned in the valley (35 use reports), and third most in the mountains (20 use reports). The genus has been shown to possess anti-tuberculosis and anti-asthmatic activity (Wahyuono et al., 2001; Mohamad et al., 2011). *Piper* spp. leaves were predominantly applied as infusion or decoction, though in some cases, together with *Eucalyptus globulus*, as inhalation or steam bath. *Sambucus nigra* subsp. *peruviana* (Adoxaceae) was often mentioned in the mountains, where the plant occurs (22 use reports versus four in the valley). Its flavonoids have been shown to exert anti-bacterial activities (Hernández et al., 2000), and in Europe, *Sambucus nigra* is used as a diaphoretic against cold (Hänsel and Sticher, 2007:1232). *Sambucus nigra* subsp. *peruviana* leaves and flowers were applied as decoctions or infusions, whereas in some cases, they were boiled in goat or cow milk rather than water. *Allium sativum* (Alliaceae) was cited 15 times. It has antibacterial, antimycotic, antiviral and anti-inflammatory effects (Hänsel and Sticher, 2007; Sankaranarayanan et al., 2007) and was added to preparations of syrups, decoctions with milk, or eaten raw. Further, the citrus fruits *Citrus limon* and *Citrus aurantium* were frequently used against respiratory conditions, drops of the former added to infusions and decoctions, the juice of the latter drank cold or hot.

Treatment against respiratory diseases was predominantly applied orally (70%), mainly as infusions (39% of use reports) or decoctions (19%), further as fresh juice or syrup. Topical applications (30%) included mainly bathing, further cataplasms, rubbing with heated leaves, inhalations, steam baths and gargling.

Urological diseases – Urological diseases were cited fourth and second most frequently in the mountains and the valley, respectively. Urinary system's diseases accounted for 4% of deaths in the department La Libertad in the year 2000 (Peruvian Health Ministery, 2011). While some authors arrange urological complaints together with gynaecology to one category (Frei et al., 1998), others do not (Leonti et al., 2003a). Here, it was chosen to arrange urological diseases in a separate category, since this arrangement reflects local people's view more accurately. Their focus laid mostly on kidney problems, and gynaecology was perceived as a quite different field. Most citations in this category (80% in the mountains, 68% in the valley) referred to kidney problems, such as kidney pain, inflammation, infection, irritation, and kidney stones. Secondly, urinary tract inflammations were cited (6% in the mountains, 19% in the valley), followed by prostate inflammations (8% and 10%, respectively), bladder inflammations and male genital infections (App.2.D). As reasons for kidney problems people denominated the hard agricultural work in the inclined, often distant fields. Agricultural field work has been associated with high prevalence of renal disease among agricultural

laborers elsewhere (Sanoff et al., 2010). Further, observation of people's habits suggests that kidney problems may partly be caused by insufficient water uptake. Local people are not accustomed to drink much during work, and during meals they content themselves with a cup of sweet coffee or oat with cow or soya milk (*avena*, at breakfast), fruit lemonade (*refresco*, mostly at lunch), or herbal tea (*agua de…,* at dinner). The low intake of water may lead to cyclic dehydration, possibly harmful to the kidneys (Sanoff et al., 2010). In the valley, where urological diseases are more prevalent than in the mountains (14% of all use reports versus 11% in the mountains), the effects of insufficient water uptake may be worsened by the heat and low air humidity during the dry season. Another reason for the high prevalence of kidney problems may be the widespread use of pesticides in agriculture; high exposure to pesticides has been argued to be related to kidney disease (Sanoff et al., 2010). Fumigation is often performed without any safety precautions, and is especially common in the valley orchards, where it may also contribute to the higher incidence of urological problems. Moreover, the contamination of drinking water is likely to be another cause for urological diseases, which may again be more important in the valley, where higher temperatures facilitate parasitic reproduction. Accordingly, water contamination is perceived as a general cause for diseases by local people.

Among the 71 plants cited for the treatment of urological diseases, the ethnospecies *Cola de Caballo* (*Equisetum bogotense* and *Equisetum giganteum*; 46 use reports) was by far the most commonly used. The species have been shown to exert hypotensive and diuretic effects (Rodriguez et al., 1994; Wright et al., 2007). *Bixa orellana* (Bixaceae), cited 38 times, has also been shown to possess hypotensive and diuretic properties (Srivastava et al., 1999). *Desmodium molliculum* (Fabaceae) got 37 use reports; the genus has been reported to possess anti-inflammatory and antioxidant activity (Govindarajan et al., 2003; Govindarajan et al., 2007; Ma et al., 2011), and the species is used as anti-inflammatory agent in Peruvian complementary medicine (Joo, 2011). Further, *Hordeum vulgare* and *Linum usitatissimum* were cited 23 times each. One or both of these two plants were added to mixtures of plants, which frequently consisted of *Equisetum* spp. and *Desmodium molliculum* in both localities, or of *Equisetum* spp. mixed either with *Bixa orellana* and/or *Annona muricata* (15 use reports) in the valley. *Annona muricata* has been suggested to have antinociceptive and anti-inflammatory properties (de Sousa et al., 2010). Both *Bixa orellana* and *Annona muricata* are cultivated trees from the valley, and were used almost exclusively there. They were also used separately, or mixed together without *Equisetum* spp. Most remedies against urological complaints were applied orally, in 91% of all use reports. The mentioned plant mixtures were prepared as either infusions (56%) or decoctions (34%), and were consumed as *agua de tiempo*, which means over a long period every time one gets thirsty (for several days, weeks, months, or even years). In 4% of use reports, topical applications were preferred, in form of baths or cataplasms.

Dermatological diseases – Dermatological diseases were cited sixth and fifth most frequently in the mountains and the valley, respectively. By far the most frequently mentioned conditions were wounds (53% of use reports) and haematoma (9%), whereas wounds were mentioned twice as often in the

valley as in the mountains. This coincides with the fact that much more plant species were documented in the valley for dermatological diseases compared to the mountains. Further, pimples, skin parasites, infections and inflammations, burning skin from too much sun, swellings, hemorrhoids, and tumors were mentioned (App.2.E).

From 89 plant species used for dermatological problems, the most frequently used (27 use reports) was the ethnospecies *Llantén*, mostly referring to *Plantago lanceolata* and sometimes to *Plantago major* (Plantaginaceae). *Plantago lanceolata* leaves have antibacterial, anti-inflammatory, abirritant, and immunomodulatory properties and the fresh herbal juice is also known in European folk medicine as wound-healing agent (Hänsel and Sticher, 2007:829). Another widely employed plant species was *Mauria heterophylla* (Anacardiaceae; 25 use reports). It contains ethyl gallate which has antibacterial activity (Mori et al., 2006). Further, the ethnospecies *Matico* (Piperaceae) was cited 12 times, whereby its first use was against respiratory diseases. Furthermore, the ethnospecies *Verbena* (referring to *Verbena officinalis* and *Verbena litoralis*, Verbenaceae) and *Aloe vera* (Xanthorrhoeaceae) were used for skin treatment (10 and 9 use reports, respectively). The former's main employment was against fever, and *Verbena officinalis* has been shown to exert anti-inflammatory effects (Hänsel and Sticher, 2007:822) and its compound verbascoside acts as an antihyperalgesic (Isacchi et al., 2011). *Aloe vera* was used against a broad range of diseases, and was frequently claimed to be "good for everything" (*bueno para todo*). However, its main use was against gastrointestinal ailments (16 use reports). The *Aloe vera* gel is claimed to have antibacterial properties thanks to anthracene derivatives, and external use further exerts abirritant and immunomodulatory effects through polysaccharides, and antiphlogistic effects through glycoproteins (Hänsel and Sticher 2007:1291).

Most applications of plants against dermatological problems were topical (82%), mainly infusions and decoctions used for washings (51% of all use reports), followed by cataplasms of leaves, or in case of *Aloe vera* of leaf parenchyma gel (26%), rubbing with leaves or leaf sap (4%) or putting drops of latex on wounds, especially when applying *Musa paradisiaca* (Musaceae). Oral application (16%) included infusions (8%), decoctions (5%), and sap (3%).

Gynaecology – Gynaecology accounted for 6% of all use reports in the mountains (86 use reports) and for 8% in the valley (127 use reports); 27% and 29% of all plants cited were employed (50 and 66 plant species, respectively). The most frequent conditions were vaginal infections (34%), and infections of ovaries or uterus (32%). Menstruation made up 17% of all uses, primarily menstrual pain (12%), and further delay of menstruation or excessive menstrual bleeding. Birth and after birth care were mentioned in 9% of all cases. Further mentioned were vaginal bleedings, fertility, and contraceptives (App.2.F).

