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The use of medicinal plants by rural populations of the Pastaza province in the Ecuadorian Amazon

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ABSTRACT

Mera, Santa Clara and Pastaza municipalities are located in the Ecuadorian Amazon region. The objective of the study was to identify plant species used in traditional medicine by small farmers of these localities, and to classify these plants according to locality, farmer ethnicity and purposes of use. It was also investigated whether the use of medicinal plants differs between the ethnic groups. Data were collected by applying a questionnaire and personal interview with 213 farmers belonging to two ethnicities (Kichwa and mestizo), and to different municipalities (Mera, Santa Clara and Pastaza). Generated data were analyzed using contingency tables and frequency and the most representative species were determined by proportion analysis comparison. A total of 34 families and 52 species of medicinal plants were identified. The most used species was *Ilex guayusa* which was cited 48 times. Santa Clara municipality and Kichwa farmers used the highest number of species. These species belonged to the Lamiaceae and Solanacease family, and the plants were used for treating stomach pain, cold and inflammations. There were significant differences (Chi square test $p < 0.05$) between localities and ethnicities (Kichwa and mestizo). There were differences in the use of medicinal plant species among members of the Kichwa ethnicity and mestizo farmers, depending on locality, being *Ilex guayusa* the most used species.

KEYWORDS: ethnic group, Kichwa, Mera, Santa Clara

Uso de plantas medicinais por populações rurais da província de Pastaza, na Amazônia equatoriana

RESUMO

A pesquisa foi desenvolvida em três municípios da Província de Pastaza, (Mera, Santa Clara e Pastaza), na Amazônia equatoriana. O objetivo do estudo foi identificar espécies vegetais utilizadas na medicina tradicional pelos agricultores nestas localidades e classificar as espécies segundo a localidade, etnia do produtor e as aflições nas que eram utilizadas. Alem disso, na pesquisa analisaram-se as diferença de uso das plantas entre as etnias Kichwa e Mestiça. A metodologia do trabalho consistiu na aplicação de questionários e entrevistas pessoais com 213 agricultores das diferentes etnias. Utilizaram-se as tabelas de contingência por freqüência de uso com os dados gerados, para determinar as espécies mais representativas e em cada grupo realizou-se comparação por análise de proporções. Os principais resultados mostraram a existência de 52 espécies de plantas medicinais pertencente a 34 famílias. A espécie mais utilizada foi *Ilex guayusa* com 48 registros. Os produtores Kichwa do município Santa Clara registraram o maior número de espécies pertencente às famílias Lamiaceae e Solanacease e as plantas foram utilizadas para tratamento de dor de estômago, gripe e inflamações. A prova de "chi quadrado" mostrou diferenças ($p < 0,05$) entre os municípios e as etnias. Conclui-se que existe diferença no uso de plantas medicinais entre as localidades e os grupos étnicos estudados. A espécie *Ilex guayusa* foi a planta medicinal mais usada pelos agricultores independentemente da localidade e a etnia.

PALAVRAS-CHAVE: etnia, Kichwa, Mera, Santa Clara

INTRODUCTION

Ethnobotany studies the relationship between people and plants (Sánchez *et al.* 2007). A high percentage of the world population use medicinal plants for primary health care, and this increases the consumption of raw materials in medicinal plants (Kandari *et al.* 2012). Their use is an alternative for developing countries, mainly in poor areas (Cadena *et al*. 2013). The knowledge of the use of medicinal plants in different locations is a part of the reaffirmation of the identity of these peoples (Arenas and Del Cairo 2009).

In ethnobotanical studies, the species used in medicine and food are among those with high number of reports (Castellanos 2011). Likewise, the studies on the knowledge of medicinal plants, based on ethnic groups, are limited, especially those focused on mestizo populations, compared to those focusing on indigenous groups. Therefore, recent studies focus on the relationship between socio-cultural and socio-economical factors in order to acquire the traditional knowledge (Beltrán *et al*. 2014), where the ethnography analyzes the costumes of each population, which are related to the use of medicinal plants (Van Maanen 2011).

