Ethnobotanical study of medicinal plants of the Kichwa community, Payamino Center, Orellana, Ecuador

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ABSTRACT

This research aims to identify different types of plants and analyze their characteristics that contribute to the conservation of plant resources in different cultural contexts, in the Payamino Community properties, 70 species corresponding to 31 families were identified, of which 48 are trees, 20 shrubs and 3 herbs in the studied community. 354 individuals were registered in an area of 400 m^2. The survey was applied as an instrument, it could be determined according to the basal area of the trees that there are two types of ecosystems, the research was carried out in 12 plots of primary forest and 12 plots in secondary forest. The floristic composition was determined in two farms, for which temporary plots of 400 m were installed^2 (20 x 20 m) for trees greater than or equal to 5 cm DBH, within these two subplots of 25 m^2 (5 x 5 m) for shrubs and 2 plots of 1 m^2 (1 x 1 m) for herbs. The use value index was calculated, which allowed to establish the differences in vegetation, variations influenced by the modification of environmental and anthropogenic factors, registering a total of 365 individuals of which 70 species, 48 are arboreal species, 19 shrub species , and 3 species of herbs corresponding to 31 families and 69 genera, the most diverse families are: ***Rubiaceae, fabaceae, meliaceae, sapotaceae, moraceae, euphotaceae, solanaceae, zingiberaceae, laureaceae***, it was found that in the community the elderly have greater transmitted knowledge From generation to generation, they have also had permanent contact with the forest, adults and youth have shown little interest in maintaining ancestral knowledge or wisdom.

Keywords: traditional knowledge, food, ethnobotany, gathering, agriculture.

Introduction

With the current situation of climate change where the loss of many species and biodiversity is calculated, the scientific community must direct its studies to the rescue of the ancestral knowledge of the populations that inhabit regions with a varied biodiversity.

In Spain, research has been carried out on wild plants potentially used in human nutrition, these show a general assessment of the catalog of native wild plants of the place, which have nutritional and edible properties (Blanco, Gutiérrez, Labrador & Ruiz, 2019), the authors state that rural communities in southern Spain have developed a close relationship between biodiversity, local culture and dialect diversity over centuries of history.

In Peru, biodiversity is being investigated using modern techniques and efficient administrative procedures, its objective is to be able to reduce the rapid loss of biodiversity and natural resources, so they seek solutions to support those investigations that help to identify, describe and characterize biodiversity in as soon as possible, so that the proper conservation and mitigation measures can be taken (Von, Catenazzi, Angulo, Venegas, & Aguilar, 2012; Sulistiawati et al., 2020; Arnawa et al., 2019).

Colombia as part of the region is studying biotics, their state of conservation of the main ecosystems such as wetlands, moors, and protected areas, comparing them in light of problems such as climate change, deforestation and mining today impact these ecosystems, having as a principle that these resources provide well-being to the communities (Andrade, 2011; Suaria et al., 2021; Nadiradze, 2020).

Ecuador is one of the 17 megadiverse countries in the world, it harbors high biological diversity per unit area; This mega diversity is attributed to the purely tropical location, where the Andes Mountain range is present. These factors have given rise to a variety of ecological zones, to an extraordinary floristic diversity of around 16,087 species of vascular plants grouped into 273 families, with 4,173 endemic species, which is equivalent to 27% of the native flora, they are supplier sources. of many environmental goods and services for humans (MAE, 2016).

The country is considered by many botanists and ecologists as one of the most megadiverse countries in terms of biodiversity in the world; Due to its high and exceptional richness of plant species in relation to its territorial size, it has also been recognized and studied for a long time for having various kinds of vegetation and ecosystems, to which the flora and fauna have adapted for "thousands of generations ", giving rise to speciation, endemism and current concentration of animal and plant species.

Today many people and communities still depend directly or indirectly on plants in their natural habitat to meet their basic needs, emphasizing common uses such as: food, traditional medicine, handicrafts, ornamental objects, construction, instruments, and rituals. It is estimated that 80% of the Ecuadorian population depends on traditional medicine, for the main care of health and well-being, thus the use and trade of medicinal plants remains an active practice in the markets of Ecuadorian cities and particularly in the cities of the inter-Andean alley, where at least 273 species of medicinal herbs are sold, which are used to treat a variety of ailments (Ansaloni, León, Orellana, & Peñaherrera, 2010).