In all, 73 plant species were employed for gynaecology. The most often used species were *Buddleja utilis* (Scrophulariaceae) and *Krameria lappaceae* (Krameriaceae), with 16 use reports each. Species from the genus *Buddleja* have been shown to possess antibacterial, anti-inflammatory, analgesic and antimutagenic properties (Reid et al., 2006; Backhouse et al., 2008; Adedapo et al., 2009). Potential

antibacterial activity has been attributed to the genus *Krameria* as well (Simpson, 1991). Another widely used species was *Origanum vulgare* (Lamiaceae, 16 use reports). Whereas in Europe it is employed for its expectorant properties (Hänsel and Sticher, 2007:1112), in the research area it was used against menstrual pain. It has antioxidant effects (Miguel, 2010), and one species of the genus is known as a painkiller (*Origanum syriacum*; Mabberley, 2008:610). No study was found which provides a pharmacological base for the use of *Origanum vulgare* against menstrual pain. Further, *Desmodium molliculum* (Fabaceae) and *Equisetum* spp. (Ethnospecies *Cola de Caballo*, Equisetaceae; 12 use reports each) were used for gynaecological complaints. However, both were primarily used against urological diseases (see above).

Herbal remedies for gynaecological complaints were applied orally (53% of all use reports), as infusions (27%) or decoctions (26%). Topical applications, mainly vaginal washings, accounted for 25% of the uses reported, and a combination of oral and topical application was applied in 19% of the cases. Remarkable were the topical applications of *Aloe vera* leaf parenchyma gel: it was reported to be used as contraceptive and against vaginal infections in form of vaginal ovules.

Liver – Liver diseases accounted for 5% of all use reports in the mountains (61 use reports) and 6% in the valley (98). Of all medicinal plants cited, 37 species were used in the mountains for liver diseases (20%) and 44 in the valley (19%). This category included mainly unspecified liver problems (70% of use reports), colic (6%), inflammation (6%), liver stones (4%), hepatitis (3%), bad taste in the mouth (3%), and problems of the bile (5%; App.2.G).

Of a total of 57 plant species, the most frequently cited was *Taraxacum officinale* (Asteraceae) with 17 use reports. Its bitter taste is seen as a general characteristic for plants with liver curing properties among local people. *Taraxacum officinale* has choleretic (activating of liver cells to enhance production of bile acids), diuretic and appetizing properties (Hänsel and Sticher, 2007:868). The second most often mentioned plant against liver diseases was *Baccharis genistelloides*, also from the Asteraceae family (14 use reports). Its anti-inflammatory, liver protective and bile secretion enhancing effects are due to flavonoids (Ruiz et al., 2008). Further, *Aloe vera* (Xanthorrhoeaceae) leaf parenchyma gel and *Linum usitatissimum* (Linaceae) seeds were employed against liver diseases (8 use reports each), both plants being used against gastrointestinal complaints as well (16 and 8 use reports, respectively). They are known for their laxative properties (Hänsel and Sticher, 2007:602,1291).

Herbal remedies against liver diseases were applied orally, as infusions (49%), decoctions (31%), or sap (17%).

Cardio-vascular diseases – In both localities, cardio-vascular diseases accounted for 5% of all use reports (66 in the mountains, 81 in the valley). They were treated with 30 plants in the mountains (16% of all plant species cited) and 63 in the valley (28%).

Treatment of cardio-vascular diseases included applications for the heart (51% of all cases), blood and blood purification (28%), control of blood pressure (7%), anemia (6%), and lowering cholesterol levels (5%; App.2.H). The application "for the heart" (*para el corazón*) needs further explanation, as it may refer to psychological conditions in several cases. It was frequently mentioned together with worries and sorrow, which were grouped into "nerves", and in many cases the same plants were used to treat these conditions. However, the citations "for the heart" were arranged to cardio-vascular diseases, because even if referring to emotional rather than purely physiological conditions, their meanings may relate to psychosomatic realizations of emotional stress. Furthermore, people clearly stressed the localization of the conditions when naming explicitly the heart and it would seem fairly arbitrary to arrange these citations to another category, also because it was not always obvious if people were referring to the physiological organ or using the word in a more metaphoric way.

Of the 61 plant species mentioned against cardio-vascular problems, the most widely mentioned as useful were *Petroselinum crispum* (Apiaceae, 20 use reports) and *Alternanthera porrigens* (Amaranthaceae, 13), further *Melissa officinalis* (Lamiaceae, 9) and *Citrus aurantiifolia* (Rutaceae, 7). Whereas the former three species were predominantly mentioned in the mountains where they are widely cultivated in home gardens, *Citrus aurantiifolia* was only cited in the valley, where it is grown in orchards. *Petroselinum crispum*, *Melissa officinalis* and *Citrus aurantiifolia* are fragrant plants due to their content of essential oils. *Melissa officinalis* essential oils have antibacterial and spasmolytic properties as do most essential oils, as well as calmative and antioxidant effects (Hänsel and Sticher, 2007:1093). Antioxidant activity has further been shown for *Citrus aurantiifolia* (Guimaraes et al., 2010). *Petroselinum crispum* has been shown to inhibit blood platelet aggregation, supporting its efficacy against hypertension and related cardio-vascular conditions (Chaves et al., 2007; Gadi et al., 2009).

Most plant remedies against cardio-vascular diseases were reported to be applied orally, as infusions (43% of all use reports), sap (17%), decoctions (14%), or eaten raw (especially fruits, 7%). In 16% of all use reports, plants were applied topically, in form of baths or steam baths.

Fever – Fever amounted for 3% of all use reports in the mountains (45 use reports) and 4% in the valley (71 use reports). Of all medicinal plant species, 26 were used against fever in the mountains (14%), and 42 in the valley (19%). The category included fever, often in connection to respiratory conditions (influenza), malaria (in 11% of the cases), and rarely yellow fever (2%; App.2.I).

Of 54 plants reported to treat fever, the most often cited was the ethnospecies *Hierba Santa*, referring to *Cestrum* spp. (Solanaceae) with 14 use reports. *Hierba Santa* has been shown to exert anti-inflammatory and analgesic effects (Kawano et al., 2009), as well as antimicrobial activity (Rojas et al., 2003). The compound verbascoside of the ethnospecies *Verbena* (12 use reports) has been shown to have antihyperalgesic activity (Isacchi et al., 2011). Furthermore, *Verbena officinalis* exerts anti-inflammatory and antioxidant effects (Hänsel and Sticher, 2007:822; Rehecho et al., 2011). The fruits of *Tamarindus indica* (Fabaceae) were mentioned to be used against fever in 11 cases. *Tamarindus*

indica possesses antiplasmodial (Koudouvo et al., 2011), antibacterial (Kothari and Seshadri, 2010) and antipyretic activity (Izquierdo et al., 2007).

Plant remedies against fever were mostly applied orally (64%), predominantly as sap (31%); this was especially the case for preparations including *Verbena* spp.; further as infusions (17%) or decoctions (4%). Topical applications included baths in the majority of cases (25%), rubbing of arms, legs and front with squeezed leaves, frequently applied with sugar cane spirit (5%), and enemas (3%). The ethnospecies *Hierba Santa* (*Cestrum* spp.) was used for the preparation of baths, whereby the leaves were rubbed until foam developed. This foam was added to hot water for bathing, in some cases together with salt, lemon juice or fresh urine.

Multisystem diseases – Multisystem diseases accounted for 4% of all use reports in the mountains (50 use reports) and 2% in the valley (42 use reports). Of all medicinal plants used in the mountains, 18% were employed against multisystem diseases (34 species); in the valley 12% were used against these conditions (27 species). This category was added to account for the frequent citations of conditions such as "inflammation" and "infection", which could not be allocated to particular body parts, and were reported to be "general", "of the organs / organism / body"; or of plants which were good for "every inflammation / infection" (App.2.J). The concept of inflammation and infection as general terms to describe diseases is consistent among the people and predominantly found among older people, and has been reported in other studies (Bussmann and Sharon, 2006). It is linked to the classification system of hot and cold diseases, and accordingly, cold and hot plants to cure them (*"hierbas frescas"* and *"hierbas calientes"*, respectively), following the principle of opposites. Correspondingly, inflammations and infections – as hot conditions – must be treated with cold plants. This system is based on humoral medicine and is found widely in Latin-American countries, whereby it is most probably of Old World origin (Foster, 1987).