In Ecuador, 408 studies related to ethnobotanic areas have been registered. The Amazonian region shows 107 studies, mainly in fields like general ethnobotany, and medicinal and edible plants (Ríos *et al*. 2007).The highest number of species used in Ecuador are mainly from two families (Asteraceae and Fabaceae) and the principal uses are treatment of infections, wounds, injuries, stomach disorders (De la Torre *et al*.2008). Pastaza province, located at the Ecuadorian Amazon region, is home for the Achuar, Andowa, Huaorani, Kichwa, Shiwiar, Shuar and Zápara ethnic groups (Gobierno Autónomo Descentralizado Provincial de Pastaza 2011). In addition, there is a mestizo population in high percentage coming from other provinces. This fact generates the need to register the species used as medicinal plants according to the localities and ethnic groups within each of them. The objective of this research was to identify the plant species used as traditional medicine by farmers in Pastaza, Mera and Santa Clara localities in the Pastaza Province, Ecuador, establishing its use according to the localities, ethnicity and use purposes of the plants.

MATERIALS AND METHODS

Location

This research was developed in Ecuadorian Amazonia, at Mera, Pastaza and Santa Clara localities, Pastaza province, in Ecuador. Table 1 shows the edapho-climatic characteristics of these localities. The characteristics of the dominant ecosystem in the area are evergreen forest coastal mountain, rainy bio-climate, humid and hyperhumid ombrotype, inferior thermal tropical, foothill macro-relief, non flooded hill plateau relief (Ministerio del Ambiente de Ecuador 2012).

Table 1. Soil and climatic characteristics of the study area

	Locality		
	Mera	Pastaza	Santa Clara
Annual precipitation	5,366 mm[1]	4,562.9 mm[2]	3,703 mm[3]
Mean temperature range	20 - 22 °C	19- 23 °C	18- 24 °C
Soil type	Oxisols[4]	Andisols[4]	Andisols, Oxisols[4]
Altitude (masl)	1043	960	595
Bioclimate	Pre mountain rain forest	Pre montane rain forest	High humidity Pre montane forest

[1](Abril 2013)
[2](Instituto Nacional de Meteorología e Hidrología 2011)
[3](Gobierno Autónomo descentralizado de la provincia de Pastaza 2014)
[4](United States, Department of Agriculture 2010)
[5](Jiménez 1982).

A sample of 30% of the farmers from Madre Tierra village (Mera locality), Tarqui, Veracruz, Diez de Agosto and Fátima villages (Pastaza locality) and San José and Santa Clara villages (Santa Clara locality) was used in the study. These farmers were chosen at random, and semi-structured interviews were conducted (Castellanos 2011), with the use of a questionnaire (Kandari *et al*. 2012) based on Mott (1979), to identify the ethnicity of the farmer and the plants used in traditional medicine. This questionnaire included the name of the person, date, village, areas within the village, farm area, academic level and ethnicity of the farmer. According to the socio-economical information, the survey included years of work, economic activity, incomes, farm production and area per crop. The variables considered in the use of plants were species, part of the plant, and its use purposes. The survey also included characteristics of location, elevation, land use, vegetation, rainfall, and topography.

The survey was supervised by experts in the fields of botany and agronomy from the Amazon State University, located in Pastaza locality, which was applied to 40 farmers for its validation. As a result of this stage, the survey was redesigned to improve it understanding and, later it was applied to 213 farmers, which were distributed as follows:

In Mera locality, 58 surveys were conducted at the village of Madre Tierra (Campo Alegre, La Isla, Itayacu, Encañada, Madre Tierra, Nueva Vida, Puerto Santana, and La Y).

In Pastaza locality, 70 surveys were conducted at the villages of Tarqui (Huagrayacu, Putuimi, Rio Chico, and Vía a Madre Tierra), Veracruz (Calvario, Las Palmas,

Santa Marianita, Bobonaza and Veracruz), Diez de Agosto (Jatun Pacha, San Carlos, San Francisco, and vía a Díez de Agosto) and Fátima (El Rosal, Fátima, Las Américas, Libertad and Murialdo).

In Santa Clara locality, 85 surveys were conducted at the village of San Jose (Cajabamba 1, Cajabamba 2 and Mariscal Sucre), and Santa Clara (20 de abril, Jatun Atahualpa, Pueblo Unido, Rey del Oriente, San Cristóbal, San Francisco de Llandia, San Francisco Punin, San Juan de Piatua, San Pedro and Santa Clara). Figure 1 shows the location of these places.