In these ecosystems, the lack of research on plant resources that allows generating knowledge about the use and use value of plants is notorious, these aspects have been the main limitations to manage in a sustainable way and consequently ensure their permanence (PDOT SAN LUIS DE ARMENIA, 2015) of the species.

According to the potential use of plant resources, there are approximately 250,000 species of plants on earth, it has been estimated that up to 75,000 could be edible and about 7000 are regularly consumed worldwide (Blanco, Gutiérrez, Labrador & Ruiz, 2019).

In South America, ethnobotanical studies related to food are of particular interest since this region has a high percentage of endemism's that are currently threatened by environmental degradation processes (Scarpa, 2009).

Ethnobotany studies the relationships between humans and plants. Its main objective is knowledge about plants and their utilities in traditional popular culture (Pardo, 2003). The latter is understood as prolonged employment throughout history and its use is well established and widely recognized as safe and effective, it can be accepted by national authorities (WHO, 2014).

Currently, the Amazon faces serious threats due to the lack of knowledge of agricultural biodiversity, the dominant model derived from the Green Revolution has become one of the main threats against biodiversity (Figueroa & Domínguez, 2018).

Agricultural expansion in many developing countries contributes to economic development by increasing the production of agricultural commodities, but it also causes environmental degradation, including widespread deforestation (Jung, & Polasky, 2018). Logging and forest degradation contribute one-tenth to one-seventh of the emissions global of greenhouse gases, about the same amount the transport sector.

In the past two decades, Indigenous Communities (CI) have become increasingly important actors in efforts to address this problem. Associations such as the International Indigenous Peoples Forum on Climate Change (IIFCCC) now represent ICs in climate negotiations. Media coverage regularly promotes the benefits of carbon forest management (Blackman & Veit, 2018).

Ecuador has approximately 2% of the Amazon rainforest, the Amazonian provinces with the largest rural population are among the poorest in the country, 28% of Amazonian inhabitants correspond to indigenous peoples and nationalities. That in addition to having a cultural and linguistic variety, these peoples have made sustainable use of the region's resources, due to their deep knowledge of biodiversity and ecosystem functioning (INEC, 2010).

The Amazon basin is home to the largest tropical forest in the world with approximately 11% of the tree biodiversity; Furthermore, the Amazon plays a fundamental role in the maintenance of indigenous and non-indigenous peoples who provide different assets based on biodiversity through food gathering, hunting andshifting cultivation. Also known as hidden agriculture, SC represents the clearing of small forest areas (slash and burn) forplantationsshort-term crop. After harvest and loss offertilityof thesoil,areas are abandoned and naturally regenerated, forming second growth forests. Practiced for centuries, shifting cultivation continues to be the main agricultural system that supports thelivelihoodsofpeoplein the Amazon (Villa, Martins, de Oliveira, Rodriguez, Martorano, Monsanto, Cancio, & Gastauer, 2018).

This research work was carried out to support the conservation and contribute to the rescue of ancestral knowledge that is currently disappearing in relation to the use and management of plant species, which are threatened with extinction, mainly by the different changes in the way of life since the knowledge of the traditions of the people is increasingly relegated to the elderly; and the current generations show no interest in maintaining them. In addition, people who know the traditional uses of plants recognize that the intense pressure to which their farms are subjected are causing alterations in the flora in the Kichwa Centro Payamino Community, which is a humid tropical forest.

Materials and Methods

This research was carried out in the Kichwa Community Centro Payamino Km 14 via Loreto, located in the Northeastern Region of Ecuador between the Loreto and Francisco de Orellana cantons, Orellana province, it covers an area of 1042 global hectares at a height between 250 to 386 meters above sea level (Grefa, 2008). The climate in the area is unpredictable, rainy with high temperatures that oscillate between 23 and 26 ° C, in most of the year; receives an average annual rainfall of 3000 mm; Relative humidity 85%, which classifies it in a premontane very humid forest life zone (bmh-PM).