Of the 43 plant species employed for multisystem diseases, the most frequently mentioned were the ethnospecies *Cola de Caballo* (*Equisetum giganteum* and *Equisetum bogotense*, 12 use reports), *Desmodium molliculum* (10 use reports) and *Annona muricata* (7 use reports), all of which were also widely used against urological diseases and have anti-inflammatory properties (Duke et al., 2009; Azahuanche et al., 2010; Joo, 2011).The former two were used mainly in the mountains, *Annona muricata* only in the valley where it was cultivated.

Plant remedies reported to be used against multisystem diseases were predominantly applied orally (82%), as infusions or decoctions, or included combinations of oral and topical administration, i.e. drinking infusion or decoction and bathing the body, mostly with the same plant preparation.

Skeleto-muscular diseases – Skeleto-muscular diseases accounted for 3% of all use reports in both localities (34 in the mountains, 44 in the valley). This category included predominantly bone pain, arthritis, rheumatism (51% of use reports), further distortions (25%), fractures (14%) and sprains (6%), as well as the usage for fortifying the bones (4%; App.2.K).

Of the 40 plants used for skeleto-muscular diseases, the most frequently mentioned was the ethnospecies *Suelda con Suelda*, which referred to *Phoradendron* spp. and *Dendrophthora* sp. (Santalaceae). The South American species *Phoradendron piperoides* has been shown to have antinociceptive, anti-inflammatory and antioxidant properties (Vasconcellos et al., 2009) which may provide a rationale for the use of *Suelda con Suelda* against inflammatory skeleto-muscular diseases. Further, the ethnospecies *Ishanga* was used to treat rheumatic pains. It comprised *Urtica* spp. and the plants were used to beat or rub the hurting part. *Urtica dioica* extracts have been shown to be effective for osteoarthritis (Riehemann et al., 1999; Setty and Sigal, 2005), and the topical nettle sting treatment has been successfully tested to relieve chronic knee pain (Randall et al., 2008).

Plants were mainly applied topically (81% of all use reports), mostly as cataplasms of heated leaves. Further applications were beating with plants (in case of *Urtica* spp.), rubbing with heated leaves or macerates of plants (alcoholic plant extract with sugar cane spirit) or bathing the affected part with plant decoctions. Oral applications made up 15% of all uses, as sap, syrup, infusion and decoction.

Other uses – A remarkable proportion of all use reports are summarized in the category "other uses"; 7% in the mountains and 10% in the valley (95 and 167 use reports, respectively). In accordance with the high diversity of conditions treated in this group (see also Appendix 2.L), high numbers of plants were cited; namely 88 in the mountains and 122 in the valley (47% and 54% of total plant species, respectively).

Most use reports in this category referred to magical uses. They accounted for 28% of use reports in the mountains, and 16% in the valley. They included conditions such as *envidia* (envy), *mal ojo* (evil eye), bewitchment through *duendes* (*duende*: white female ghost in the river) or other, diabolic ghosts, or bewitchment through other people. Further, the use of love spells and aphrodisiacs was mentioned, and the use of a plant to influence the sex of an unborn baby. *Envidia* and *mal ojo* refer to ailments which are caused by envy, even without bad intention of the person who caused it. When a person looks at a baby, child or animal which she or he admires and would like to have one for her/his own, the bad energy of this look is seen to cause illness. It can also happen to adults who are enjoying a successful life, and are envied by other people – negative energies caused by resentments and jealousy of others can reach these persons and affect them. As a consequence, the person affected starts to feel unwell, uneasy, depressed and gets ill, with physical symptoms such as head ache and nausea. Eventually, if not treated by a healer conducting a ritual *limpia* ceremony, the person or animal will die. Bewitchment through *duendes* leads to craziness, and also to death if not treated properly with a *limpia*. Bewitchment through other people using black magic is believed to cause severe physical ailments, and must be treated also by a healer, usually with *limpias*. The ceremony may include additional rituals, which intend bewitchment of the person who sent the spell. Generally, believes in witchcraft, ghosts, sorcerers and witches are part of people's reality, and have importance for them. Of course, there are striking differences between people, and not all of them believe in these supernatural phenomena; nevertheless, most of them do so.

The most frequently reported plants against *envidias* and bewitchment belonged to the ethnospecies *Trencilla*, which comprises different species of *Huperzia* (Lycopodiaceae). These plants were qualified as magical and powerful, as *plantas vivas* (living plants), able to change their locality and to lead the one who searches them into aberrance. *Trencillas* were used, amongst other plants, for the preparation of *seguros*, herbal amulets in form of a flask containing magical plants and either *agua florida* (floral perfume) or sugar cane spirit. Interestingly, a species of the genus has been investigated for uses against dementia (Jesky and Hailong, 2011). The observed traditional use of *Huperzia* spp. may be due to its unusual growth form, which reminds to the form of a serpent. The serpent is an important mythical symbol in many cultures (Narby, 2007). Particularly, in the Peruvian Amazon it is seen as the most powerful of all animals and the mother of the holy plant Ayahuasca (Peña Velazquez, 2010). Consistently, the serpent is the most prevalent image in Chachapoya iconography, and has been retained in Andean cosmology to date. For example, the myth of the origin of a valley north of Cajamarca with the name *"pampas de la culebra"* (pampas of the snake), told by a key informant, goes as follows: a god in form of a serpent came down to earth to castigate people for not believing in the gods, as a fire breathing serpent, killing the people, until another god, the god of the lightning, killed it with a lightning bolt, and the dead burnt body of the serpent god gave the valley its meandering form (Fieldnotes, May 2010). So the serpentine form of *Huperzia*, its appearance which suggests its capacity to move like a snake, may have contributed to its selection as a powerful, magical plant (*planta viva*), as did its occurrence in high mountainous regions. Plants growing on high altitudes, on inhospitable environments in close proximity to the summits, are believed by local people to be the most powerful, magical plants. Another frequently mentioned plant for protection against witchcraft and *envidia* was *Ruta graveolens* (Rutaceae). A bouquet of *Ruta graveolens* flowers in the house is believed to protect home and residents against evil spirits and bad energies. The fragrant plant has its origin in Southern Europe where its history of cultivation and medicinal use goes back to antiquity (Mabberley, 2008:755). Hippocratic physicians employed it mainly for gynaecological conditions, i.e. as abortifacient and emmenagogue (Touwaide et al., 2008). It was also used in Roman rites of the Catholic Church, and its religious importance may have contributed to promote its use in Latin America (Touwaide et al., 2008).

The category further includes some other, small categories of medicinal uses, which amount together only 3% of the total number of use reports in all categories, but account for 33% of all use reports in the category "other uses" in the mountains, and 56% of in the valley. Here, they are given in ascending order with their relative contribution to the category "other uses" in the mountains and in the valley: veterinary medicine (1% and 2%, respectively), otological problems (1% and 4%), diabetes (0% and 7%), "cures everything" (6% and 4%), tonic (4% and 11%), ophthalmological problems (15% and 8%), and cancer (5% and 20%). Interestingly, a plant which could not be identified from the family of Bignoniaceae was cited for treatment of diabetes, and informants reported a very high efficacy of the species with the local name *Perlilla* to lower blood sugar levels. This species seems promising for

pharmacological investigation, and provides an apparently efficient gratuitous alternative to biomedical treatment for local people. The concept of universal remedies is mirrored in plants which were used to "cure everything", where *Aloe vera* was cited most frequently, followed by the very popular medicinal plant *Cola de Caballo* (*Equisetum bogotense* and *Equisetum giganteum*). As tonics, the fortifying properties of apple (*Malus domestica*, Rosaceae) and alfalfa (*Medicago sativa*, Fabaceae) were mentioned. For ophthalmological problems, which were assigned to the dusty roads and the sun, principally chamomile (*Matricaria recutita*, Asteraceae) infusions were used for bathing. For treatment of cancer, which was said to be one of the main causes of death, *Annona muricata* was cited by far most frequently. Its Annonaceous acetogenins are responsible for its anticancer activity (Chang et al., 2003; Bermejo et al., 2005). Cancer was perceived by people as becoming more frequent than it used to be, and as causes people mentioned the contamination of food and unbalanced diet.