Producers from each locality have the following distribution per ethnics: 76% mestizo and 24% Kichwa in Pastaza, 40% mestizo and 60% Kichwa in Mera, and 47% mestizo and 53% Kichwa in Santa Clara. The 69% of the population works in agricultural and livestock activities, and they mostly have primary or secondary level of education. Mestizo producers dedicate their work to single crops (monoculture), mainly sugar cane, and Kichwa producers plant their crops in small fields "chacras", where they cultivated diverse species.

In the surveyed farmers, the planted species were photographed, and when necessary samples of the plant material were collected to confirm identification. These samples were taken to the herbarium of the Amazon State University for identification by the authors of this paper by using, descriptions and photographs found in the specialized literature (Burnieo 2006; Gentry 1996). Later, their nomenclatures were searched in the website of Missouri Botanical Garden (TROPICOS 2015). Data were analyzed using the program INFOSTAT (Di Rienzo *et al.* 2014). The analysis of contingency tables was performed for frequency of use report per species versus locality, and for frequency of use species versus producer ethnicity. The analysis showed significant differences in Chi square coefficient. An analysis of proportions was performed by using the proportion module of Excel, in order to determine the species that showed statistical differences in their use reports. This research was developed in accordance with legal regulations of Ecuador.

RESULTS

A total of 52 plant species belonging to 34 botanical families were identified in the area. Solanaceae and Lamiaceae families showed the highest number of species. In the study area, there were only mestizo and Kichwa farmers, they are the only inhabitants of the northwestern area of Pastaza province, at the mentioned localities. Other ethnic groups settle in southern and southeastern areas of this province. Table 2 shows the species reported per botanical family and their frequency of use, as reported per each locality and per Kichwa/mestizo producer. It also shows that Santa Clara locality and Kichwa ethnic group used the highest number of species. There is also a description of the part of the plant used from each species, and its intended use, which demonstrates that the most used part of the plant are the leaves, mainly for treating stomachaches and colds, as well as an analgesic. Table 2 also shows the report from other researches related to the identified species.

Results from contingency tables, showed significant results (Pearson´s and MV- G2 chi square value), for the frequency of use vs. locality and for the frequency of use vs. producer ethnicity (Table 3). *Ilex guayusa* Loes, *Psidium guajava* L., *Banisteriopsis caapi* (Spruce ex Griseb.) C.V. Morton and *Mansoa alliacea* (Lam.) A.H. Gentry were the most frequently reported species, as showing in Table 4.

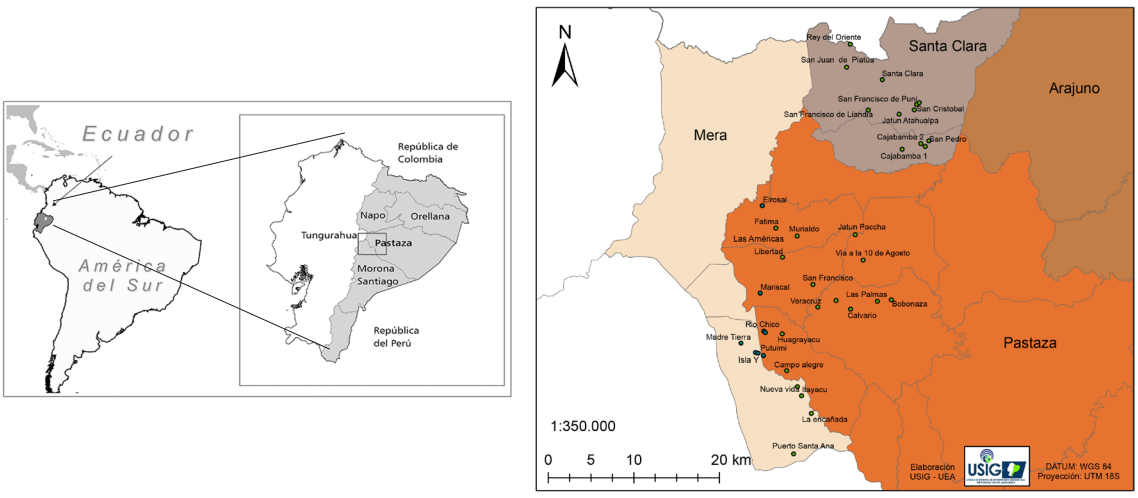

Figure 1. Locations of the localities included in this study. This figure is in color in the electronic version.