Finally, we proceeded to take points one and two from each plot, noting the coordinates given from the GPS in a field notebook (see Figure 2). For the taxonomic identification and description of the plant species, fertile samples of each species were collected with the help of a hand pruner. Later the specimens were pressed, dried, and taxonomically identified in the herbarium "Reinaldo Espinosa" of the National University of Loja. To interpret the information collected in the field, the basal area data in native forest was considered, the sum of the basal area of the native forest represents 100%, therefore the basal area> 40% corresponds to forest secondary and the basal area <40% corresponds to forest in succession. The diameters were determined by measuring the circumference of each of the individuals with a tape measure and then the values were transformed to DAP dividing for π (3.1416)". Everyone was placed on paper and covers with their respective alphabetic code (observed in Table 1).

The basal area is given as a function of the diameter at chest height (DBH) of the tree, it is calculated using the equation 1.

$$AB = D^2 . \frac{\pi}{4} \qquad (1)$$

The field work was carried out between August 2015 and November 2016. To achieve a first approach to the subject, open interviews were carried out with residents who were permanent residents in the study area.

Analysis and discussion of the results

The study was developed in a Kichua community predominantly clay soils of medium texture of black color, shallow, according to the new version of the genesis classification of the soils of Ecuador, with floodplain topography, characterized by an average productivity (Holdrigde, 1996). In figure 1, the map of the study study area is shown.

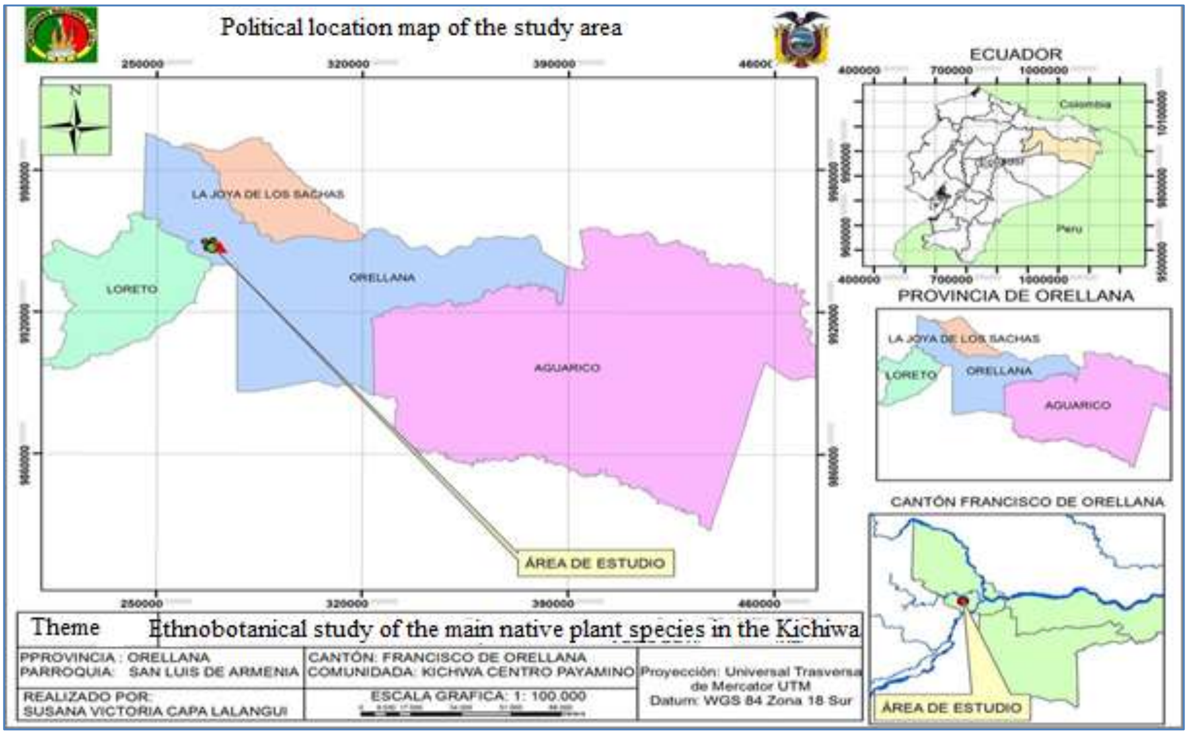

Figure 1. Map of the Research Area –Kichua Communities Payamino Center

Source: (Capa, 2016)

