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# ETHNOBOTANY OF THE TACANA: QUANTITATIVE INVENTORIES OF TWO PERMANENT PLOTS OF NORTHWESTERN BOLIVIA<sup>1</sup>

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ETNOBOTÁNICA DE LOS TACANA: INVENTARIO CUANTITATIVO DE DOS PARCELAS PERMANENTES DEL NOROESTE DE BOLIVIA. *Presentamos descripciones ecológicas y etnobotánicas de dos parcelas permanentes de 1-hectárea localizadas en bosque amazónico cerca de dos comunidades de Tacana situadas al norte y al oeste del Parque Nacional Madidi en la Provincia Iturrealde, Departamento de La Paz del noroeste de Bolivia. Entrevistamos a 13 hombres y mujeres Tacana para identificar los nombres y usos de los árboles, palmeras y bejucos  $\geq 10$  cm dap en las parcelas. De las 185 especies que encontramos en ambas parcelas, 115 especies son utilizadas por los Tacana: 59 especies se utilizan para construcción, 9 como fuente de fibra, 33 para tecnología y manualidades, 66 para leña, 32 para comida o agua, 40 para medicinas, 8 para caza o pesca, 9 para usos comerciales, y 11 para usos misceláneos. El 64% de las especies de provecho tienen usos múltiples. Los datos relevantes al modo de utilización del monte corresponden a otros grupos amazónicos étnicos, y demuestran una alta dependencia de los recursos naturales vegetales del bosque, especialmente en cuanto a la medicina, tecnología, artesanía, y construcción.*

**Key Words:** Amazonia; Bolivia; ethnobotany; permanent plot; Tacana.

Quantitative ethnobotanical studies are one method to document and compare the knowledge of plants held by different native and non-native groups (Phillips et al. 1994; Pinedo-Vasquez et al. 1990; Prance et al. 1987). They provide information on the number of species, number of individuals, and guilds of plants used by these groups. Although the number of studies of

the plant use by native inhabitants is growing, both the ethnobotany and ecology of many areas within Amazonia remain undocumented.

In this paper, we present descriptions of the diversity of trees and lianas used by the Tacana, a group of original inhabitants of the northwestern lowlands of Bolivia. We report ecological and ethnobotanical results from two 1-ha plots in lowland tropical moist forest in order to determine the species diversity of the forests and to quantify the Tacana's use of the forest for timber and non-forest timber products. The Tacana

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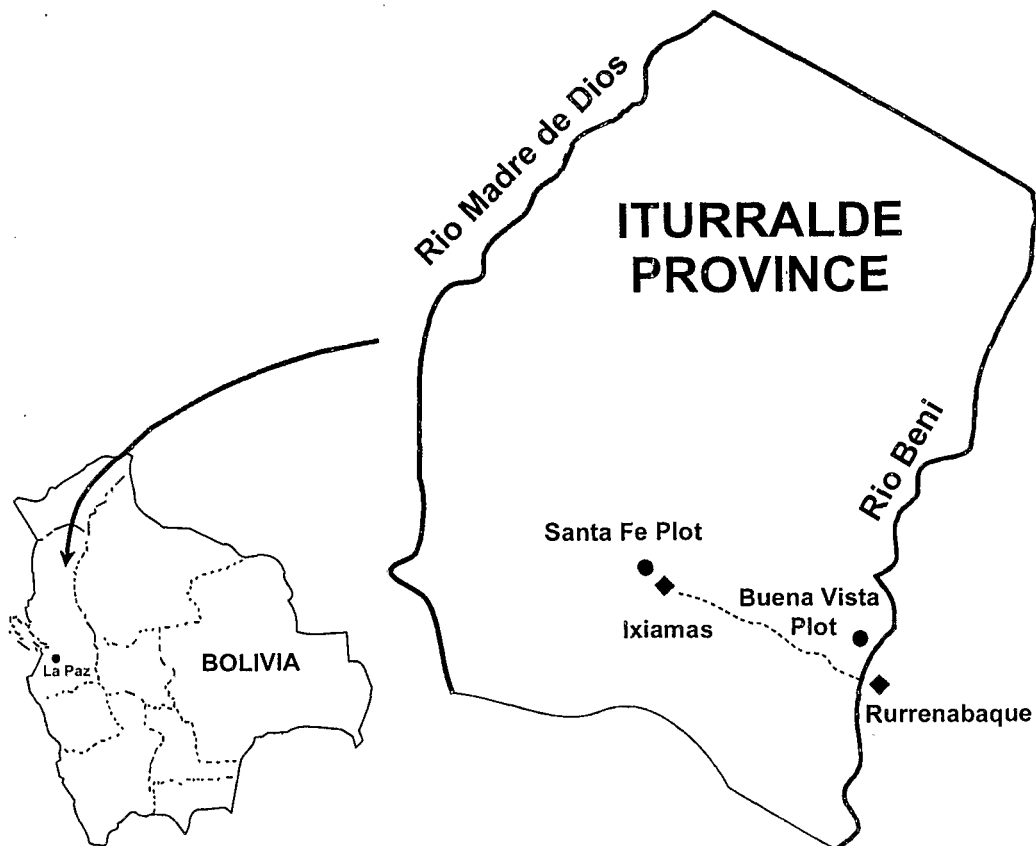


Fig. 1. Map of Iturrealde Province in the Department of La Paz, Bolivia. Buena Vista and Santa Fe permanent 1-ha plots are indicated with circles.

live in the northern and eastern buffer zone of the Madidi National Park, which was established in September 1996. Biological inventories in the area of the park have found that the park encompasses one of the areas of highest biodiversity in South America (Parker and Bailey 1991; Remsen and Parker 1995). As part of the buffer zone, the Tacana occupy a key position for the protection of the Madidi Park. Colonization by highland migrants and exploitation of natural resources by timber companies, however, are increasing the pressure on Tacana lands.

#### PEOPLE AND STUDY AREA

We studied the ethnobotany of the Tacana living in several communities in the Iturrealde Province, Department of La Paz, at the foothills of the Cordillera Oriental of the Andes Mountains (Fig. 1). The meteorological station at Rurrenabaque records mean annual temperatures of

25.9°C and mean annual precipitation of 2550 mm. There is a distinct dry season from May to August. This area is a transitional zone between the high forests of the Department of Pando and the Llanos de Mojos in the Department of Beni. We selected the communities of Buena Vista and Santa Fe as the sites of permanent 1-ha plots. The communities are located approximately 90 km apart and represent different ecological as well as cultural aspects encompassed within the lands traditionally held by the Tacana.

The community of Buena Vista (14°22'S 67°33'W, 180 m) lies on the western bank of the Beni River. Sixty-three families were living in Buena Vista including approximately 355 men, women, and children. Buena Vista was established as a community after the Agrarian Reform in 1953 by Tacana who had come from Tumupasa and Ixiamas to work growing and processing sugar cane for a non-Tacana patron.

Santa Fe (13°40'S 68°12'W, 250 m) is located 3 km NW of the town of Ixiamas. The community was founded in 1973 by seven Tacana veterans of the Gran Chaco War. The original community members came from Ixiamas looking for land on which to grow their crops. Eight years before our study most families returned to Ixiamas because the elementary school in Santa Fe closed, although some retained their agricultural plots in the community. At the time of the study, fewer than five families were living in Santa Fe.

The Tacana language is part of the Macro-Panoan stock, which unites the widespread Panoan and Tacanan subfamilies. The Tacanan linguistic family includes Ese'ejja, Araona, Toromono, Reyesano, and Cavineña (Ruhlen 1987). This language family is most closely related to the Panoan family, which includes Chácobo, Amahuaca, Cashinahua, Capanahua, and Ksharari (Ruhlen 1987). The isolete Chimane or Mosen language is also part of the Macro-Panoan stock.

Prior to the current study, a few investigations examined the ethnobotany of the Tacana. The Franciscan missionary Armentia (1897), the French geographer D'Orbigny (1946), and the Italian naturalist Balzan (1891a; 1891b; 1892) were the first to give descriptions, albeit brief, of the Tacana's use of plants and the names of these plants. A detailed anthropological study that compiled Tacana myths and some use of plants was conducted by Hissink and Hahn (1984). Wentzel (1989) also gathered unvouchered ethnobotanical information in her anthropological study of several Tacana communities in relation to their land use practices. Moraes, Sarmiento, and Oviedo (1995) documented the Tacana's use of palms. Our study is the first, however, to document quantitatively and systematically the use of vouchered trees, palms, and lianas by the Tacana.