Table 2 . Species showing statistical differences in the proportions analysis according to locality and producer ethnicity against frequency of use by the population (percentage)

Family	Species		Locality			Ethnic group		Percentage of the population that reported the species (%)	Plant part used	Plant uses	Plant use reported by others
	Scientific name	Common name	Pastaza	Mera	Santa Clara	Mestizo	Kichwa				
Adoxaceae	*Sambucus nigra* L.	Tilo	2	0	1	3	0	1.41	leaves , flowers	cold	Respiratory, analgesic, anti-inflammatory, fever (Molares and Ladio 2014) bone fracture, (Costa *et al*. 2012)
Apocynaceae	*Tabernaemontana sananho* Ruiz & Pav.	Tsicta	0	0	3	0	3	1.41	stem	cold, stomach washes	
Aquifoliaceae	*Ilex guayusa* Loes.	Guayusa	17	9	22	24	24	22.54	leaves	energizing stomach pain	Energizer (Lewis and Lewis 1995)
Asteraceae	*Baccharis* sp.	Chilca	0	0	1	1	0	0.47	leaves	healing	Cancer, cholesterol, (Costa *et al*. 2012)
	Galinsoga quadriradiata Ruiz & Pav.	Shiram	0	0	9	0	9	4.23	whole plant	cold, renal anti-inflammatory	Snake bite (Mirutze *et al*. 2009), removal of retained placenta (Tolossa *et al*. 2013)
Bignoniaceae	*Jacaranda glabra* (A. DC.) Bureau & K. Schum.	Cupa	0	0	1	0	1	0.47	leaves	fungus, scabies	
	Mansoa alliacea (Lam.) A.H. Gentry	Ajo De Monte	3	10	10	1	22	10.80	stem, leaves, flowers	cold, anesthetic, muscle pain	Cold, fever, rheumatic (Bichara *et al*. 2009)
Boraginaceae	*Cordia nodosa* Lam.	Araña Kaspi	0	0	1	0	1	0.47	leaves, stem	infections, snake bite, diarrhea	
Caricaceae	*Carica papaya* L.	Papaya	1	0	0	0	1	0.47	seeds	laxatives	Roundworms, stomach pain, muscle relax (Costa *et al*. 2012)
Celastraceae	*Maytenus krukovii* A.C. Sm.	Chuchuwasu	0	0	20	1	19	9.39	stem (rind)	stomach pain anti-inflammatory	Antimutagenic, antioxidant (Bruni *et al*. 2006), analgesic, anti-inflammatory (Salazar *et al*. 2008)
Commelinaceae	*Floscopa peruviana* Hassk. ex C.B. Clarke	Hoja De Viento	0	0	1	0	1	0.47	leaves	fearfulness	
Costaceae	*Costus* sp.	Caña Agria	2	0	3	3	2	2.35	stem	fever, anti-inflammatory bronchitis	