For the development of the research, records were made on life histories, to detect the best qualified informants on the subject, emerging socio-cultural traits, as well as the processes of abandonment and persistence of habits related to the use of plants in food. The information that refers to customs of the past refers to what happened until the 1970s.

To collect the information, the field study was divided into plots, as shown in figure 2. Points one and two were taken of each plot, writing down the given GPS coordinates in a field notebook. For the taxonomic identification and description of the plant species, fertile samples of each species were collected with the help of a hand pruner. Later the specimens were pressed, dried, and taxonomically identified in the herbarium "Reinaldo Espinosa" of the National University of Loja. To interpret the information collected in the field, the basal area data in native forest was considered, the sum of the basal area of the native forest represents 100%, therefore, the basal area> 40% corresponds to secondary forest and the basal area <40% corresponds to forest in succession.

The diameters were determined by measuring the circumference of each of the individuals with a tape measure and then the values were transformed to DAP dividing for π (3.1416).

The basal area is given as a function of the diameter at chest height (DBH) of the tree, this is calculated using the Guide of methods to measure biodiversity (Aguirre, 2013).

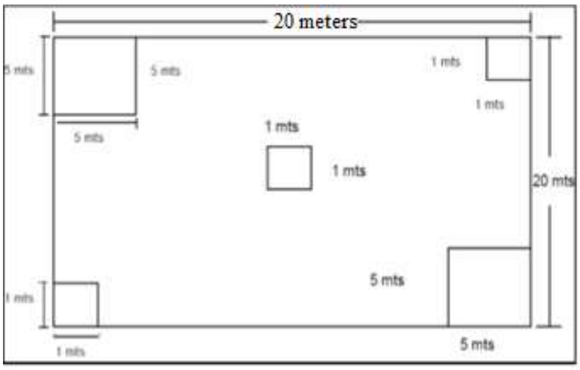

Figure 2. Form of the Plot

Figure 2. Map of the Research Area –Kichua Communities Centro Payamino

Source: (Capa, 2016)

During the process of collecting information on the species frequently used in the research community, a matrix was used to Performing the calculation of the value of uses was determined by sex (men and women) and age groups (young, adult and elderly), it was estimated for each species, considering the number of uses that the informants give to each species, divided for the total of uses defined in this research. The categories of uses that were obtained through data tabulation were the following: food, medicinal, timber, construction, artisanal, spiritual (GADMFO, 2018). Table 1 shows the different plants used for food.

Table 1. Plants used for food

Common name	Scientific name	Family	Total number of mentions of use
Ovo	*Spondias mombin* L.	ANACARDIACEAE	46
Guaba	*Inga edulis* (Mart)	FABACEAE	55
Ají	*Capsicum annuum* L	SOLANACEAE	20
Guayusa	*Ilex guayusa* Loes.	AQUIFOLIACEAE	95
Chinese potato	*Colocasia esculenta* L. Schott	ARACEAE	25
Cassava	*Manihot esculenta* Crantz	EUPHORBIACEAE	85
Banana	*Musa paradisiaca* L.	MUSÁCEAE	75

The results show that the edible species with the highest priority for use are the following species: Ilex guayusa Loes, the species Manihot esculenta Crantz, to make chicha an aphrodisiac drink for the inhabitants. Colocasia esculenta L. Schott, Inga edulis (Mart).

It was possible to determine the species of plants most used for medicine, shown in table 2.