## METHODS

### PERMANENT PLOT DATA COLLECTION

We selected plots in late-secondary or old-growth forest that were located within a reasonable (40-minute) walk from the communities. The Buena Vista plot (BV) was located in seasonally flooded, late secondary growth forest (approximately 100 years old; T. Killeen, personal communication) and was surrounded on

three sides by young secondary vegetation dominated by *Cecropia* spp. The Santa Fe plot (SF) was located in primary, non-inundated forest. Following the descriptions in Killeen, García E., and Beck (1993), the forests of BV and SF are classified as Amazonian Forest (Bosque Amazónico).

Each plot was sampled with two adjacent parallel transects (240 and 260 m long) of contiguous 20 × 20 m quadrats. All living trees, lianas, and palms ≥ 10 cm dbh were tagged in the two 1-ha plots. Voucher specimens were collected in triplicate, deposited in the Herbario Nacional de Bolivia (LPB) and the Missouri Botanical Garden (MO), and sent to specialists for identification. Unidentifiable species were grouped into morphospecies. When species could be identified unambiguously in the field as one that had already been collected, we did not collect a new voucher. Palm vouchers were collected outside of the plot.

### ETHNOBOTANICAL DATA COLLECTION

We collected ethnobotanical information on the trees and lianas in our plots by interviewing 13 Tacana men and women in 1995. We selected informants who were older members of the communities, were known to be knowledgeable about uses of plants, were not currently engaged in wage labor, and were physically able to walk to the plots. The interviews were conducted in Spanish, which was spoken by all of the members of the Tacana communities in which we worked. We interviewed more men than women. Women were reluctant to be interviewed because they doubted their ability to identify the trees. We conducted all interviews for this study in the permanent plots by going with the informant to every tagged tree and liana and asking them for their names in Spanish and Tacana and uses, if any. Informants were encouraged to smell the inner bark, examine the leaves, or do whatever was necessary for them to identify the plant. We also encouraged them to tell us of other plants that had similar uses. We interviewed informants separately and paid them the local daily wage. Most interviews lasted a day and a half.

Six Tacana men and two women currently living in Buena Vista were interviewed. Their ages ranged between 50 and 65, with a mean age of 58. The men identified themselves primarily as farmers, but most had worked cutting lumber,

piloting boats on the Beni River, and/or harvesting or processing rubber and Brazil nuts near Riberalta, Bolivia. Neither of the two women had worked outside of agriculture. One of the men served as *yanacona*, or traditional healer, in the community.

Four men and one woman were interviewed in the Santa Fe plot. They ranged in age from 49 to 79, with a mean age of 64. As in Buena Vista, the men were mainly farmers, but a few had also raised cattle or worked harvesting rubber and/or Brazil nuts. The one woman interviewed had worked collecting Brazil nuts near Riberalta, Bolivia.

Twelve Tacana informants verified uses, names, and spellings for the trees in the plots with reference to dried herbarium specimens in a 3-day workshop in October 1997. Our initial orthography of the Tacana names was conducted with reference to van Wynen and van Wynen (1962). Some local variation in spelling was found to occur between communities closer to Ixiamas and those nearer to Tumupasa, so we used spellings from the latter area for consistency.

#### DATA ANALYSIS

We calculated taxonomic importance values of each species according to Cottam and Curtis (1956) and Curtis and Cottam (1962), and family importance values using the formulae in Mori et al. (1983). Species importance values are the sums of relative density (number of individuals of a species/total number of individuals in the plot), relative frequency (number of subplots in which the species occurred/total number of subplots of occurrence for all species), and relative dominance (total basal area of the species/total basal area of all individuals in the plot). Family importance values are the sums of the family relative diversity (number of species in the family/total number of species in the plot), the family relative density (number of individuals in a family/total number of individuals in the plot), and the family relative dominance (total basal area of individuals in the family/total basal area of all individuals). Lianas were included in all of these calculations.

Several authors have addressed the problems of investigator-biased use of broad categories, specifically that the categories are contrived groups created by ethnobotanists in order to analyze their data (Boom 1987; Phillips and Gen-

try 1993; Prance et al. 1987). Although we are aware of these problems, we used categories to group our data. We attempted to present the species in regard to their local uses and their relation to the Tacana. Our categories, however, also correspond fairly closely with those of Prance et al. (1987) with the exception that we have categories for firewood and sources of fiber. We determined the latter category to be separate from technology and crafts or construction because our informants used one word: *panchos* (local Spanish) to describe plain strips of bark used for a variety of uses.

Our categories were species used for or appreciated as: a) construction, b) sources of fiber, c) technology and crafts, d) firewood, e) edible parts (including water), f) medicine or remedy, g) hunting and fishing, and h) commerce. We also had an "other" category for plants used for magical properties that are not medicinal, toys, and beauty or cosmetic products. Species with multiple uses were placed into each relevant category.

## RESULTS

### FOREST COMPOSITION

We measured a total of 185 species of trees and lianas  $\geq 10$  cm dbh in 49 families in the BV (618 individuals, 117 species) and/or SF (567 individuals, 122 species) plots. Sorenson's coefficient of similarity of the two plots, based on presence vs. absence of species, is 0.46 (55 species in common), suggesting a fairly high level of similarity between the two plots. The *Arecaceae*, *Moraceae*, *Fabaceae*, *Annonaceae*, and *Meliaceae* had the highest family importance values in both plots (Table 1), and the 15 species with the highest importance values in the two plots were 50% similar (Table 2). Emergent trees were *Clarisia* spp., *Dipteryx odorata*, *Poulsenia armata*, and *Terminalia amazonia*. Palms comprised over 30% of the total number of tagged plants in the BV plot, but only 16% of all individuals in SF. We measured five species of lianas in BV and 17 in SF. Three of those in SF were actually hemiepiphytes in the *Moraceae*: *Ficus guianensis*, *F. pertusa*, and *Coussapoa ovalifolia*.

The presence of four individuals of *Theobroma cacao* in BV and one of *Bactris gasipaes* in SF may suggest that these forests were once managed for agroforestry practices, however we found no other evidence of such management.

TABLE 1. THE 10 FAMILIES WITH HIGHEST TAXONOMIC IMPORTANCE VALUES IN THE A) BUENA VISTA AND B) SANTA FE PERMANENT PLOTS. THE FAMILIES ARE LISTED IN DESCENDING ORDER OF FAMILY IMPORTANCE VALUE (FIV).

Family	No. species	No. trees	Basal area (cm <sup>2</sup> )	F.I.V.
a) Buena Vista				
Arecaceae	6	207	56 376	59.27
Moraceae	9	71	38 079	33.13
Fabaceae	14	22	15 902	21.35
Annonaceae	9	47	10 777	19.24
Meliaceae	6	39	11 027	15.48
Bombacaceae	5	8	17 866	12.11
Euphorbiaceae	4	10	13 868	10.12
Myristicaceae	3	17	9914	8.95
Flacourtiaceae	5	22	2752	8.84
Combretaceae	2	5	16 548	8.58
Subtotal	63	448	193 108	197.06
Other families	54	170	79 933	102.94
Total	117	618	273 040	300.00
b) Santa Fe				
Fabaceae	24	63	53 334	52.17
Moraceae	10	67	39 713	35.95
Arecaceae	6	91	20 295	29.13
Meliaceae	4	58	21 472	22.13
Annonaceae	5	61	13 650	20.35
Tiliaceae	2	23	14 413	11.48
Polygonaceae	4	13	13 467	10.97
Bombacaceae	4	16	6405	8.67
Bignoniaceae	8	8	1220	8.46
Burseraceae	2	24	4441	7.66
Subtotal	69	424	188 410	206.96
Other families	53	142	61 157	93.04
Total	122	566	249 567	300.00

#### ETHNOBOTANICAL RESULTS

Of the 185 species found in the two plots, 115 (62%) are used by the Tacana. The Tacana use 59 (32% of all species) species for construction, 9 (5%) as sources of fiber, 33 (18%) for technology and crafts, 66 (36%) as firewood, 32 (17%) as food or water, 40 (22%) for medicine, 8 (4%) for hunting or fishing, 9 (5%) for commercial purposes, and 11 (6%) for other miscellaneous uses. Of the 115 utilized species, 74 (64%) had more than one use. Discounting firewood as a category, 112 species are used by the Tacana. Appendix 1 presents the scientific determination, voucher numbers, Tacana names, other vernacular names (usually the local Spanish), use codes, and detailed descriptions for each species found in the plots. Species that are

not used but occurred in the plots are included in the appendix as well. We limit our description of plant uses within the body of the article to those that are of special interest or require further explanation.