Another frequently reported application was the use of plants against cold temperatures (*frio*), particularly in the mountains, where it accounted for 17% of all use reports in the category. Treatment took place in form of infusions and baths of a variety of plants, and the only plant with several use reports was *Minthostachys mollis*, a fragrant Lamiaceae.

Furthermore, 4% of the use reports in both locations referred to the prevention of diseases, vitamins and natural food accompanying medicinal plant treatment. Hair care made up 1% and 3% of use reports in the mountains and the valley, respectively, and 2% of the uses in the valley related to weight control.

Figure 15: Local specialists

A) Specialized local healer with plant macerate for conduction of "spiritual flowering baths" (*baños de florecimiento*)

B) Ritual for the mountain (*cerro*) during collection of magical plants

C) Preparation of the altar for a healing ceremony, the flasks contain plant macerates, the plastic bag contains *Coca* leaves

D) Performance of cleansing ceremony (*limpia*) with *Chonta* wand (*Bactris* sp.)

4.2. Botanical aspects of the documented medicinal plants

Plant families used

In total, 279 medicinal plant species from 78 botanical families were documented. In the mountainous locality, 188 plant species from 66 families were mentioned with 1346 use reports. In the valley, 226 species belonging to 76 families were cited with 1689 use reports.

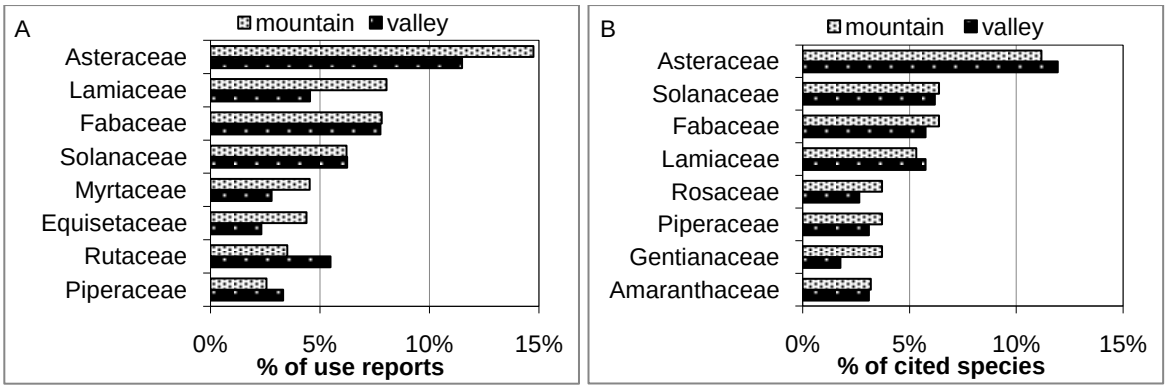

Figure 16: Percent of use reports per botanical family (A) and percent of cited plant species per family (B) in the two localities for the best represented plant families.

Plant families with the highest percentages of use reports for the two localities are shown in Figure 16.A. Asteraceae were referred to by 15% of all use reports in the mountains and 11% in the valley. Fabaceae account for 8% of use reports in both localities and Solanaceae for 6%. Lamiaceae cover 8% of use reports in the mountains, but only 5% of use reports in the valley. Rutaceae (4% of all use reports in the mountains, 5% in the valley), Myrtaceae (5%, 3%), Equisetaceae (4%, 2%), and Piperaceae (3%, 3%) were the next frequently cited families. The families with the highest percentages of use reports, Asteraceae, Solanaceae, Fabaceae, and Lamiaceae, were also the families with the highest percentages of cited plant species (Figure 16.B). Asteraceae account for 11% of all species cited in the mountains and for 12% in the valley. Solanaceae and Fabaceae cover 6% of all species cited, both in the mountains and in the valley. Lamiaceae account for 5% of all plant species cited in the mountains and 6% in the valley. These findings corroborate earlier results from ethnobotanical studies in Andean ecological regions (Hammond et al., 1998; Macia et al., 2005; Bussmann and Sharon, 2006; De-La-Cruz et al., 2007). However, Rutaceae, Myrtaceae, and Equisetaceae are not among the families with high percentages of species cited, even though they account for high percentages of use reports. This is explained by the fact that they contain only few, though widely used species; such as *Ruta graveolens* and the citric fruits for Rutaceae, *Eucalyptus globulus* for Myrtaceae, and *Equisetum giganteum* and *Equisetum bogotense* for Equisetaceae.

Habit of medicinal plants

Life forms of the medicinal plants are shown in Figure 17. Of the 279 documented medicinal plant species, 126 species (45%) were woody plants, i.e. trees, shrubs, or lianas, whereas 153 species (55%) were non-woody plants, i.e. herbs, vines, or succulents.

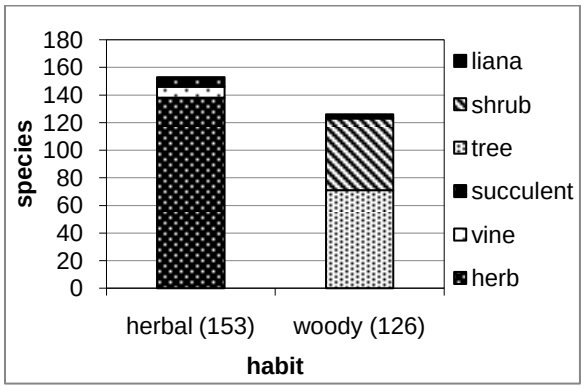

Figure 17: Woody vs. non-woody habit of the documented medicinal plants.

Of the woody plants, 37% were cultivated, whereas of the non-woody plants, 27% were cultivated. From the total of all collected plants which were used for medicinal purposes, 31% were cultivated; 29% were wild collected, woody plants, and 40% were wild collected, herbaceous species (including vines and succulents). Many species of the last group grow in habitats disturbed by human activities, as fields, along the road side, in populated areas, or on pastures, and are characterized as weeds. It has been noted before that the life form of medicinal plants is often herbaceous (Voeks, 1996; De-La-Cruz et al., 2007), and that they tend to be collected primarily from disturbed, non-forest habitats (Frei et al., 2000). Stepp and Moerman (2001) found high use of weeds as medicinal plants by native North Americans and Mexican highland Maya. They explain it by chemical defense against herbivores, as a result of which weeds tend to be high in bioactive and toxic secondary compounds such as alkaloids, cardiac glycosides or terpenoids. Therefore, they conclude, they are likely to have pharmacological effects and be effective medicinals (Stepp and Moerman, 2001). However, in the present study a considerable high use of woody species was encountered. Lacking a complete floristic inventory of the region, it is not possible to calculate the expected proportions of woody and non-woody plants to be used as medicinals, in dependence on their respective frequency. Still, the ecological conditions are likely to be responsible, since during the long dry season many herbaceous species are not available, or only in distant areas on high altitudes. Further, a wide part of the studied area is covered by dry forest with very few herbaceous species, and also in the cloud forest, woody species predominate. So, concerning the wild plants, people are forced to use the woody species growing throughout the year.

Habitat of medicinal plants

Collection sites of medicinal plants are shown in Figure 18. The majority of medicinal plants were collected in Andean cloud forest (22%), seasonally dry tropical forest (20%), and gardens (19%). Further, they were collected on fields (mostly cultivated plants, some weed species), on *jalca* vegetation (16%), along the road side (6%) and in riverine forest (4%).

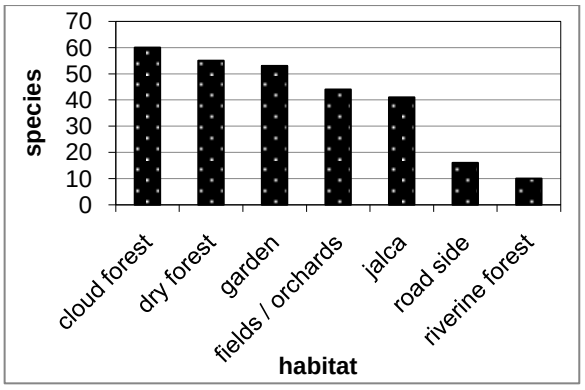

Figure 18: Main habitats of the documented medicinal plants.