Table 2. Plants used for medicine

Common name	Scientific name	Family	Total number of mentions of use
Sandi	*Brosimun alicastrum* Sw.	MORACEAE	85
Blood of dragon	*Croton lechleri* Muell . Arg	EUPHORBIACEAE	83
Sour cane	*Costus sp.*	ZINGIBERACEAE	35
Ginger, wormwood	*Zingiber offiicinale* Roscoe	ZINGIBERACEAE	20
Cat's claw	*Uncaria tomentosaga* (Willd.) DC	RUBIACEAE	85
Matico	*Piper cf. Maranyonense* Trel.	PIPERACEAE	20
Sigta	*Psychotria cf. brachiata* Sw.	RUBIACEAE	35
Chiriguayzo	*Brunfelsia chiricaspi* Plowman	SOLANACEAE	45
Matiricosi	*Ficus sp.*	MORACEAEleg	25
Cow	*Bauhinia tarapotensis* Benth.	FABACEAE	34

The results show that the use of the plants and based on the knowledge they possess, show that the species Uncaria tomentosaga (Willd.) DC, Zingiber offiicinale Roscoe, the plants Brosimun alicastrum Sw and Croton lechleri Muell. Arg., they are used to heal ulcers and wound and cut healing. Costus sp, Psychotria cf. Bbrachiata Sw are used for inflammations, stomach pain, fever. The species Piper cf. maranyonense Trel, Benth and Bauhinia tarapotensis Benth, the latter are used to wash and disinfect wounds.

Collection of wild plants

For the Ethnobotanical analysis of each plant species in the studied community, priority was given to the use values of the species registered in the sampled plots, as well as the contributions of the categories and percentage of knowledge of the vegetation according to the / Key informants are shown in table 3.

Table 3. Most representative species in the community

Common	name Scientific name	Family	Total number of mentions of use
Sangre de gallina	*Otoba sp.*	MYRISTICACEAE	70
Jigua	*Nectandra crassiloba* R.	LAURACEAE	66
Sandi	*Brosimun alicastrum* Sw.	MORACEAEDragon's	85
blood	*Croton lechleri* Muell. Arg	EUPHORBIACEAE	83
Mate	*Crecentía cujete* L.	BIGNONIACEAE	55
Porotillo	*Dussia lemannll* Willd.	FABACEAEapple	65
Custard	Annona spp.	ANNONACEAE	50
Caimitillo	*Micropholis venulosa* Marth & Eichler	SAPOTACEAE	45
Chonta pambil	*Bactris gasipaes.* HBK	ARECACEAE	53
Cat's claw	*Uncaria tomentosaga* (Willd.) DC	RUBIACEAE	85
Tobacco	*Nicotinana tabacun* L.	SOLANACEAE	45
Guayusa	*Ilex guayusa* Loes.	AQUIFOLIACEAE	90
Yucca	*Manihot esculenta* Crantz	EUPHORBIACEAE	85
Ayawaska	*Banisteriopsis caapi* (Spruce & Griseb) Morton.	MALPIGHIACEAE	85
Matico	*Piper cf. Maranyonense* Trel.	PIPERACEAEWild	56
garlic	*Mansoa alliacea* (Lam.) AHGentry	*BIGNONIACEAE*	46
Sigta	*Psychotria cf. Brachiata* Sw	RUBIACEAE	35
Chiriguayzo	*Brunfelsia chiricaspi* Plowman	SOLANACEAE	45
Paja toquilla	*Carludovica palmata* Ruiz & Pav.	CYCLANTHACEAE	65
Matiricosi	*Ficus sp*	MORACEAE	44

As can be seen, the Guayusa Ilex guayusa Loes is one of the most used, in addition to four others marked with a use value of 85, recognized by the inhabitants as the most used.

Timber trees

Through the study and the surveys carried out, the most used timber trees were inventoried, these are shown in table 4**.**

Table 4. Best known timber trees

Common	name Scientific name	Family	Total number of mentions of use
Canelo	*Nectandra sp.*	LAURACEAE	26
Jacaranda	*Jacaranda copaia* Martius ex A. DC.	TILIACEAE	95
Peine mono	*Apeiba membranaceae* Spruce ex Benth	TILIACEAE	50
Coco	*Ferruleduckei* AC Smith	MELIACEAE	35
Mahogany	*Swietenia macrophylla* King	MELIACEAE	53
Guayacán black	*Tabebuia serratifolia* M. Vahl	BIGNONIACE AE	19
Jigua	*Nectandra crassiloba* R	LAURACEAE	32
Cedrela	*odorata* L	MELIACEAE	35
	Bactris gasipaes HBK	ARECACEAE	
Chonta pambil			65