#### Construction

House construction is one of the main uses of the trees in the plots. Tacana housing is characterized mainly by the use of local materials: Y-shaped house posts are planted in the soil and serve to hold up the beams for the roof. The walls are made of split palm or bamboo, the roofs of thatched palm leaves, and the floor of soil mixed with water which is smoothed and then left in the sun to dry. A few houses have walls made from adobe. Valued house posts can be made of six tree species occurring in the plot. The Tacana use these species because they are dense and resist rotting and wood-eating insects. The beams and rafters can be made from 11 other species; they do not need to be as resistant as the house posts. For the outside walls of their houses, the Tacana use the split trunks of the palms, *Socratea exorrhiza* and *Euterpe precatoria*. These species are said to be the most resistant to decay.

The preferred Tacana roofing comes from the leaves of *E. precatoria*, which last about 20 years. Leaves from *Attalea phalerata* are also said to last 15–20 years if they are correctly processed, i.e., if the leaves are simply folded and not split down the midvein.

#### Fiber Sources

Strips of bark are used for a variety of purposes. The different poles and beams of the house are tied together using long strips of bark of *Unonopsis floribunda*, *Eriotheca* sp., *Pseudobombax* sp., and *Pourouma cecropiifolia*. The Tacana also use the fibers of other tree barks to make mats and tumplines. The bark of *Heliocharpus americanus*, typically a tree of secondary growth areas and found in a treefall gap in the BV forest, is used to make floor mats. The Tacana use strips of the bark of *Apeiba membranacea*, *Duguetia spixiana*, and *Iriarteia deltoidea* to make tumplines, used in carrying meat during hunting trips or in bringing agricultural products back from the fields.

#### Technology and Crafts

The inner wood or roots of certain species are used to make articles for food preparation items,

TABLE 2. THE 15 SPECIES WITH HIGHEST TAXONOMIC IMPORTANCE VALUES LISTED IN DESCENDING ORDER OF SPECIES IMPORTANCE VALUE IN THE A) BUENA VISTA AND B) SANTA FE PERMANENT PLOTS.

Family	Determination	Abundance	Frequency	Basal area (cm <sup>2</sup> )	Importance value
a) Buena Vista					
Arecaceae	<i>Iriartea deltoidea</i>	86	22	20 443	26.44
Arecaceae	<i>Euterpe precatoria</i>	50	21	10 537	16.76
Arecaceae	<i>Jessenia bataua</i>	38	19	16 832	16.66
Moraceae	<i>Sorocea</i> cf. <i>pileata</i>	18	14	7580	8.89
Moraceae	<i>Pseudolmedia laevis</i>	17	13	7037	8.30
Tiliaceae	<i>Pentaplaris davidsmithii</i>	15	11	7971	7.86
Meliaceae	<i>Guarea</i> aff. <i>guidonia</i>	19	13	4521	7.71
Combretaceae	<i>Terminalia amazonia</i>	4	4	16 415	7.57
Annonaceae	<i>Unonopsis floribunda</i>	16	14	2989	6.89
Arecaceae	<i>Astrocaryum gratum</i>	18	11	3506	6.71
Elaeocarpaceae	<i>Sloanea guianensis</i>	4	4	13 211	6.40
Burseraceae	<i>Protium rynchophyllum</i>	16	12	1935	6.04
Ulmaceae	<i>Celtis schippii</i>	12	11	4082	5.95
Violaceae	<i>Leonia racemosa</i>	13	11	2712	5.61
Myristicaceae	<i>Otoba parvifolia</i>	12	8	4856	5.55
Subtotal		338	188	526	143.36
Other species		280	249	148 414	156.64
Total		618	437	273 040	300.00
b) Santa Fe					
Fabaceae	<i>Dipteryx odorata</i>	12	11	28 543	16.19
Meliaceae	<i>Trichilia pleeana</i>	33	18	14 496	15.94
Arecaceae	<i>Astrocaryum gratum</i>	38	19	9074	14.90
Tiliaceae	<i>Pentaplaris davidsmithii</i>	21	12	13 075	11.82
Moraceae	<i>Pseudolmedia laevis</i>	28	14	7612	11.35
Annonaceae	<i>Ruizodendron ovale</i>	25	16	6524	10.86
Fabaceae	<i>Myroxylon balsamum</i>	19	13	10 050	10.49
Annonaceae	<i>Unonopsis floribunda</i>	29	14	4271	10.18
Arecaceae	<i>Euterpe precatoria</i>	21	12	4322	8.31
Arecaceae	<i>Socratea exorrhiza</i>	25	10	3423	8.18
Violaceae	<i>Leonia racemosa</i>	17	15	2965	7.78
Moraceae	<i>Sorocea</i> cf. <i>pileata</i>	16	12	4724	7.59
Combretaceae	<i>Terminalia oblonga</i>	5	5	11 586	6.72
Moraceae	<i>Poulsenia armata</i>	5	3	12 614	6.66
Meliaceae	<i>Trichilia</i> cf. <i>adolphi</i>	13	9	2861	5.60
Subtotal		307	183	136 139	152.57
Other species		259	235	113 428	147.43
Total		566	418	249 567	300.00

containers, and tools. The Tacana carve the inner wood of *Clarisia racemosa* into mortars (*tacú* in local Spanish). The large buttress roots of *Sloanea guianensis*, *Dipteryx odorata*, and *Ficus kiliipii* are made into containers, grinding surfaces, or basins. The spiny, adventitious roots of the stilt palm *Socratea exorrhiza* were used as graters for plantains. Ax handles, sugar cane presses, and ox-drawn carts (which are used in Santa Fe to transport material across the savannas) are all made from wood or buttress roots of certain species in the plot.

In the recent past, the Tacana were active in making pottery (Hissink and Hahn 1984), but now they have mostly abandoned the practice. However, the Tacana informants reported that several plant species were used in the process. Pottery was made with a special type of blue clay and strengthened with the silica-containing bark from two Chrysobalanaceae species (*Hirtella* sp.1 and *Licania arborea*) and one undetermined species, which were burned (calcined) and mixed with the clay. The use of *Licania* bark for temper in ceramics is widespread

among indigenous and peasant groups in Amazonia (Balée 1994; Beck and Prance 1991).

Before manufactured clothing was introduced, some Tacana made tunics from the bark of *Poulsenia armata*. The bark was stripped, beaten until soft, and then cut to make a simple tunic. Currently, the Tacana only make these tunics for festivals which include traditional dancing. The use of *P. armata* for cloth and handicrafts has been documented in other parts of Amazonia (Duke and Vasquez 1994).

#### Firewood

Although most trees in the plot could be used as firewood, 66 species are considered good quality fuel for cooking, smoking rubber, or running steam-powered boats. Eight species were recognized as being of superior quality for cooking fires because they burn for a long time without producing much smoke. A female informant employed *Sapium marmieri* for cooking *chicha*, a drink which here is made from maize, manioc, rice, plantain, or palm fruit, because its wood burns slowly and evenly. *Inga* spp. and *Pourouma cecropiifolia* were said to be especially suitable for firing pottery because they burn quickly and at high temperature.

#### Plants with Edible Parts

The main staples in the Tacana diet are corn, rice, plantains, banana, and manioc (Wentzel 1989). Edible vegetable products extracted from the forest are an important part of the diet, seasonally harvested while hunting, fishing, or walking to the agricultural fields (Wentzel 1989). Fruits from 12 tree species found in the plots were reported to be edible raw.