The collection sites coincide with the relatively high use of woody species as medicinals (45% of all species; see above), as these were predominantly collected in cloud or dry forest, and on cultivated fields or orchards. Further, the findings are in agreement with the high use of cultivated plants as medicinals (32% of the medicinal plants are collected in gardens and on fields), and of wild plants which are easily available in the surrounding vegetation. As the valley locality is mainly covered by dry forest, many trees and shrubs from these forests are used as medicine. The mountainous locality lies within Andean cloud forest and in close proximity to the *jalca* highlands. However, some plants have to be collected on higher, less easily accessible *jalca* regions, and are used in both localities. Such is the case for the magical ethnospecies *Trencilla, Vira Vira*, *Rima Rima*, and *Pagra Pagra*, but also for the widely used *Valeriana*. The habitats of all medicinal plants collected are shown in Table 1 (pp. 31-53).

Plant parts used

In the majority of cases, leaves or shoots of plants were used for medicinal purposes, as shown in Figure 19. Leaves accounted for 34% of use reports in the mountains and 40% in the valley. Shoots were used in 39% of all cases in the mountains and in 27% in the valley.

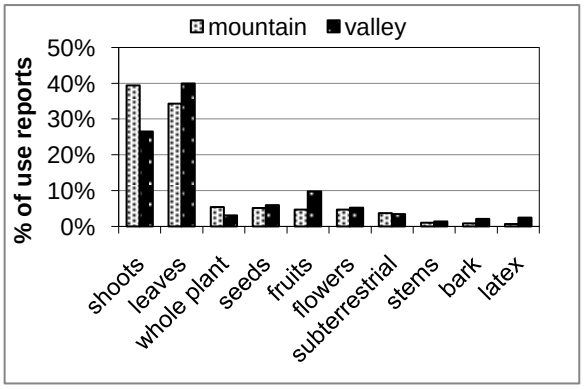

Figure 19: Plant parts used for medicinal purposes.

Whereas leaves were the most frequently used parts of trees, shoots (*cogollos*) referred to aerial parts of herbs which were used entirely with leaves, stems and eventually occurring flowers, or to branches of shrubs with leaves and eventually flowers. The differences in the amounts of use reports of these two plant parts between the two localities can therefore readily be explained: in the valley, there was a generally higher use of tree species, according to the fact that there exists extensive tree cultivation and that some of these cultivated trees are widely used as medicinals. On the other hand, the use of herbaceous species was higher in the mountains, due to the closer proximity to the *jalca* ecological zone where many medicinal herbs were collected, and to more favorable conditions for herbs in the wetter and cooler environment on the higher altitude. Fruits were used in 5% of use reports in the mountains and 10% in the valley. Again, the difference is due to fruit tree cultivation in the valley, with citric fruits being most frequently used for medicinal purposes. Seeds, flowers, subterrestrial parts and whole plants (including subterrestrial parts), latex, bark and stems are used in minor percentages. The preference for aerial parts have been reported before in previous research in the Peruvian Andes (Roersch, 1994; De-La-Cruz et al., 2007).

Introduced versus native medicinal plants

Identification of species' origin revealed that about one third of the documented medicinal plant species are not native to Peru. Among the introduced species several belong to the botanical families Fabaceae, Lamiaceae, and Rutaceae. Obviously, introduced plant species play an important role in medicinal plant use in the studied communities. This phenomenon holds true widely throughout northern South America (Bennett and Prance, 2000). Many of the introduced species are known to have medicinal properties, and many of them are cultivated in gardens or on fields, for example *Matricaria recutita* (Asteraceae), *Ruta graveolens* (Rutaceae), *Petroselinum crispum* (Apiaceae), and the Lamiaceae *Melissa officinalis, Mentha spicata, Ocimum basilicum, Origanum vulgare,* and *Rosmarinus officinalis*. Many of these species are known for their medicinal properties in their places of origin, or used as spices there. Overall, only a relatively small proportion of species were introduced for their medicinal value (e.g. *Aloe vera*), and the diversity of introduced healing plants has been considered to be largely due to the therapeutic properties of many important food plants (Bennett and Prance, 2000). As rural communities mostly lack the dichotomy between food and medicines, and many food plants and spices were introduced to South America, they broadened the pool for the selection of potential medicinal plants, whereby the often fragrant Lamiaceae appear to have been selected preferably (Bennett and Prance, 2000). In northern South America, many introduced major food plants are used as medicines as well; such is the case for *Musa paradisiaca, Allium cepa, Citrus* spp., *Cocos nucifera* and *Saccharum officinarum*, among others (Bennett and Prance, 2000).

4.3. Distribution and transmission of medicinal plant knowledge

Different types of local specialists

Different types of specialists are distinguished by local people: the *curanderos* / *curanderas* and *curiosos* / *curiosas* are "general healers", who treat all kind of diseases, but may be specialized in specific treatments such as cleansing ceremonies (*limpias*) against the *susto* condition or bewitchment (see Figure 15). For example, one *curandero* was specialized in "spiritual flowering baths" (*baños de florecimiento*) to strengthen the patients, and in the preparation of *seguros*, i.e. herbal amulets in form of a flask containing magical plants and floral perfume or sugar cane spirit. The term *brujo* (sorcerer) was used for a general healer who is able to deal with witchcraft, i.e. to treat patients who got bewitched through another person. Usually, *brujos* perform *limpias* to cure diseases. Exclusively, male healers were described as *brujos*, and sometimes the terms *brujo* and *curandero* were used interchangeably. However, some healers are mainly known as *brujos* among the population, and others mainly as *curanderos*. People who believe that diseases are often caused by witchcraft mainly consult *brujos*, while people who do not believe in witchcraft doubt the capabilities of the *brujos* and rather describe them as charlatans (*charlatanes*). The following two remarks on brujos by a key informant aim to illustrate the local belief in witchcraft.

„Two types of magic exist: white magic, with which people seek to achieve good things as health or richness, and black magic, with which damage can be done. This is reflected in the altars (*mesas*) of the sorcerers; on one side, they are equipped with pictures of saints, on the other side with human cranes. The white part is called *ganadería*, from the verb *ganar* = to win, the black part is called *justiciero*, from *justicia* = justice; justice is seeked in causing harm to those who did evil to one. At the celebration for the eternal father, white candles are lit by those who pray for good things, while black candles are lit by those who beg for harm to other people. Hence, sorcerers can work with both types of magic. The business of some is causing harm to people; a more rentable work than curing. They can do it directly in poisoning food, or from distance, whereby they form underwear or a similar thing of the target person to a puppet, and put needles on the body part they wish to damage. The puppet is then brought to a humid place, such as a lagoon, so that the needles oxidize enhancing the suffering of the person. Everything is a question of balance between the two types of magic. Many people here believe that diseases are caused by envy (*envidia*) or evil (*malo*), they do not believe in biological causes of disease."

„It happened in the 1940s. My grandfather was travelling by mule to Cajamarca for trading, and one man of the group was Señor Marcos, from whom people told he was a *brujo*. My grandfather did not believe it. They arrived to Huambamarca and found a place to stay over night. When they laid down to sleep, suddenly, the Señor Marcos was caught by strong colic which would not let him get on his feet again. He asked my grandfather to give him his bag where he stored his sugar cane spirit, *Coca* leaves and other things for preparing his altar. He put his poncho on the floor and arranged the things on it. He took his *Chonta* staff and started fighting against an invisible enemy. Suddenly he shouted: „You

chose the wrong man for messing around with!“ and then fighting stopped. „He failed“, added Señor Marcos and went to sleep. In the morning, people told them that the most famous *brujo* of the place had died this very night.“

The terms *pulsero* / *pulsera* were also used sometimes for general healers who take the pulse of the patient to diagnose diseases. These terms were employed exclusively by older people. *Hueseros* are specialists who “arrange the bones” (*arreglan los huesos*), and apply plant remedies to cure fractures, distortions, and sprains. A *huesero* may be a general healer as well. *Parteras* are midwifes assisting during pregnancy and birth. A few women were named *parteras*, and in some cases the same women were called *curiosas* as well, indicating that they are general healers too. Interestingly, they were rarely mentioned; this may be due to the fact that the biomedical doctors recommend to the local women to give birth in the health outposts.

Generally, being healer is not a main occupation, but all specialists are farmers and, with one exception, do not charge for their treatment. Instead, the patients may donate food, firewood or also money, according to their possibilities. In many cases the *curanderos* / *curiosas* do not treat the patients themselves, but rather recommend the use of specific medicinal plants and explain how to administer them. Consequently, they rarely store medicinal plants at their home. However, all *curanderos* / *curiosas* perform *limpias*, cleansing ceremonies necessary above all for the treatment of *susto*. They use macerates of magical and usually intensely fragrant plants in sugar cane spirit, or fresh fragrant plants to conduct these rituals. The macerates are prepared by the healers and stored at home.