Table 2. Continuation

Family	Species		Locality			Ethnic group		Percentage of the population that reported the species (%)	Plant part used	Plant uses	Plant use reported by others
	Scientific name	Common name	Pastaza	Mera	Santa Clara	Mestizo	Kichwa				
Crassulaceae	*Kalanchoe pinnata* (Lam.) Pers.	Paki Panka	1	10	7	2	16	8.45	leaves	infections, healing	Cold (Costa *et al*. 2012), anti-inflammatory , (Nascimiento et al. 2013) anti-Leishmaniasis (Muzitano et al. 2006)
Cyperaceae	*Cyperus luzulae (L.)* Rottb. ex Retz.	Tres Filos	0	0	1	1	0	0.47	leaves	labor pains	Skin diseases (Simpson and Inglis 2001)
	Fimbristylis littoralis Gaudich.	Dunduma	0	0	14	0	14	6.57	stem, rind	stomach pain	
Erythroxylaceae	*Erythroxylum coca* Lam.	Coca	0	0	2	2	0	0.94	leaves , stem	infections, stomach pain anti-inflammatory	Stomach pain , artery pressure (Madaleno and De la Torre 2013)
Euphorbiaceae	*Croton lechleri* Müll. Arg.	Sangre de Drago	11	0	7	11	7	8.45	stem, latex	healing	Prostate inflammation, (Costa *et al*. 2012)
Fabaceae	*Pseudopiptadenia suaveolens* (Miq.) J.W. Grimes	Asna Guarangu	0	0	1	0	1	0.47	stem	fungus	Epilepsie, fever, (Ruysschaert. *et al*. 2009)
Gesneriaceae	*Columnea nariniana* (Wiehler) L.P. Kvist & L.E. Skog	Saragoza	1	0	5	1	5	2.82	stem	colic, stomach pain	
Lamiaceae	*Coleus ambonicus* Lour.	Orégano	2	0	2	2	2	1.88	leaves	stomach pain	
	Hedyosmum anisodorum Todzia	Menta De Monte	0	0	1	0	1	0.47	leaves	analgesic	
	Mentha sp.	Menta	1	0	5	4	2	2.82	leaves	stomach pain	Bronchitis, cold (Costa *et al*. 2012)
	Stachys micheliana Briq.	Pedorrera	0	0	1	0	1	0.47	stems and leaves	stomach pain	
Lauraceae	*Cinnamomum* sp.	Ishpingo	0	0	5	3	2	2.35	leaves	stomach pain	Antimicrobial (Pessoa *et al.* 2007)
Lecythidaceae	*Grias neuberthii* J.F. Macbr.	Pitón	1	0	10	6	5	5.16	fruit and stem	anti-parasitical	
	Couroupita guianensis Aubl.	Lustundo	0	0	2	0	2	0.94	stem, leaves, fruit	infections, pain	Inmunomodulatory (Pradham *et al*. 2009), antibiotic, antiseptic, (Kumar *et al*. 2011)

Table 2. Continuation

Family	Species		Locality			Ethnic group		Percentage of the population that reported the species (%)			
	Scientific name	Common name	Pastaza	Mera	Santa Clara	Mestizo	Kichwa		Plant part used	Plant uses	Plant use reported by others
Loganiaceae	*Potalia amara* Aubl	Curarina	0	0	7	0	7	3.29	leaves , stems	healing, snake bite	
Malpighiaceae	*Banisteriopsis caapi* (Spruce ex Griseb.) C.V. Morton	Ayawaska	2	1	21	1	23	11.27	stem	pain, hallucinogenic, anesthetic	Hallucinogen, psychodelic (Tupper and Labate 2014)
Marantaceae	*Maranta amazonica* L. Andersson	Challua Kaspi	0	0	6	0	6	2.82	rind	detoxifying	
Moraceae	*Artocarpus altilis* (Parkinson) Fosberg	Frutipan	1	0	0	0	1	0.00	stem, latex	healing	
	Brosimum utile (Kunth) Oken	Sandi	0	0	1	1	0	0.47	stem, latex	anti-inflammatory reduction	
Myrtaceae	*Psidium guajava* L.	Guayaba	4	12	9	19	6	0.47	leaves, fruit	stomach pain, diarrhea	Diarrhea (Costa *et al*. 2012), saliences for women (Hannazaki *et al*. 2006) Anti-inflammatory, (Fernández *et al*. 2009)
Olacaceae	*Heisteria acuminata* (Bonpl.) Engl.	Amarun Kaspi	0	1	3	0	4	11.74	root, stem leaves	colic, diarrhea, healing	
Piperaceae	*Pothomorphe umbellata* (L.) Miq.	Maria Panka	6	0	2	7	1	1.88	leaves	anti-inflammatory	Antifungal (Rodríguez *et al.* 2012).
Plantaginaceae	*Plantago major* L.	Llantén	1	0	1	2	0	3.76	leaves	stomach pain	Stomach pain (Madaleno and De la Torre 2013), antimicrobial, anti-inflammatory (Tolmacheva *et al*. 2014), heart diseases, laxative (Costa *et al*. 2012).
	Scoparia dulcis L.	Teatina	10	0	1	7	4	0.94	root, stem	stomach pain	Hypertension, analgesic. (Uma *et al*. 2014), rheumatism , skin diseases (Madaleno and De la Torre 2013)
Poaceae	*Guadua angustifolia* Kunth	Guadua	2	10	0	0	12	5.16	leaves	diarrhea	
Rubeaceae	*Borojoa patinoi* Cuatrec.	Borojó	2	0	0	0	2	0.47	fruit	energizing	Antimicrobial agent (Sotelo and Casas 2010)