Palm fruits are collected during special trips to the forest or from trees planted in or near the communities for use as cooking oil, refreshments, and palm hearts. Cooking oil can be extracted from the seeds of the *Jessenia bataua* and *Attalea phalerata*. The Tacana also prepare a milky refreshment from the fruit of *J. bataua*. The palm hearts of *Astrocaryum gratum*, *E. precatorea*, and *Iriartea deltoidea* are sometimes eaten. The mesocarp of *Attalea phalerata*, *Baccharis gasipaes*, and *Astrocaryum gratum* is scraped off and eaten, although the latter is only eaten in cases of food shortage.

The Tacana, like many indigenous groups in Peru and Bolivia, chew coca leaves as a medicine and stimulant. The Tacana said that the

leaves of *Sorocea* cf. *pileata* could be used as a coca substitute. Ashes made from the burnt bark of *T. cacao* or *T. speciosum* or the bract of the palm, *Attalea phalerata*, are used as *piti*, which is added to the coca leaves in the mouth and stimulates the breakdown of their alkaloids. Davis (1983) reported that the Tacana also use the liana *chamairo*, *Mussatia hyacinthina* (Standl.) Sandw., as a coca additive to sweeten the quid. This species only grows in the Andean foothills and further down the Beni River. It was not encountered in either of the permanent plots, but we observed many of the informants using it.

#### Medicine

The Tacana recognize a wide variety of forest products that have medicinal properties. Palm trees seem to be the most used species for medicinal purposes, perhaps because of the many parts of the palm that can be utilized: seeds, roots, bark. *Attalea phalerata* and *Jessenia bataua* are very highly valued species for the oil extracted from their fruit, and also for the beetle larvae, called *tuyutuyu* (*Rhynchophorus palmarum*), living inside their old, decaying trunks. The oil is taken internally to treat intestinal complaints and coughing, bronchitis, and tuberculosis. It is applied externally to treat headaches and fevers. The oil is also said to be a good cicatrizant, if applied in the form of a poultice on large wounds, burns, or boils. The beetle larvae living in the decaying stems of these two species are also collected and ingested (raw or fried), or rubbed on the affected part of the body in order to cure severe chest complaints. Medicinal use of larvae living in the same palm species is also practiced by the Cayaps and Coaiques of Ecuador (Barfod and Balslev 1988). In addition, the young reddish roots of *A. phalerata* are prepared as a syrup used against anemia and dysentery. The *asai* palm, *E. precatorea*, is also a highly valued medicinal species. Its roots have the same medicinal properties as *A. phalerata*. The two species are sometimes prepared together to cure dysentery or to be used for health fortification. The roots of *asai* are also said to be very effective against kidney and liver ailments, as are those of *chonta loro*, *Astrocaryum gratum*. They are prepared by decoction with other well-known medicinal species such as leaves of the avocado tree and the large tuberous roots of a *Smilax* sp. (DeWalt 363 LPB). The oil from the mesocarp of the fruit of the *asai* palm

can also be extracted and ingested to relieve kidney ailments, but the treatment with the roots is said to be more effective.

The Tacana named several species to which they ascribe magical, medicinal properties. The leaves or bark of the liana *Mansoa alliacea* and the bark of the tree *Gallesia integrifolia*, both of which have a garlic odor, and the strongly scented resin of *Protium glabrescens* are used to cure or to prevent *mal viento* (literally, bad wind). *Mal viento* is said to be caused by the soul of a sick person meeting with that of a dead person or by the person passing by a tree in front of which forest spirits have played. Such trees include canopy emergents of *Dipteryx odorata*, *Ceiba samauma*, and *Ficus* spp. A person suffering from *mal viento* is generally affected by fever, vomiting, and diarrhea.

#### *Plants Used in Fishing or Hunting*

Although only shotguns are now used for hunting, older Tacana in Santa Fe said that the inner wood of the palm *B. gasipaes* used to be employed in making bows. The light floral peduncle of a domesticated variety of *Gynerium sagittatum* (Aubl.) P. Beauv. (not in plots) was hardened in the fire and used as shafts for arrows made from *Guadua* spp. (not in plots), *Astrocaryum gratum*, or *Bactris gasipaes*, depending on the game. Bird feathers were affixed to the shafts with a special preparation that was placed on a small piece of bird skin left on the feathers. The preparation was made from burnt bark of *Ochroma pyramidale* (Cav. ex Lam.) Urb. (not in plots), latex from *Batocarpus costaricensis* or *Clarisia racemosa*, oil from *Attalea phalerata* seeds, and black beeswax.

Several plants are used to ensure success in hunting. The bark of *Trichilia pleeana* is boiled and men bathe in the water in the early morning. The water from the leaves of an herbaceous plant not counted in the inventory, *Oxalis leptopodes* Don. (DeWalt 879 MO), is also used in this way. However, snakes are said to be more attracted to the hunter who uses these leaves.

#### *Species of Commercial Value*

The Tacana have a long tradition of harvesting plants of commercial value to be traded with highland communities or for missionary dues. Some archeological findings, such as items from vegetative material from lowland areas found in a medicine man's tihuanacoid tomb located in

Niño Korin (Department of La Paz, Bautista Saavedra Province), have determined that the Chunchos (a general name for lowland tribes, including the Tacana) had pre-Incan contact with the Callawayas during the Tiwanacu period (800–1000 A.D.; Wassen 1972). Other archeological finds suggest that there was a great deal of highland–lowland interaction in the post-Tiwanacu period, within the Mollo Culture (1200–1450), and later during rule by the Inca (Wentzel 1989). More recently, the Tacana exchanged plants, essential oils, and animal products at the annual fair in the sub-Andean town of Pata, which ended around 1950 (Wentzel 1989). These products included some medicinal goods, such as stems from *Mussatia hyacinthina*, flowers from *Chamaedorea angustisecta* (a small palm found in the plots), oil from *Attalea phalerata*, bark from *Cinchona callisaya* Wedd., and latex from *Clarisia biflora* and *C. batocarpus*.

In the last decade, Wentzel (1989) found that gathering and braiding the leaves of the small *jatata* palm, *Geonoma deversa* (Poit.) Kunth, for the local and regional markets was the most important commercial extractive activity for a few Tacana families. We also found that the making of roofing material from the palms *Phytelephas macrocarpa* Ruiz & Pavón (acaulescent palm found in the plots) and *Attalea phalerata* is currently a productive commercial activity. However, most of the species with current commercial value are timber species such as *Tabebuia serratifolia*, *Terminalia amazonia*, *Cedrela odorata*, *Virola* spp., and *Otoba parvifolia*.

#### DISCUSSION

The uses described by the Tacana for the plants found in the two plots reflect a high use of forest trees and lianas. Of the 49 families and 185 species in the two 1-ha plots, the Tacana use 38 (78%) and 112 (61%), respectively. Moreover, more than half of these species are used for multiple purposes.

The number of species found in our 1-ha plots is similar to that found in other 1-ha plots in Amazonia. In the four plots of Prance et al. (1987), they found between 70 and 119 species of trees, comparable to the 117 and 122 species of trees and lianas  $\geq 10$  cm dbh we measured in the BV and SF plots, respectively. This species diversity is also very similar to the 1-ha plots studied by Smith and Killeen (1998) from the Pilón Lajas region to the southeast of the



Tacana communities where 78 species were found on plots on the piedmont and 146 species on the crest of the *serranía*. Despite the fact that we sampled a similar number of trees and lianas as the other studies, we only sampled about 80% of the number of trees and lianas  $\geq 10$  cm dbh estimated to occur in BV and SF (DeWalt et al., unpublished data).

The percentage of utilized species for the Tacana also corresponds to results from other 1-ha inventories (Prance et al. 1987). Prance et al. (1987) found that the Ka'apor (Brazil), Temb  (Brazil), Panare (Venezuela) and Ch cobo (Bolivia) use 77%, 61%, 49% and 79% of woody species in 1-ha plots, respectively. The Tacana use a relatively lower percentage of the species in the plots for food, more for construction, and the same for technology, medicine (or remedy), and commerce in relation to these other Amazonian indigenous groups.

Some of the families and species with the highest taxonomic importance values were also very highly valued by the Tacana for a variety of uses. The 15 species with highest importance values in each plot all had uses; more common species may also have higher rates of utilization. Most of the species were used for house construction or had edible fruit. The high abundance and dominance of species in the Arecaceae and Moraceae coincide with the families' importance to the Tacana for construction, fruits, cultural objects, and medicine. Other Amazonian peoples are as reliant on palms for medicine, construction, crafts, and food (Bal e 1988; Barfod and Balslev 1988; Boom 1986). On the other hand, the Fabaceae has one of the highest family importance values in the plots, but only a few species are used by the Tacana for purposes other than firewood.