Interestingly, a total of eigth informants from both communities denied the existence of local *curanderos* or *curiosas* these days, and only referred to people who passed away. When they were asked to name persons with large medicinal plant knowledge, however, they named the same persons who were described as healers by others.

Obviously, there are different types of healers, distinguished in different ways by different informants. Also, the amount of plant remedies they know varies considerably. A *brujo* may use only a few, magical plant species and a *huesero* only one or few species for mending bones (e.g. the ethnospecies *Suelda con Suelda*); other healers know a lot of medicinal plants and their applications. Strikingly, only one third of the persons who were named as healers by others, also see themselves as healers. The woman who reported the most plant uses, for example, denied being a healer, as she only treats her own family members. But many people consult her when they are sick, and she knows how to prepare complex macerates with over one hundred different plant ingredients. Her mother was a famous healer, who was mentioned by many informants.

Distribution of medicinal plant knowledge within the communities

According to the number of use reports per informant, no distinction between specialist versus generalist knowledge is possible (Figure 20). This is not surprising given the fact, that healers may be specialized on few remedies only, as explained above. On the other hand, most of the local people

know at least a couple of medicinal plants and how to use them. Generally, people who have a broad medicinal plant knowledge also reported to frequently use medicinal plants.

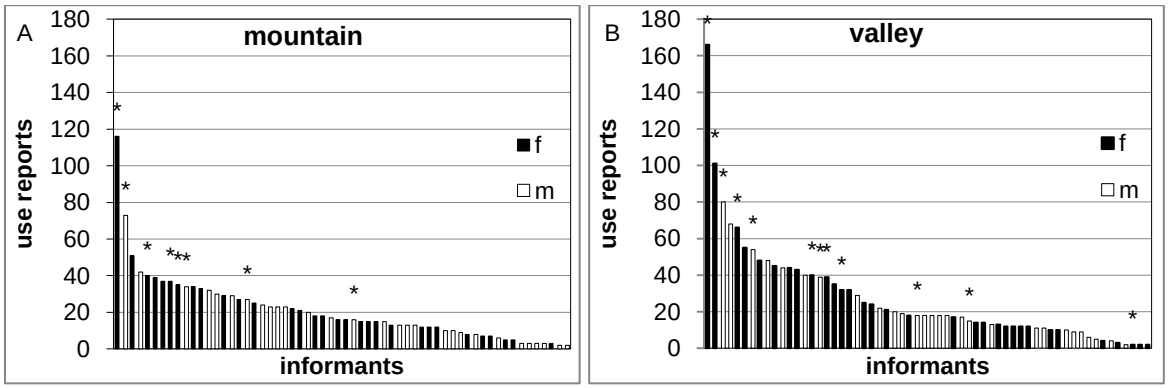

Figure 20: Number of use reports per female and male informants in the mountains (A) and in the valley (B). Asterisks indicate specialists.

The mean numbers of use reports per informant did not differ significantly between female and male informants[2] (see Figure 20). Female informants reported 22.3±15.1 uses on average, male informants 19.4±14.7. Also, within different age categories the number of use reports per informant varied considerably. Significantly less use reports on average were found among the young people below 21 years[3]. This may be explained with the fact that they are still young and have not yet learned much about medicinal plant use; for example, many older women stated that they learned about medicinal plants only when they got children. However, the finding may also indicate an erosion of knowledge (see below).

Acquisition and transmission of medicinal plant knowledge

Knowledge is passed on through generations (Figure 21). Most informants designated their parents or grandparents as sources of their medicinal plant knowledge. In about 50% of these cases they specified to have learned from the mother or grandmother, whereby father and grandfather were rarely mentioned. Others indicated to have learned from further family members, older people, neighbours, or through asking friends or other people.

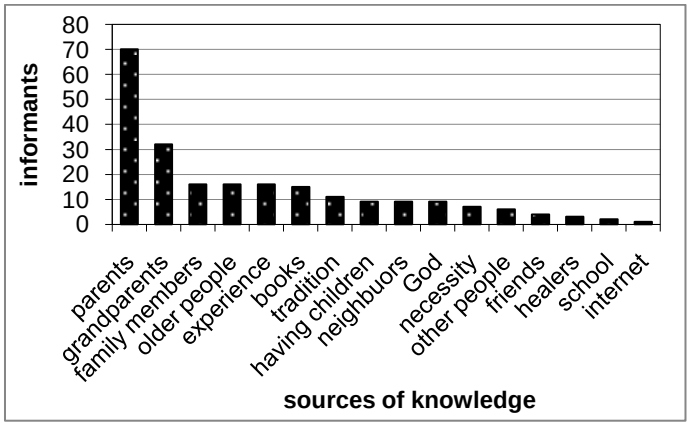

Figure 21: Sources of knowledge mentioned by informants (multiple citations per informant possible).

[2] Student's t-test, p=0.29 (five specialists with exceedingly high numbers of use reports (three women, two men) have been excluded from calculation)

[3] Student's t-test, p***<0.001 (mean number of use reports per informant (without five specialists, see above), for informants < 21 years: 8.2±6.7; 21-40 years: 25.7±15.4; 41-60 years: 24.6±14.3; >60 years: 23.7±14.6)

Several persons, especially local healers (*curanderos* / *curiosas*) indicated to have gained their knowledge through experience, practice, and experiments. Poverty, or necessity, have been mentioned as further reasons to become knowledgeable about medicinal plant use: the lack of economic means to pay for biomedical treatment makes people use medicinal plants instead. Several of the local healers claimed to have learned how to cure with plants because of their poverty. Remarkably, in nine cases, people claimed to have received their knowledge from God. Five of these informants indicated that they were healers by birth; that they had obtained a gift from God and were born with the knowledge of curing. Three informants, in this case not healers, indicated to have been severely ill and that God sent them dreams about which plants to use. One healer told that he found a remedy against stomach cancer, when the doctors in the clinic had given up his wife who suffered from it, and told him to bring her home to die. He claimed to have heard "like a voice from above" telling him which plants to use (*Penca Sábila, Flor de Arena, Abreojo*) for the preparation of a remedy. His wife got healthy again. This healer had also learned from experience, and out of necessity, as he was an orphan and grew up in poverty. Another important source of knowledge he indicated were medicinal plant books.

Books were mentioned as sources of knowledge in 16 cases[4]. It is evident that they play an important role in shaping the local knowledge on medicinal plant use, as they are used predominantly by specialists. Therefore, the contents are distributed among the population when these people give recommendations to those who ask them. Further, when informants indicate that they learned from their parents or grandparents, this does not necessarily mean that their knowledge has been passed on through many generations; also the grandparents may have been using medicinal plant books.

Especially in case of healers or persons with particularly extensive knowledge, the knowledge may represent a mixture of traditional uses that have been passed on through generations, and uses developed in other places, documented in forms of books. It may have been further expanded by uses these people acquired through experimentation and as well through oral communication with people from other regions. Even though most people designated their parents or grandparents as sources of their medicinal plant knowledge, the importance of books in shaping the local knowledge should not be underestimated, especially as books distribute information in a long term and conservative manner (Leonti, 2011).

Erosion of medicinal plant knowledge?

Overall, 66% of all informants perceive a loss of medicinal plant knowledge. This finding, together with the fact that many young people only know very few medicinal plants, may indicate a change in medicinal plant knowledge. The small number of use reports by the young people does not necessarily mean a break in knowledge transmission, as they may learn more later on in their lives. However, according to the majority of the local people, the young do know less about medicinal plants compared

[4] Above all, the following books were mentioned: Arroya Aceveda JL, Garcia Mirera GA, Saldaña Leyra LE. 2002. *Plantas medicinales.* Publicaciones ASDIMOR.
Arroya Aceveda JL, Garcia Mirera GA, Saldaña Leyra LE. 1994. *Guía moderna de medicina natural.* Publicaciones ASDIMOR.

to earlier times. The fact that many informants had learned from their parents and grandparents may indicate that learning starts early in life, when the children themselves are sick and receive plant remedies, mostly from their mothers or grandmothers; if this is the case, it may be that the young of these days learn less compared to former generations. Some older specialists claimed that their grandchildren are not interested in the medicinal plants anymore. There may be a connection with today's compulsory education and declining medicinal plant knowledge, as schooling has been negatively associated with the use of medicinal plants (Giovannini et al., 2011). However, the question about the erosion of medicinal plant knowledge cannot be conclusively answered within the frame of this study. Despite this, it is obvious that the Andean societies face changes in different domains of life, through the influence of globalisation. It is evident that the use of medicinal plants also changes, due to the availability of biomedicine and the oncoming of health assurances. On the other hand, teachers and school directors appear to favor the integration of education about medicinal plants into the curriculum. A small project on medicinal plants was done in a primary school in a neighbouring village, and school directors from secondary schools in the study sites showed interest in using the documentation resulting from the present work. This can be an opportunity to counteract knowledge erosion and to contribute to the preservation of local knowledge on medicinal plant use.