Table 2. Continuation

Family	Species		Locality			Ethnic group		Percentage of the population that reported the species (%)	Plant part used	Plant uses	Plant use reported by others
	Scientific name	Common name	Pastaza	Mera	Santa Clara	Mestizo	Kichwa				
Rutaceae	*Citrus* × *limon* (L.) Osbeck	Limón	3	0	8	10	1	0.94	fruit	cold	Gastrointestinal, (Angulo *et al*. 2012) Fever, cold, (Costa *et al*. 2012)
	Citrus x sinensis Osbeck	Naranja	1	0	2	2	1	5.16	leaves, fruits	cold	Respiratory (Angulo *et al*. 2012) conjuntivitis (Costa *et al*. 2012)
Smilacaceae	*Smilax* sp.	Zarzaparrilla	6	0	13	2	17	1.41	stem	urinary tract inflammation	Inflammatory and anti-malarial (Okoye *et al*. 2014)
Solanaceae	*Brugmansia arborea* (L.) Lagerh	Floripondio	0	0	9	1	8	8.92	stem, leaves	anti-inflammatory	Application in body part affected (De Feo 2004)
	Brugmansia suaveolens (Humb. & Bonpl. ex Willd.) Sweet	Guanto	2	7	3	4	8	4.23	leaves, flowers	muscle pain	Hallucinogen (Bradley 1992)
	Brunfelsia chiricaspi Plowman	Chiriwaysa	0	0	1	0	1	5.63	leaves	inhalation	
	Nicotiana tabacum L.	Tabaco	1	0	2	0	3	0.47	leaves	cold	Thyroid (Costa *et al*. 2012), respiratory problems (Mirutze *et al*. 2009)
	Solanum dulcamara L.	Dulcamara	1	0	2	1	2	1.41	leaves	inflammations, diabetes	
	Solanum americanum Mill.	Hierva Mora	2	0	0	2	0	1.41	stem, leaves, flowers	stomach pain	Crying (Ruysschaert *et al*. 2009)
	Witheringia solanacea L'Hér.	Tsimbio	0	0	1	0	1	0.94	leaves	scabies	
Urticaceae	*Urtica incisa* L.	Ortiga	1	4	13	5	13	0.47	stem, leaves	muscle pain	
Verbenaceae	*Stachytarpheta cayennensis* (Rich.) Vahl.	Verbena	8	4	6	8	10	8.45	whole plant root, stem, leaves,	infections, rash, stomach pain, anger, fever	Fractures , gastritis , cold , muscle relaxant , cough and worms(Costa *et al*. 2012), skin affections (Angulo *et al*. 2012)
	Verbena officinalis L.	Verbena	8	4	6	8	10	8.45	whole plant	infections, rash	Anti-inflammatory (Calvo 2006) pain , colds , sinusitis and cough (Costa *et al*. 2012)
Number of reported species			32	13	51	36	49				

Table 3. Analysis of contingency. Frequency of use of medicinal plants versus locality and frequency of use of medicinal plants versus producer ethnicity (Kichwa/mestizo).

Statistical	Medicinal plants vs. locality			Medicinal plants vs. ethnicity		
	statistical value	degrees of freedom	P value	statistical value	degrees of freedom	P value
Pearson´s square chi	284.87	110	<0.0001	196.51	55	<0.001
MV-G2 square chi	298.86	110	<0.0001	237.75	55	<0.0001
Cramer contingence coefficient.	0.44			0.46		
Pearson contingence coefficient	0.61			0.54		

Table 4. Species that showed statistical differences in the proportions analysis for uses, and considering the components of locality and ethnicity.

Species	Locality			Producers	
	Pastaza	Mera	Santa Clara	Mestizo	Kichwa
Banisteriopsis caapi (Spruce ex Griseb.) C.V. Morton			x		x
Croton lechleri Müll. Arq.	x				
Ilex guayusa Loes	x		x	x	x
Mansoa alliacea (Lam.) A.H. Gentry					x
Maytenus krukovii A.C. Sm			x		x
Psidium guajava L.		x		x	

DISCUSSION

The presence of localities with different edaphoclimatic characteristics and ethnicity generates a variability in the use of plant species for traditional medicine, being locality and ethnics two characteristics that interact with each other, which is demonstrated through the differences reported.