Our methodology did not allow us to calculate the informant-derived use values of Phillips et al. (1994), which would have made a direct comparison possible between the value of trees in the current study and their study of *ribere o* use of different forest types. One interesting point that can be made, however, is that the Tacana place a much lower value on *Iriartea deltoidea* than do the *ribere os*. The Tacana utilize almost all of the other palms found in the study plots to a greater extent than they use *I. deltoidea*.

Although most tropical forest inventories do not include lianas, they are thought to have an

important impact on forest structure and are important for ethnobotanical and economic reasons (Phillips and Gentry 1993). Paz y Mi o C., Balslev, and Valencia (1995) found 46 species of lianas  $\geq 0.5$  cm dbh in one hectare of tropical moist forest that were useful to the Siona-Secoya of eastern Ecuador. Our study only included lianas  $\geq 10$  cm dbh, a relatively large size for a liana. However, we found five species in the seasonally inundated forest in Buena Vista and 17 in the non-inundated forest in Santa Fe. Of these 22 species, the Tacana only recognized six; five were used for medicine and one for various technological purposes.

Our study has shown that the Tacana use and value the forest as a source of construction materials, medicine, cultural objects, and food to a high degree. Although some of the uses we documented in this study are for products the Tacana no longer employ, such as temper for pottery or barkcloth for clothing, many of the medicinal and edible plants are currently utilized. Palms are especially valued by the Tacana. Thus, despite the acculturation of the Tacana into the greater Bolivian society that has been documented by Wentzel (1989), the Tacana retain much of their ancestral knowledge of the uses and value of the forest. Although we did not test whether age and plant knowledge are correlated, we are fairly certain that this knowledge lies mainly with the older generation. Younger generations also know little to none of the Tacana language (Wentzel 1989). Despite the gap in knowledge, the relatively high tree and liana diversity and the value of these plants for the Tacana suggest that the forest in this area should be conserved in a way that allows the Tacana unrestricted access to their sources of construction, medicine, and food.

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APPENDIX 1. INVENTORY OF PLANTS IN THE BUENA VISTA (BV) AND SANTA FE (SF) 1-HA PERMANENT PLOTS WITH CORRESPONDING ABUNDANCE AND ETHNOBOTANICAL DATA FOR EACH SPECIES. VOUCHER NUMBERS CORRESPOND TO SJD UNLESS THEY ARE PRECEDED BY A GB. SPANISH (OR OTHER LOCAL NAMES) AND TACANA NAMES FOLLOWED BY BV OR SF IN PARENTHESES INDICATE THE LOCALITY WHERE THE NAME APPLIES. THE NUMBERS IN THE BV AND SF STEM CATEGORY CORRESPOND TO THE NUMBER OF INDIVIDUALS OF EACH SPECIES FOUND IN THE TWO PLOTS. THE USE CATEGORIES ARE DEFINED AS C = CONSTRUCTION, E = EDIBLE, Fib. = SOURCES OF FIBER, H = HUNTING OR FISHING, L = FIREWOOD, M = MEDICINAL, O = COMMERCIAL ITEM, T = CRAFT OR TECHNOLOGY, AND Z = MISCELLANEOUS USES.

Scientific name	Voucher No.	Spanish name	Tacana name	BV stems	SF stems	Use category	Description of use
<b>Anacardiaceae</b>							
<i>Astronium graveolens</i> Jacq.	261			1	0		
<i>Astronium lecointei</i> Ducke	599	Cuchi	mud'ud'uqui tad'e	1	1	C, M, T	House posts; bark is boiled and resulting resin is applied to bone fractures; furniture
<i>Spondias venosa</i> C. Martius ex Colla	316	Cedrillo	diji	2	0		
<i>Tapirira guianensis</i> Aublet	729		tahua rara	0	3		
<b>Annonaceae</b>							
<i>Duguetia spixiana</i> C. Martius	68	Chirimoya del monte	dipurari, hu-abu midha	13	0	E, Fib., L	Fruit edible; bark strips used to carry meat; firewood
<i>Guateeria</i> sp.	121, 727		midha dha-hua	11	1	C, L, M	House beams; firewood; bark used for problems of the liver, kidneys, and lungs
<i>Rollinia</i> sp.	240			1	0	C	House beams
<i>Ruizodendron ovale</i> (Ruíz & Pavón) R. E. Fries	283, 510	Ojoso	tumuqui	1	25	C, L, T	House beams; firewood; axle of ox-drawn cart
<i>Unonopsis floribunda</i> Diels	97, 535	Pancho de chancho	huabu midha	16	29	C, Fib.	House beams; bark strips used as ropes
<i>Xylopia</i> aff. <i>cuspidata</i> Diels	83	Palo verde	midha dha-hua	1	0	C, L, M	House beams; firewood; bark used for problems of the liver, kidneys, and lungs
<i>Xylopia</i> cf. <i>ligustrifolia</i> Humb. & Bonpl. ex Dunal	213	Piraquina negro	cipiku	1	0	C	House beams
<i>Xylopia</i> sp.1	226	Cipiko negro	juquiqui	2	0	C	House beams
<i>Xylopia</i> sp.2	77, 602	Piraquina negro (BV), palo del bahio (SF)	juquiqui (BV), nadudu (SF)	1	5	C, L	House beams; firewood
Undetermined genus	785			0	1		

## APPENDIX 1. CONTINUED.

Scientific name	Voucher No.	Spanish name	Tacana name	BV stems	SF stems	Use category	Description of use
Apocynaceae							
<i>Himatanthus sucuuba</i> (Spruce) Woodson	383, 805	Bellaco caspi	nasha ai, bashi pasha	1	1	M	Latex applied externally to heal broken bones, swellings, boils, and respiratory diseases
<i>Peschiera cymosa</i> Jacq.	GB1726	Leche leche	Guiapu	0	4	M	Latex diluted in water used externally to treat conjunctivitis
Undetermined genus 1	GB1835			0	1		
Araliaceae							
<i>Dendropanax arboreus</i> (L.) Decne. & Planchon	115	Aliso blanco		5	0	L	Firewood
<i>Didymopanax morototoni</i> (Aublet) Decne. & Planchon	189	Gitarrero	arana	1	0		
Arecaceae							
<i>Astrocaryum gratum</i> Kahn & Millán	328, 827	Chonta loro	ad'une	18	38	C, E, H, M, T	House posts; edible mesocarp and palm heart; wood for arrows; young leaves are used to promote lactation; roots are used for kidney pain; midveins of leaves are tied together to make brooms
<i>Attalea phalerata</i> C. Martius ex Sprengel	331, 831	Motacú	tumi	1	3	C, E, M, O, T, Z	Leaves for roofing; edible mesocarp and oil; bracts burned for <i>piti</i> (coca additive); oil for various diseases; roots for anemia and dysentery; medicinal grubs ( <i>tuyutuyu</i> ) for lung ailments; oil sold commercially; oil for adhesion of feathers to arrows; oil for hair care
<i>Bactris gasipaes</i> H.B.K.	861	Chima	mue	0	1	E, H, L	Edible mesocarp; wood for bows and arrows; firewood
<i>Euterpe precatoria</i> C. Martius	325, 860	Asai	ehuid'a	50	21	C, E, M	Leaves for roofing; split trunks for walls; edible fruit and palm heart; roots and oil for anemia, liver, and kidneys