4.4. The role of medicinal plants in the local health care system

"Natural medicine" and biomedicine as complementary components

The medicinal system in the research area consists of natural medicine, i.e. use of medicinal plants, on the one hand and biomedical health outposts (one in each research locality) and pharmacies on the other hand. However, the health outposts do not dispose of much technical or medicinal equipment, there are no laboratories available and medicament supply is insufficient. Hence, in severe cases, the inhabitants go to the next bigger towns of Celendín (about four hours by bus) or Cajamarca (eight hours), if they dispose of the necessary economic means. The overall picture of local health care is dominated by a combination of plant medicine, or natural medicine (*medicina natural*) as people call it, and biomedicine, called chemical medicine (*medicina química*). The vast majority of informants use both parts of the medical system; only one informant claimed to never use plants, and only four stated that they never take pills or consult the health outpost. Two thirds of all informants indicated to use plants in the majority of cases, mostly as first treatment for less severe ailments, and to visit the health outpost only if the plants remedies do not help. About 30% of the informants preferred biomedical treatment as first measure, and used plants as accompanying support. Whereas most informants prepared the plant remedies themselves, several mentioned the importance of *curanderos* and *curiosas* for giving recommendations and instructions of which plants to use and how to apply them. However, a large proportion emphasized the need to go to a *curandero* or *curiosa* for the curing *susto* (39%). Hence, the choice of which part of the medical system to use first depends on the kind of disease. For example, for bronchial complaints it is common to go to the local health outpost for antibiotic injections. Remarkably, even though many informants indicated that natural medicine is healthier than

taking the pills from the pharmacy, they claimed that many people prefer the pills because of their faster action (mostly referring to other people, but not to themselves). People use the different parts of their health care system according to their needs, preferences and possibilities; if one part does not bring cure, alternatives are used. The typical medical itinerary delineates as follows: Firstly, plant remedies are used; if they do not bring relief, the patient visits the health outpost for diagnosis or goes straightly to the pharmacy to buy pills. If they neither bring cure, the patient consults a local healer, and if the healer cannot help him, he travels to Celendín or Cajamarca if possible. Of course, there are variations in this scheme. About 30% of the informants, including the people who deny the existence of local healers, would rather go to the health outpost or the pharmacy first; but most of them would use plants to accompany the pharmaceutical treatment. Also, some biomedical doctors working at the health outposts prohibit the use of medicinal plants. The picture emerging is one of a medical system with different components complementing each other, as has been found in other studies (Giovannini et al., 2011).

Causes of illness as perceived by local people

The practice of the local people to combine different types of medicinal care rooted in both, biomedicine as well as their traditional system, is also mirrored in their explanations of what can cause a disease. They make no difference between living and non living parts of nature, and perceive all components of the environment as animated. They also do not dichotomize between „natural“ and „supernatural“ or „spiritual“, as the western worldview usually does. Thus, biological items such as parasites can cause diseases, as well as bad energies, or witchcraft can. Actually, most people do integrate both types of causes of disease into their perspective, and these are equally important and not seen as contradictory or opposite to each other. Different causes for disease simply have to be treated differently, and bad habits in relation to diet for example is as normal a cause for disease as is *susto*, fright leading to loss of the spirit caused by evil energy.

5. Conclusions

Medicinal plant knowledge and use among the inhabitants of two study sites located at different altitudes in the northern Peruvian Andes was documented and comparatively analyzed. Broad medicinal plant knowledge exists among the inhabitants of both localities and different types of "natural medicine" specialists can be consulted. The pattern of documented plant species and families found in this study corresponds with findings from similar studies conducted in Andean ecological regions in South America, especially with regards to the frequent usage of species from the Asteraceae, Lamiaceae, Fabaceae and Solanaceae families, and the importance of introduced, often cultivated plants as medicinals. Predominantly aerial parts of herbal species are applied, although a considerable proportion of woody species are also employed, likely due to their higher availability during the dry season. The main administration route of medicinal plants is orally, in the form of infusions, decoctions or sap. Most uses were reported for gastrointestinal diseases, nerves, urological and respiratory diseases, and dermatological complaints. The effective use of the most common medicinal plants is supported by scientific findings on their compounds and pharmacology.

People rely on medicinal plants or on the treatment they receive from a local specialist mainly for minor diseases, as well as for diseases caused by witchcraft, by the envy of other people, or by soul loss through fright (*susto*), conditions which must be treated by the performance of ritual cleansing ceremonies. This is in contrast to, for example, bronchitis, which is commonly treated with antibiotic injections at the biomedical health outpost. People flexibly combine medicinal plant use with biomedicine according to their beliefs, economic situation, familial history, personal experience and preferences. They also combine the related epistemologies to explain the causes of diseases, e.g. parasites or bad dietary habits are seen as normal causes as fright, envy or evil winds. Furthermore, sorrow, worries and anger can also lead to disease and must be treated accordingly. Thus, medicinal plant use and biomedicine complement each other to form the local health care system. Nevertheless, a loss of medicinal plant knowledge is perceived, possibly due to the availability of alternative treatments, such as the biomedical health outposts and pharmacies. With the integration of medicinal plant knowledge into the curriculum of local schools, such knowledge erosion may be counteracted.

The overall picture regarding medicinal plant use, knowledge distribution, types of local healers, and plant families used, is the same for both study sites. However, differences in the environment of the study sites are reflected in medicinal plant knowledge and use. For example, more uses against respiratory diseases were reported in the mountains, where the climate is characterized by cold temperatures and harsh winds; disease caused by evil winds was also more frequently mentioned in this region. On the other hand, more uses against urological and dermatological complaints were reported in the valley, assumingly due to the warmer temperatures favoring dehydration and leading to higher infection rates of wounds by facilitating parasitic reproduction. Further, species occurring only in ecological zones at higher altitudes, such as *Sambucus nigra* subsp. *peruviana* and *Mauria*

heterophylla, were more often cited in the mountains, whereas *Aloe vera* and *Annona muricata*, which grow exclusively in the valley, were mentioned more frequently in this region.

The ethnobotanical data obtained from this study may provide a basis for further investigation, both from an ethnopharmacological and from an anthropological perspective. For example, an unidentified species from the Bignoniaceae family was reported to be highly effective against diabetes indicating that pharmacological investigations could be promising. Also, the question of knowledge erosion and its causes and consequences present further topics of interest for ethnobotanical research.

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Appendices

Appendix 1: Interview guide

Main questions	Following questions
¿Cuáles son las enfermedades más frecuentes acá en la zona?	
¿Cuáles son las enfermedades más graves?	
¿Qué plantas medicinales conoce usted?	
¿Para qué se usa esas plantas, y cómo se las aplica?	
¿De dónde tiene usted las plantas?	¿Usted misma/-o las colecta?
¿Qué hace usted cuando usted mismo/-a se enferma, o alguien de su familia?	¿También se van a un curandero o una curiosa? / ¿También se van a la posta?
¿Cuáles son las causas de las enfermedades, por qué se enferma una persona?	
¿Hay curanderos / curiosas acá? ¿Quiénes?	¿Usted conoce a alguien que también sabe de las plantas medicinales?
¿Dónde adquirió usted sus conocimientos sobre plantas medicinales?	
¿Usted transmite sus conocimientos sobre plantas medicinales?	¿A quién? ¿Cómo?
¿Cree usted que los conocimientos sobre plantas medicinales están en peligro de perderse?	¿Por qué?

Appendix 2: All medicinal uses and their classification in disease categories.