As can be seen there are several known trees, among them the most representative are the Jacarandas, the Chonta pambil and the Mahogany, many of them used as wood within the territorial scope. The 9 species such as: Jacaranda copaia Martius ex A. DC, Bactris gasipaes HBK, Swietenia macrophylla King, Apeiba membranaceae Spruce ex Benth, Nectandra crassiloba R, Cedrela adorata L, Virola duckei AC Smith, Tabebuia serratifolia M. Vahl, its usability is found According to this order of appearance, they are used to remove wood, boards, and planks.

Cultivation in family gardens

Experiences with domestic cultivation of vegetables and fruit trees are limited. Until a few decades ago, the supply of vegetables was carried out mainly from small home gardens and street vendors that passed through the rural area. In the region, horticulture has not achieved the momentum that it had in the neighboring province of Mendoza with its extensive irrigated areas. The absence of surface water courses and the limited underground supply condition this activity. Even today, in the home gardens of La Humada there are no adequate irrigation systems.

Vegetables in meals

It is considered by many botanists that Ecuador is one of the most megadiverse countries in terms of biodiversity in the world; Due to its high and exceptional richness of plant species in relation to its territorial size, it has also been recognized and studied for a long time for having various kinds of vegetation and ecosystems, to which the flora and fauna have adapted for "thousands of generations ", giving rise to speciation, endemism and current concentration of animal and plant species.

Ecological succession is the replacement of some elements of the ecosystem by others over time so that a certain area is colonized by increasingly complex plant species. If the environment allows it, the appearance of mosses and lichens is followed by grasses, then by bushes and finally by trees. The state of equilibrium reached once evolution has been completed is called a climax. Modifications occur between members of the same species: for example, new trees replace old ones (Tananta, 2014).

In ancient times, ethnobotany dealt first with plants of economic interest, the peoples discovered the nutritional value of numerous plants such as cereals (rice, wheat, corn), sugar cane; However, currently plant species have received a multitude of uses, the main reason for confusion when compiling popular knowledge about plants and their traditional uses, to overcome this inconvenience these uses have been divided into six ethnobotanical categories (Armijos & Villena, 2009).

In studies carried out in Ecuador as a rescue to the ancestral knowledge of the Amazonian peoples in the face of the challenges of medicine, for the benefit of native peoples, the pharmacological value of plants and plant extracts in general is demonstrated, which today is permanently devalued, One could mention the study carried out by (Valarezo, Jaramillo, Vásconez, Djabayan, Andrade & Falconí, 2016), where they present certain studies on the use of plant extracts in ophidian accident and the extract of the bark of the Piwi tree (Pictocoma discolor).

Food preservation

In the Community, 70 species were recorded in 64 genera and 31 families of which: 48 trees, 19 shrubs and 3 herbs in a sampling area of 400 m^2 in the studied community. The most representative families were: RUBIACEAE, FABACEAE and MELIACEAE (5 species), SAPOTACEAE, MORACEAE, (4 species), EUPHORBIACEAE, SOLANACEAE, ZINGIBERACEAE,

LAURACEAE (3 species). The most ecologically important species of the studied communities were: *Uncaria tomentosaga* (Willd.) DC, *Manihot esculenta* Crantz, *Pouteria sp*, *Brosimun alicastrum* Sw, *Croton lechleri* Muell. Arg, *Bactris gasipae* HBK, *Ilex guayusa* Loes, *Banisteriopsis caapi* (Spruce & Griseb) Morton, in contrast to the study of in the Puglla Forest of the Ilincho community (Iñiguez, Granda & Guamán, 2012), registry 38 families, in 58 genera and 57 species. The most common families in this area are: ASTERACEAE, ERICACEAE and MELASTOMATACEAE with a density of 1020 ind / ha between trees and shrubs. Likewise (Granda & Guamán, 2006) in the sector 33 species of trees were counted in 32 genera and 21 families. For the shrub stratum, 8 species, 8 genera and 7 families were recorded, a diversity like the study.