## APPENDIX 1. CONTINUED.

Scientific name	Voucher No.	Spanish name	Tacana name	BV stems	SF stems	Use category	Description of use
<i>Iriartea deltoidea</i> Ruiz & Pavón	332, 859	Copa	tuhuanu	86	3	C, E, Fib., L	House posts; edible palm heart; bark strips used to tie things together; firewood
<i>Jessenia bataua</i> (C. Martius) Burret	330	Majo	macuri	38	0	C, E, M, Z	Leaves for roofing; fruit prepared in form of milk, cooking oil; medicinal oil for lungs and tuberculosis; medicinal grubs ( <i>tuyutyu</i> ); hair oil
<i>Socratea exorrhiza</i> (C. Martius) H.A. Wendl.	247, 828	Pachubilla	ji	14	25	C, H, M, T, Z	Split trunk for walls; roots mashed and thrown in water for use as ichthyotoxin; new roots for leishmaniasis, dog mange; spiny old roots used to scrape plantains; penis enlarger
Asteraceae							
cf. <i>Vernonanthura patens</i> (H.B.K.) H. Rob.	165			1	0		
Bignoniaceae							
<i>Arrabidaea</i> sp.1	671			0	1		
<i>Arrabidaea</i> sp.2	808			0	1		
<i>Clytostoma</i> sp.	106		bacua junu	1	0		
<i>Macfadyena</i> sp.	674			0	1		
<i>Mansoa alliacea</i> (Lam.) A. H. Gentry	562	Bejuco ajo ajo	Ju junu	0	1	M	Leaves and bark for treating rheumatism, <i>mal viento</i> , fever, intestinal trouble
<i>Tabebuia serratifolia</i> (Vahl) Nicholson	160, 758	Tajibo amarillo	uduriqui t'idi	1	1	O, T	Timber; wood for sugar cane presses
<i>Tabebuia</i> sp.	281			1	0		
Undetermined genus 1	69			1	0		
Undetermined genus 2	801			0	1		
Undetermined genus 3	564			0	1		
Undetermined genus 4	674			0	1		

## APPENDIX 1. CONTINUED.

Scientific name	Voucher No.	Spanish name	Tacana name	BV stems	SF stems	Use category	Description of use
<b>Bombacaceae</b>							
<i>Ceiba samauma</i> (Ulbr.) Bakh.	223	Mapajo	trapu	1	0		
<i>Chorisia speciosa</i> A. St.-Hil.	301	Toborochoi	buidhi	3	0		
<i>Chorisia</i> sp.	742	Mapajo	buidhi	0	1	C, T	Canoe construction; wooden basins for tanning leather
<i>Eriotheca</i> sp.	120, 548	Pirichu	marai	1	1	Fib., H	Bark fibers spun and used as very resistant rope and fishing lines
<i>Pseudobombax</i> sp.	145, 621	Palo de cordel	marai	2	5	Fib., H	Bark fibers spun and used as very resistant rope and fishing lines
<i>Quararibea wittii</i> K. Schum. & Ulbr.	86, 627		jupequi	1	9	C	House beams
<b>Boraginaceae</b>							
<i>Cordia bicolor</i> vel. spp. aff. A. DC.	679	Hueruru negro	Hueruru dheve	0	4	C, E, L	House beams; edible fruit; firewood
<b>Burseraceae</b>							
<i>Protium glabrescens</i> Swart.	148, 555	Isigo	yuhua, huani midha	1	11	E, L, M	Edible fruit; firewood; resin applied externally for headaches, boils, <i>mal viento</i> and <i>aire</i>
<i>Protium rhynchophyllum</i> Rusby	66, 624	Isigo de jochi (BV), blanquillo (SF)	madayuhua (BV), yapare (SF)	16	13	C, L, T	House beams; firewood for smoking rubber; wood for ox-drawn cart bed
<i>Protium</i> sp. aff. <i>Protium apiculatum</i> Swart.	275			1	0		
<i>Protium</i> sp.	82			1	0		
<b>Capparaceae</b>							
<i>Capparis amplissima</i> Lamard <i>sensu lato</i>	538	Quechu negro	quechu dheve	0	3	E	Edible fruit
<b>Caricaceae</b>							
<i>Jacaratia spinosa</i> (Aublet) A. DC.	172	Papagillo, papaya del monte	pajajaja	4	0	M	Inner wood for liver, kidney, and vesicular inflammation

## APPENDIX 1. CONTINUED.

Scientific name	Voucher No.	Spanish name	Tacana name	BV stems	SF stems	Use category	Description of use
Celastraceae							
<i>Maytenus magnifolia</i> Loes.	GB1725, 538	Limoncillo		1	2	M	Sap for tooth pains and leishmaniasis
Chrysobalanaceae							
<i>Hirtella</i> sp. 1	565	Caripe	d'reu	0	1	T	Bark mixed with clay for pottery
<i>Hirtella</i> sp. 2	750	Caripe del jochi colorado	mad'a d'reu	0	3	C	House construction
<i>Licania arborea</i> Seemann	682	Caripe	d'reu	0	1	T	Bark mixed with clay for pottery
<i>Licania oblongifolia</i> Standley	102, 673		caicoma dhere	6	2	C, L	House beams; firewood
<i>Parinari</i> cf. <i>excelsa</i> Sabine	236, 641		yuritari	1	1	C, E, L	House beams; edible fruit; firewood
<i>Parinari</i> sp.	267	Caripe macho	mad'a d'reu	1	0	C	House beams
Clusiaceae							
<i>Rheedia acuminata</i> (Ruíz & Pavón) Planch. & Triana	140, 511	Ocoro	camururu	8	5	E, Z	Edible fruit; used to make spinning tops
<i>Rheedia gardneriana</i> Miers ex Planch. & Triana	110, 669	Achachairu	jashau	1	2	E	Edible fruit
Combretaceae							
<i>Terminalia amazonia</i> (Gmelin) Exell	78	Verdolago negro	shacuaqui dheve edehuequi dheve	4	0	C, L, O, T	House beams; firewood; timber; furniture
<i>Terminalia oblonga</i> (Ruíz & Pavón) Steudel	216, 559	Verdolago amarillo	shacuaqui t'idi, edehuequi t'idi	1	5	C, L, T	House beams; firewood; wood for saddle stirrups
Dilleniaceae							
<i>Davilla nitida</i> (Vahl) Kubitzki	157	Chaquillo bejuco	jama junu	1	0	E, Fib., H, M, T	Water from cut liana; bark strips for rope and fishing lines; water to treat eye infections and diarrhea; leaves used to smooth surfaces

## APPENDIX 1. CONTINUED.

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Scientific name	Voucher No.	Spanish name	Tacana name	BV stems	SF stems	Use category	Description of use
Elaeocarpaceae							
<i>Sloanea guianensis</i> (Aublet) Benth.	67, 591	Urucusillo	mat'requi	4	1	C, L, T	House beams; firewood; buttress roots for cutting boards and small basins
Euphorbiaceae							
<i>Hyeronima alchorneoides</i> Allen	260			2	0	L	Firewood
<i>Pera benensis</i> Rusby	203			2	0		
<i>Sapium laurifolium</i> (A. Rich.) Griseb.	718	Leche leche blanco	bashi pasha	0	1	L, M, Z	Firewood; latex applied externally to treat broken bones, swellings, and respiratory diseases; latex used to make rubber balls
<i>Sapium marmieri</i> Huber	99	Leche leche blanco	bashi pasha	5	0	L, M, Z	Firewood; latex applied externally to treat broken bones, swellings, and respiratory diseases; latex used to make rubber balls
<i>Sapium</i> sp.	199	Leche leche blanco	bashi pasha	1	0	M, Z	Latex applied externally to treat broken bones, swellings, and respiratory diseases; latex used to make rubber balls
Fabaceae							
<i>Acacia</i> sp.	893	Cari cari blanco	bana pasha	1	0	L	Firewood
<i>Andira inermis</i> (W. Wright) H.B.K. ex DC.	300, 772			1	1		
<i>Caesalpinia</i> sp.	317			1	0		
<i>Clitorea</i> cf. <i>arborea</i> Benth.	759		patus'hequi	0	1	L	Firewood
<i>Copaifera reticulata</i> Ducke	601	Copaibo	aqui aceite	0	2	M	Sap used against liver pain, gynecological infections, wounds, throat discomforts, and impotency in men
<i>Dalbergia</i> sp.	614			0	1	L	Firewood
cf. <i>Dalbergia</i>	186			3	0		
<i>Dioclea</i> sp.	739	Remedio para picada de vibora		0	1	M	Latex used to treat snake bites

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## APPENDIX 1. CONTINUED.