The amount of reported species is inferior to that reported in other studies, where the Kichwa community of San José de Payamino (Orellana province), reported 63 species (Doyle *et al*. 2014), and Saraguro and Shuar communities (Loja and Zamora Chinchipe provinces) reported 275 species 68 different therapeutic uses (Tene *et al*. 2007), and a higher number of species reported by Kichwa producers, with 49 species, (Lewis and Lewis 1995).

Overall species are used for 26 types of ailments. Species were mainly used for the treatments of stomach pain 16 spp. (31%), cold 7 spp. (13%), infections 6 spp. (12%), diarrhea and healing 4 spp. (8%) and inflammations 8 spp. (15%). This amount is inferior to that obtained by Marles *et al.* (1986) that, in studies performed in the Ecuadorian Amazon, (Napo province) with Kichwa population, identified a total of 138 species that are used with 80 therapeutic purposes. Different from that we found, Marles *et al*. (1986), reported that the most treated ailments with plant species were, parasitic infections and fever with 64 spp. (53%), uses for pain relief, 32 spp. (27%), female infertility treatment 30 spp. (25%), and anti-venoms 12 spp. (10%).

For ailment treating, the parts of the plants most used were leaves (30 species, 58%), stem 21 spp. (40%), fruit 5 spp. (10%) and flowers 4 spp. (8%). In the community of Saraguro (Loja province) it was reported a high use of branches and the entire plant in traditional medicine (Armijos *et al*. 2014).

Mestizo and Kichwa producers differ in the use of medicinal plants. Mestizo producers show higher use of the most commonly known species, and cultivate many of them. From these species, 11 of them show only one use report by farmers. Kichwa producers use mainly uncultivated species, found in their natural environment. This was confirmed after finding 16 species with only one use report. This is corroborated by the analysis of contingency tables and agrees with Turner *et al*. (2011), who states that the use of species in different ecosystems show differences, depending of life forms and their climatic characteristics.

Regarding botanical families, Lamiaceae and Solanaceae have the highest number of species reported in medicinal use, which agrees with Alberthasedade *et al*. (2010).

In Ecuador, Ríos *et al*. (2007) reported species used in medicine, including *Artocarpus altilis, Brosimum utile, Brunfelsia chiricaspi, Carica papaya, Citrus × lemon, Columnea nariniana, Cordia nodosa, Costus sp., Croton lechleri. Cymbopogon citratus, Cyperus luzulae, Erythroxylum sp., Fimbristylis littoralis, Grias neuberthii, Guadua angustifolia,, Heisteria acuminatta, Ilex guayusa, Inga edulis* var. edulis, *Jacaranda glabra, Mansoa alliacea, Maranta amazonica, Maytenus krukovii, Melissa officinalis, Mentha sp., Nicotiana tabacum, Ocimum basilicum, Plantago major, Potalia amara, Psidium guajava, Sambucus nigra,, Scoparia dulcis, Smilax sp., Stachytarpheta cayennensis, Tabernaemontana sanano, Verbena officinalis*, and *Witheringia solanacea.*

The comparison with studies from other countries shows similar characteristics regarding the purposes of uses of the species identified in this research for medicinal purposes.

This indicates that these plants are used elsewhere, and have a wide distribution. Only *Floscopa peruviana* is not reported in human medicine by other authors. In addition, the purpose of the most frequent uses were the treatment of stomach pains, healing and colds, as well as anti-inflammatory and analgesic. This shows a more preventive culture of healing medicine in the surveyed producers, which is also observed in the other studies. This clearly indicates the existence of indigenous knowledge among the different ethnic groups living in different localities of different regions. It is quite common the percentage of species that are specifically used in an area, which does not indicate that the distribution of these will restrict to a single sector, but the knowledge developed on its use.

CONCLUSIONS

The variability of species used in traditional medicine is influenced by factors of locality and producer ethnicity. Solanaceae and Lamiaceae families report the highest number of species and *Ilex guayusa* is the most representative species as inferred from the number of reports and the statistical analysis. Species were mainly used for treating stomachaches and colds, and as analgesics. Most of the identified species are present in other studies conducted around the World.

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