Floristics

In the Payamino Community plots, 70 species corresponding to 31 families were identified, of which 48 are trees, 20 shrubs and 3 herbs. In the studied community, 354 individuals were registered in an area of 400 m^2. The most outstanding plant species are: Otoba sp, Jacaranda copaia Martius ex, A. DC, Nectandra crassiloba R, Ochroma pyramidale Standl, Bactris gasipaes HBK, Croton lechleri Muell. Arg, Brosimun alicastrum Sw, Micropholis venulosa Marth & Eichler, Bryophyllum pinnatum (Lam.) Pers, Mansoa alliacea (Lam.) AHGentry, Brunfelsia chiricaspi Plowman, Carludovica palmata Ruiz & Pav. The 9 most diverse families of the Payamino community forests are shown in figure 3.

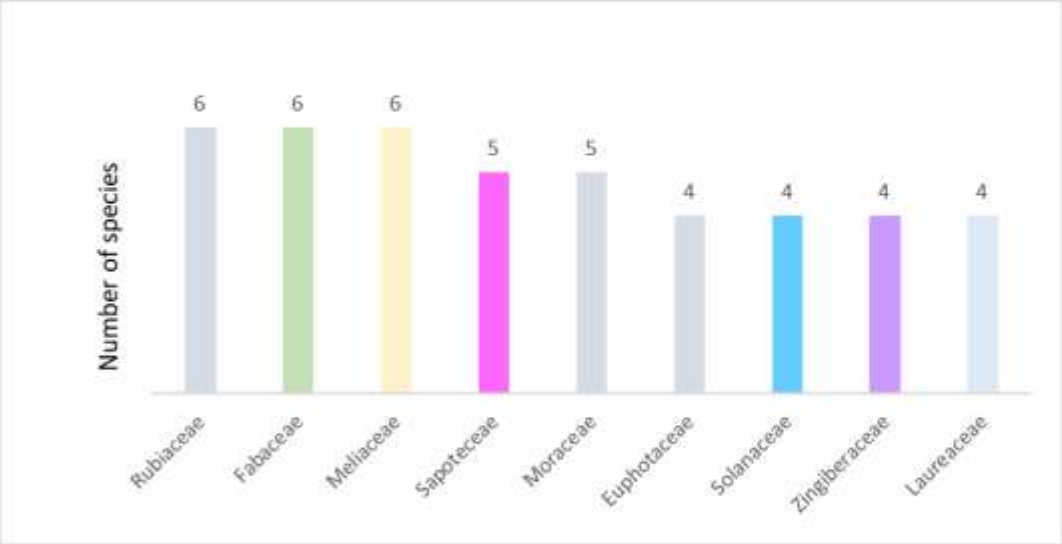

Figure 3. Number of most diverse species of the Payamino community

The most diverse families as observed are RUBIACEAE, FABACEAE and MELIACEAE with 6 species

With this study It is confirmed that ethnobotanical studies should be increased, where a greater number of plant communities are included, in order to have greater knowledge about the use of plants and therefore avoid the loss of traditional and / or ancestral knowledge, it is worth noting that The sustainable use of non-timber resources should be promoted, such as: blood drago and Sandi resin, developing training actions for the men and women of the surrounding communities; in the implementation and installation of a collection center, in the replacement of the resource through repopulation or favoring the natural regeneration of this species

Conclusion

Most of the population knows about the use that species have, but currently they use it for medicinal, artisan, except for spiritual species and those that provide, older people use plants for different uses, but younger populations do not have the same interest in such a way that ancestral cultures are lost and with-it sustainability of the populations of the territory studied so programs must be made to be rescued.

The most ecologically important species of the studied communities were: Uncaria Tomentosaga (Willd.) DC, Cordia alliodora (Ruiz & Pav.), Cedrelinga cateniformis Ducke, Croton lechleri Muell Arg, Otoba sp, Ilex guayusa Loes, Banisteriopsis caapi (Spruce & Griseb) Morton, Verbena officinalis L.

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