Scientific name	Voucher No.	Spanish name	Tacana name	BV stems	SF stems	Use category	Description of use
<i>Dipteryx odorata</i> (Aublet) Willd.	289, 628	Almendrillo	mahui	4	12	C, E, M, T	House posts; toasted or boiled seed is edible; furniture; the sap is rubbed on the skin to treat boils and various forms of dermatitis; buttress root cut to make a corn grinding surface
<i>Inga cf. ingoides</i> (Rich.) Willd.	285, 752	Pacay	nasha tu-rud'u	1	1	E, L	Edible fruit; firewood for cooking pottery
<i>Inga</i> sp. 1	276, 580	Pacay colorado	nasha tu-rud'u	1	2	E, L	Edible fruit; firewood for cooking pottery
<i>Inga</i> sp. 2	258	Pacay aplastado	nasha tu-rud'u	3	0	E, L	Edible fruit; firewood for cooking pottery
<i>Inga</i> sp. 3	760			0	2		
<i>Inga</i> sp. 4	581	Pacaysillo	nasha tu-rud'ujaja, chipichipi	0	2	E, L	Edible fruit; firewood for cooking pottery
<i>Machaerium jacarandifolium</i> Rusby	309	Cari cari negro	bana dheve	1	0	C, L	House beams; firewood
<i>Machaerium cf. latifolium</i> Rusby	549			0	1		
<i>Machaerium subrhombiforme</i> Rudd	561			0	1		
<i>Myroxylon balsamum</i> (L.) Harms	241, 544	Resino, quina quina	aqui mad'i	1	19	C, L, T	House posts; firewood; wood for sugar cane presses
<i>Pithecellobium cf. angustifolium</i> (Rusby) Rusby	634		tamarina aqui	0	1	C, L	House beams; firewood
<i>Pithecellobium</i> sp. 1	191	Cari cari negro	bana dheve	1	0		
<i>Pithecellobium</i> sp. 2	566		matuhuequi	0	2	L, T	Firewood; seed produces soap and trunk used for drum cylinder
<i>Pithecellobium</i> sp. 3	539		epamuqui	0	1		
<i>Platymiscium aff. fragans</i> Rusby	711	Cirari del monte	yurahay	0	1		
<i>Pterocarpus rohrii</i> Vahl	711	Tushi blanco	tushi pasha	0	1	L	Firewood
<i>Swartzia jorori</i> Harms	176, 850	Tushi negro	tushi dheve	2	2	L	Firewood
<i>Swartzia myrtifolia</i> Harms	257, 521	Lengua de loro		1	5	C, T	House beams; ax handles

## APPENDIX 1. CONTINUED.

Scientific name	Voucher No.	Spanish name	Tacana name	BV stems	SF stems	Use category	Description of use
<i>Swartzia</i> sp. 1	302			1	0		
<i>Swartzia</i> sp. 2	657			0	1		
<i>Swartzia</i> sp. 3	690			0	1		
Undetermined genus 1	576			0	1		
Undetermined genus 2	557		narhi	0	1		
Flacourtiaceae							
<i>Casearia</i> sp.1	218, 509	Camururu de los monos	bihua camururu	1	9	C, L	House beams; firewood
<i>Casearia</i> sp.2	125			2	0		
<i>Casearia</i> sp.3	159			1	0		
<i>Hasseltia floribunda</i> H.B.K.	887, 514	Palo amarillo	aqui t'idi	5	3	C, L	House beams; firewood
<i>Lunania parviflora</i> Spruce ex Benth.	118, 534	Blanquillo	hueruru	13	4	C, E, L, M	House beams; edible fruit; firewood; infusion of leaves used to treat swellings and coughs and in a bath to alleviate general aching; leaves are chewed for keep teeth in good condition
Hippocrateaceae							
<i>Salacia cordata</i> (Miers) A. M. Menega	560			0	1		
<i>Salacia</i> cf. <i>elliptica</i> (C. Martius) G. Don	259, 600	Guapomo, chuchuhuasu	panu	1	1	E, M	Edible fruit; bark and roots to treat rheumatism, colds, kidney pain and when soaked in alcohol to act as a general health fortifier; mashed bark is applied in poultice against boils
Undetermined genus	623			0	1		
Icacinaceae							
<i>Calatola</i> cf. <i>colombiana</i> Sleumer	633			0	5		
<i>Calatola</i> sp.	GB1724			0	1		
Lacistemataceae							
<i>Lacistema aggregatum</i> (Bergins) Rusby	592			0	1		

## APPENDIX I. CONTINUED.

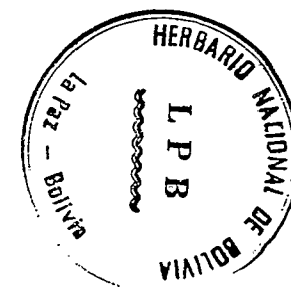
Scientific name	Voucher No.	Spanish name	Tacana name	BV stems	SF stems	Use category	Description of use
Lauraceae							
<i>Undetermined genus 1</i>	101, 804	Laurel	dhahuamu	11	1	C, L, O	House beams; firewood; timber
<i>Undetermined genus 2</i>	100	Laurel	dhahuamu	8	0	C, L	House beams; firewood
Malpighiaceae							
<i>Banisteriopsis</i> sp.	65			1	0		
Melastomataceae							
<i>Miconia</i> sp.1	190	Palo vena	esuhana aqui	1	0	C	House beams
<i>Miconia</i> sp.2	194	Palo vena	esuhana aqui	1	0		
<i>Mouriri</i> sp.	319			1	0		
Meliaceae							
<i>Cedrela odorata</i> L.	146, 771	Cedro	cuabad'u	2	2	C, M, O, T	Wood planks for construction; infusion of bark to treat diarrhea and parasites, to stop internal or external hemorrhages, and in a wash against scabies or rash; timber; furniture
<i>Guarea</i> aff. <i>guidonia</i> (L.) Sleumer	73, 640	Huapi de altura, trompillo de altura	buinapaqui	19	10	C, L, M, T	House beams; firewood; bark for killing stomach parasites and stopping diarrhea; bark for tanning leather and wood for furniture
cf. <i>Talisia cerasina</i> (Benth.) Radlk.	229			1	0		
<i>Trichilia</i> cf. <i>adolphi</i> Harms.	79, 515		shapuraqui dheve	7	13	C, L, M, T	House beams; firewood; bark in decoction used to treat liver, lungs, and kidney ailments; bark to cure leather
<i>Trichilia</i> cf. <i>inaequilatera</i> Pennington	237		shapuraqui pasha	1	0		
<i>Trichilia pleeana</i> (Adr. Juss.) C. DC.	153, 508		shapuraqui pasha	9	33	C, L, H	House beams; firewood; bark boiled and mixed with other plants for hunting success
Monimiaceae							
<i>Siparuna</i> sp.	310			1	0		

## APPENDIX I. CONTINUED.

Scientific name	Voucher No.	Spanish name	Tacana name	BV stems	SF stems	Use category	Description of use
Moraceae							
<i>Batocarpus costaricensis</i> Standley	109	Chicle	Pid'ui	6	0	C, E, L, T	House beams, edible fruit, firewood, latex used to make glue
<i>Brosimum alicastrum</i> ssp. <i>bolivianense</i> (Pittier) C. C. Berg	822	Quechu verde	quechu dhahua	0	2	E, L	Edible fruit; firewood
<i>Clarisia biflora</i> Ruíz & Pavón	224, 524	Chicle	pid'ui	4	5	C, E, L, O, T	House beams; edible fruit; firewood; latex sold commercially; latex used to make glue and burned as candles
<i>Clarisia racemosa</i> Ruíz & Pavón	225	Mururé	shucuiru	7	0	C, O, T	House posts; latex sold commercially; wooden mortar for hulling rice; latex used to make glue
<i>Coussapoa ovalifolia</i> Trécul	794	Matapalo negro	shite midna	0	1	M	Bark crushed and applied as a dressing on hernias and broken limbs and is attached with strips of bark of the same species
<i>Ficus guianensis</i> Desv.	541	Matapalo colorado	shite midha	0	1	M	Bark crushed and applied as a dressing on hernias and broken limbs and is attached with strips of bark of the same species
<i>Ficus killipii</i> Standley	244	Bibosillo	shite midha	1	0	L, M, T	Firewood; bark crushed and applied as a dressing on hernias and broken limbs and is attached with strips of bark of the same species; buttress roots for basins
<i>Ficus maxima</i> Miller	197	Bibosi, ojé	maja pasha	2	0	C, L, M	House beams; firewood; latex taken internally for parasites and hernias
<i>Ficus pertusa</i> L.F.	547	Matapalo negro	shite midha	0	1	M	Bark crushed and applied as a dressing on hernias and broken limbs and is attached with strips of bark of the same species