App.2.A. Gastrointestinal diseases

antibiotic	intestinal fever	stomach infection
antibiotic for the stomach	intestinal infection	stomach inflammation
babies with swollen stomach	intestinal inflammation	stomach irritation
cicatrising the stomach	intestinal parasites	stomach pain
colic	intestinal ulcers	stomach parasites
constipation	intestinal worms	stomach problems
cronical gastritis	intestines	stomach purification
diarrhea	laxative	stomach ulcers
diarrhea (of babies)	laxative (for babies mostly)	stomach walls
diarrhea (of children)	nausea	strong colic
dysentery	pain from a hernia	strong stomach infection
functioning of the stomach	pancreas	swollen stomach
gases	pancreas infection	tapeworms
gastric indisposition	parasites	to clean the stomach
gastritis	purgative	to purify the stomach
hard stomach	stomach	to travel quietly (nausea)
heavy stomach	stomach colic	ulcers
hernia	stomach defenses	vomiting
indigestion	stomach fever	weak stomach
intestinal colic	stomach function	worms

App.2.B. Nerves

aire	head ache	shaking
aire de muerto	hypocondria	sorrow
anger	insomnia	stress
antimonia	intellect development	stroke
baby's hands red of drinking milk from angry mother (can kill)	malaire	strong aire
back pain	memory	susto
body pain	mental work	susto
brain	nerval infection	to extract theeth
calmative	nerves	to forget heart ache
Chucaque	nervous system	to relax the body
depression	nervousness	to sleep
dizziness	pain	to sleep well
epilepsy	pain of removing teeth	tooth ache
fainting	pity	tooth inflammation
for better sleep of the children	poor vision	worries
hallucinogen	revolting children	

Appendix 2: All medicinal uses and their classification in disease categories (continuation).

App.2.C. Respiratory diseases

aching lungs	expectorant	respiratory tract
amygdalitis	flu	sinusitis
angina	flu with fever	sore throat
asthma	for the bronchia of newborn babies	sternutation
black cough	lungs	strong cough
breathing difficulties	mumps	strong flu
bronchia	nose bleeding	throat
bronchitis	nose irritation	throat infection
catarrh	pain in the chest	throat inflammation
chronical bronchial ailments	phlegm	throat operation
cold	prevention of respiration difficulties	to drop catarrh
cold of the lungs	pulmonary infection	tonsil infection
congestion	respiration difficulties	tonsil inflammation
congestion of lungs	respiratory diseases	
cough	respiratory infection	

App.2.D. Urological diseases

bladder	kidney irritation	prevention of renal diseases
bladder infection	kidney pain	prostate
bladder inflammation	kidney problems	prostate inflammation
blood in the urine of men	kidney purification	swollen penis of a baby
diuretic	kidney stones	to purify the kidneys
genital infection	kidneys	urinary detention
good for the kidneys	male genital infection	urinary tract
inflammation of sexual organs of men and women	men's inflammation	urinary tract infection
kidney infection	prevention of prostate inflammation	urinary tract inflammation
kidney inflammation	prevention of prostate diseases	when a child's urine is greenish

Appendix 2: All medicinal uses and their classification in disease categories (continuation).

App.2.E. Dermatological diseases

after operation on the head	hemorrhages of wounds, cuts	swollen feet
animal's ulcers, also person's	herpes	swollen skin
bee sting	infected wounds	swollen wounds
big wounds	infected, swollen feet	to cauterize wounds
bleeding after tooth extraction	inflammation of wounds	to clean the face
burning	irritated hands or feet	to disinfect wounds
burning sensation in the feet	mosquito and fly bites	to refine the skin
burning sensation on the skin	nosebleeding	to regenerate the tissue
burnings	pimples	to remove spines
children with pustules on the skin	pimples in the face	to wash haematoma
cicatrising	pimples on the chest	to wash the skin
cuts	rectal infection	too much sun
disinfect wounds	skin	tumors
disinfectant	skin diseases	UTA
excoriated baby's bottom	skin fungi	warts
external wounds	skin infection	when the umbilical residues do not fall off
facial skin infection	skin inflammation	white soft swelling of the feet
fire in the mouth	skin inflammation (from the sun)	white swellings
for good skin	skin irritation	wounds
haematoma	skin parasites	wounds from to much sun
haematoma on the head	skin tumors	wounds that do not heal
haemorrhoids	sun	
hemorrhages	swellings	

App.2.F. Gynaecology

after birth care	inflammation of sexual organs of women	to have children
belly	menopause	to induce labour
belly infection	menstrual cramps	uterus infection
belly inflammation	menstrual pain	vaginal burning sensation
belly pain	menstruation	vaginal discharge
birth pain	mothers who don't have breast milk	vaginal hemorrhages
contraceptive	ovaries	vaginal infection
delay of menstruation	ovary infection	vaginal inflammation
excessive menstrual hemorrhages	ovary inflammation	vaginal prolapse
female genital infection	ovary inflammation	vaginal washings
fertility	regulation of menstrual hemorrhages	women's diseases
fertility	strong belly infection	women's hemorrhages
fungal infection	strong vaginal infection	women's infection
hemorrhages	swollen breast after giving birth	women's inflammation
infection of the uterus	to give birth	women's prolapse

Appendix 2: All medicinal uses and their classification in disease categories (continuation).

App.2.G. Liver

bad breath	liver	liver prevention
bad taste in the mouth	liver colic	liver problems
bile	liver infection	liver purification
cirrhosis	liver inflammation	liver stones
hepatitis	liver pain	prevention of hepatic diseases

App.2.H. Cardio-vascular diseases

anemia	colesterol	high blood pressure
blood	control of blood pressure	high colesterol
blood intoxication	cronic anemia	to purify the blood
blood purification	heart	to regulate the blood
circulation	hemorrhages	varices

App.2.I. Fever

fever	heat	inflammations with fever
fever (because of too much sun)	heat from too much sun	internal heat
fever (of children)	high fever	malaria
flu with high fever	hot front (from infection)	shivering
head ache with fever	inflammation of the body (from too much sun)	yellow fever

App.2.J. Multisystem diseases

a lot of diseases	infection	internal inflammation
body infection	infection of the body	irritation
body inflammation	inflammation	protection of the organism
every infection	inflammation of the body	purification of the organism
every inflammation	inflammation of the organism	strong infection
every kind of inflammation	inflammation of the organs	to purifiy the organism
general infection	internal diseases	
general inflammation	internal infection	

App.2.K. Skeleto-muscular diseases

artritis	fractures	tendon strain
bone pain	infection of distortion	to fortify the bones
bone pain from the cold	knee pain	to harden the bones
bones	muscle pain from insolation	twist
cold of the bones	rheumatism	twisted ankle or wrist
distortion	sprain	

Appendix 2: All medicinal uses and their classification in disease categories (continuation).

App.2.L. Other uses

MAGIC	**OTHERS**	
aphrodisiac	against acidity	to heal
against bad people	against hair spliss	to keep the hair
against envidia	against thirst	to lose weight
defense against witchcraft	allergies	to prepare wine
diabolic spirits	children who urinate into the bed	to stimulate appetite
duende (white female river ghost)	cold (frio)	viper bites
envidia	detoxifying (after fumigation)	vitamines
envidia of animals	get rid of insects	vitamines, prevention
for bewitched persons	hair growth	weight control (oppresses appetite)
love spell	medicinal food	
magic	medicine and food	
ojo of animals	natural food acompanying medicinal plant treatment	
prevention of envidia	overweight	
protection from envidias	prevention	
to get visions	prevention (vitamine C)	
to give birth to a boy	repellent against mosquitos	
to give birth to a girl	shining hair	
to kill	syphilis	
to tie up the marriage	to bathe	
witchcraft	to bathe the dead	
witchcraft: to punish the thief; his eye will explote when you call his name		
witchcraft; "hombre ciego", to give to the men so they don't realize their women go out with other men		
Small categories of medicinal uses (<40 use reports), summarized to other uses		
DIABETES	**OPHTHALMOLOGICAL**	**TONIC**
diabetes	cataract	activation
to drop the sugar in the blood	eye pain	cronic weakness
CANCER	eyes	for the defenses
anticancerogenic	irritated eyes	natural tonic
cancer	red eyes	stimulant
cancer (early stages)	remove clouds from the eyes	strength
cancer prevention	stongly infected eyes	to stay young
lung cancer	to bathe the eyes	to strenghten
stomach cancer	to keep the eyesight	tonic
EVERYTHING	vision	weakness
every disease	**OTOLOGICAL**	**VETERINARY MEDICINE**
everything	ear	chicken pest
good for everything	ear pain	prevention of animal diseases
		wounds of animals