## APPENDIX I. CONTINUED.

Scientific name	Voucher No.	Spanish name	Tacana name	BV stems	SF stems	Use category	Description of use
<i>Perebea tessmannii</i> Mildbr.	636		tehrushanui	0	2	E, L	Edible fruit; firewood
<i>Poulsenia armata</i> (Miq.) Standley	96, 593		chamane	6	5	E, T	Edible fruit; bark pounded to make bed mats and traditional clothing
<i>Pourouma cecropiifolia</i> C. Martius	74, 579	Ambaibillo, ambaibo macho	tahua pa, tahua midha	10	6	E, Fib., H, L	Edible fruit, fibers from inner bark spun for fishing lines; firewood for baking pottery
<i>Pseudolmedia laevis</i> (Ruíz & Pavón) J. F. Macbr.	71, 590	Nui	nui	17	28	E, L, M	Edible fruit; firewood; latex alleviates ant stings/bites
<i>Sorocea</i> cf. <i>pileata</i> W. Burger	104, 545	Palo de los viejos	baba ina	18	16	C, E, L, M	House beams; leaves used as coca substitute; firewood; young leaves to treat wounds
Myristicaceae							
<i>Otoba parvifolia</i> (Markgraf) A. Gentry	119, 632	Sangre de toro	naiqui	12	3	C, L, M, O, T	House beams; firewood; latex used as a general fortifier, for colds and rheumatism; timber; furniture
<i>Virola peruviana</i> (A. DC.) Warb.	387	Sangre de toro macho	naiqui d'aja	1	0	C, O, T	House beams; timber; furniture
<i>Virola sebifera</i> Aublet	311, 843	Sangre de toro macho	naiqui d'aja	4	2	C, O, T	House beams; timber; furniture
Myrtaceae							
<i>Eugenia</i> aff. <i>heterochroma</i> Diels	238			2	0		
<i>Eugenia</i> cf. <i>lambertiana</i> DC.	271			1	0		
Nyctaginaceae							
<i>Neea</i> sp. 1	72, 604	Palo verde	aqui dhahua (BV), idateque (SF)	8	3		
<i>Neea</i> sp. 2	719		idateque	0	2		
Olacaceae							
<i>Heisteria concinna</i> Standley	513			0	3		
Undetermined genus	668	Gabetillo	aquipabi	0	1	C, T	House beams; ax handles



## APPENDIX 1. CONTINUED.

Scientific name	Voucher No.	Spanish name	Tacana name	BV stems	SF stems	Use category	Description of use
<b>Opiliaceae</b>							
<i>Agonandra</i> sp.	204, 691	Colomera	chaiqui	1	1		
<b>Phytolaccaceae</b>							
<i>Achatocarpus</i> sp.	546			0	1		
<i>Gallesia integrifolia</i> (Sprengel) Harms	603	Ajo ajo	bua	0	3	M, T	Baths in bark infusion to treat <i>mal viento</i> ; tea drunk for parasites; ash of bark for soap
<b>Polygonaceae</b>							
<i>Coccoloba</i> cf. <i>mollis</i> Casar.	813		padhehuequi	0	1	L	Firewood
<i>Coccoloba</i> sp.1	672			0	2	L	Firewood
<i>Coccoloba</i> sp.2	743	Gabetillo	aquipabi	0	2		
<i>Triplaris americana</i> L.	124, 512	Palo diablo	anani	2	8	C, L, M	House beams; firewood; decoction of bark for diarrhea, leishmaniasis, worms, and birthing aid
<i>Triplaris poeppigiana</i> Wedd.	92	Palo santo macho	ananipa	5	0	C, L, Z	House beams; firewood; flowers used ornamentally
<b>Quinaceae</b>							
<i>Quiina florida</i> Tul.	239			2	0		
<b>Rubiaceae</b>							
<i>Calycophyllum spruceanum</i> (Benth.) Hook f ex K. Schumann	720	Guayabochi	putaqui	0	1	C, L	House beams; firewood
<i>Ixora peruviana</i> (Spruce ex Schum.) Standley	164			1	0		
<b>Rutaceae</b>							
<i>Zanthoxylum</i> sp.	144		patut'requi	3	0	C, L	House beams; firewood
<b>Sabiaceae</b>							
<i>Meliosma herbertii</i> Rolfe	214	Cafecillo	huahuiqui	3	0	C	House beams
<b>Sapindaceae</b>							
<i>Allophylus</i> cf. <i>mollis</i> (Kunth) Radlk.	577		subipasha aqui	0	1		
<i>Cupania</i> sp.	699		hat'rao dhere	0	1	C, L	House construction; firewood
<i>Lophostigma schunkei</i> (Acev.-Rodr.) Acev.-Rodr.	783			0	1		
<i>Paullinia</i> sp.	295			1	0		
<i>Sapindus saponaria</i> L.	117	Sululu	sululu	1	0	M, Z	Fruit used for soap to cure mange; fruit used as a toy

## APPENDIX I. CONTINUED.

Scientific name	Voucher No.	Spanish name	Tacana name	BV stems	SF stems	Use category	Description of use
Sapotaceae							
<i>Micropholis guyanensis</i> (A. DC.) Pierre	856			0	2		
<i>Pouteria caimito</i> (Ruíz & Pavón) Radlk.	516			0	11		
<i>Pouteria</i> sp.	552	Coloradillo	aqui dhere	0	2	L	Firewood
Simaroubaceae							
<i>Simarouba amara</i> Aublet	721			0	1		
Undetermined genus	295			1	0		
Sterculiaceae							
<i>Sterculia tessmannii</i> Mildbr.	192, 517		bata d'eja	3	6		
<i>Theobroma cacao</i> L.	85	Chocolate	mura	4	0	C, E, L, M	House beams; pulp of fruit edible; toasted seeds to prepare chocolate paste; burned wood for <i>piti</i> (coca additive); firewood; infusion of leaves and bark for skin rash, leaves in poultice for headaches
<i>Theobroma speciosum</i> Willd. ex Sprengel	788	Chocolate de la sierra	mura cuat're	0	1	C, E, L, M	House beams; pulp of fruit edible; toasted seeds to prepare chocolate paste; burned wood for <i>piti</i> (coca additive); firewood; infusion of leaves and bark for skin rash, leaves in poultice for headaches
Tiliaceae							
<i>Apeiba membranacea</i> Spruce ex Schumann	269, 537	Cabeza de mono silbador	bechu echua	1	2	Fib., L, Z	Strips of bark for rope; firewood; essential oil of the fruit perfume
<i>Heliocarpus americanus</i> L.	284	Llausa	pud	1	0	Fib, M	Strips of bark for mats; infusion of new leaves for aid in birth, calmative for snake and stingray bites/stings, and to treat dog mange
<i>Pentaplaris davidsmithii</i> Dorr & C. Bayer	70, 620		puneru	15	21	L	Firewood

## APPENDIX 1. CONTINUED.

Scientific name	Voucher No.	Spanish name	Tacana name	BV stems	SF stems	Use category	Description of use
<b>Ulmaceae</b>							
<i>Ampelocera ruizii</i> Klotzsch	551		ehsujaqui	0	4	L	Firewood
<i>Celtis schippii</i> Standley	136, 701	Palo de aji	bid'uqui	12	5	L	Firewood
<b>Violaceae</b>							
<i>Leonia racemosa</i> C. Martius	64, 520	Huevo de peta	dati laja	13	17	E, L, Z	Edible fruit; firewood; fruit signals season for land turtle eggs; fruits said to stimulate egg laying in chickens
<i>Rinorea lindeniana</i> (Tul.) Kuntze var. <i>lindeniana</i> Blake	57	Cafecillo, blan quillo	rauqui	2	0	C, L, T	House beams; firewood; pot holder from branches
<b>Vochysiaceae</b>							
<i>Vochysia</i> sp.	770			0	1		
<b>Undetermined family</b>							
1	107	Caripé	d'reu	1	0	T	Bark mixed with clay for pottery
2	Tr16670			1	0		
3	697			0	1		
4	728			0	1		