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## Non-timber forest products (NTFPs) of plant origin in five communities in Quilanga canton, Loja province, Ecuador

Productos forestales no maderables (PFNM) de origen vegetal en cinco comunidades del cantón Quilanga, provincia de Loja, Ecuador

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### Abstract

Tropical forests are characterized by their great ecosystem diversity, biological richness and supply of ecosystem goods and services, which are essential for the subsistence of rural communities that use non-timber forest products (NTFPs). The research aims to characterize the plant species that provide NTFPs in terms of traditional and current uses in five communities in Quilanga canton. A total of 234 surveys were applied using a thirteen-question form directed to three age groups. Quantitative ethnobotanical parameters were calculated: use value, frequency of use by category and level of significant use. We report 139 species, from 130 genera and 68 families, of which 49 correspond to herbs, 46 trees, 36 shrubs, 6 lianas and 2 epiphytes. The species with the highest use value are *Jacaranda sparrei* and *Cordia alliodora*, present in seven and five use categories, respectively. The categories with the highest number of species are: human medicine and handicrafts, *Piper aduncum*, *Cinchona officinalis*, *Zanthoxylum* sp. are the most used. The species with the highest level of significant use were *Psidium guajava* and *Bixa orellana*. There is minimal difference in the knowledge of species between men and women, and older adults are the most knowledgeable, while young people claim to know, but no longer use. Knowledge and utilization of plant species that provide NTFPs is still common practice in the five communities studied, although there is a lack of interest among the youngest.

**Keywords:** non-timber forest products, knowledge, goods, vegetables, use value, use level.

## Resumen

Los bosques tropicales se caracterizan por poseer una gran diversidad ecosistémica, riqueza biológica y oferta de bienes y servicios ecosistémicos, siendo parte esencial para la subsistencia para comunidades rurales que aprovechan los productos forestales no maderables (PFNM). La investigación tiene como objetivo caracterizar las especies vegetales que proveen PFNM en torno a los usos tradicionales y actuales en cinco comunidades del cantón Quilanga. Se aplicaron 234 encuestas usando un formulario de trece preguntas dirigidas a tres grupos etarios, se calcularon parámetros de la etnobotánica cuantitativa: valor de uso, frecuencia de uso por categoría y nivel de uso significativo. Se reportan 139 especies, de 130 géneros y 68 familias, de las cuales 49 corresponden a hierbas, 46 árboles, 36 arbustos, 6 lianas y 2 epífitas. Las especies con mayor valor de uso son *Jacaranda sparrei* y *Cordia alliodora* presentes en siete y cinco categorías de uso respectivamente. Las categorías con mayor número de especies son: medicina humana y artesanías, *Piper aduncum*, *Cinchona officinalis*, *Zanthoxylum* sp. son las más utilizadas. Las especies con mayor nivel de uso significativo fueron *Psidium guajava* y *Bixa orellana*. Existe diferencia mínima en el conocimiento de especies entre hombres y mujeres, y los adultos mayores son los que más conocen, mientras que los jóvenes afirman conocer, pero ya no utilizar. El conocimiento y la utilización de especies vegetales que proveen PFNM aún es práctica común en las cinco comunidades en estudio, aunque existe desinterés en los más jóvenes.

**Palabras clave:** Productos forestales no maderables, conocimiento, bienes, vegetales, valor de uso, nivel de uso.

## Introduction

Tropical forests are characterized mainly by their great ecosystem diversity, biological richness and supply of ecosystem goods and services, which are livelihoods through the use and harvesting of non-timber forest products (NTFPs) (López, 2008). According to FAO (2007), NTFPs are defined as goods of biological origin, other than timber, originating from forest ecosystems, from different forest zones and from trees outside the forest. These NTFPs can be harvested in the wild or produced in forest plantations or agroforestry systems.

The use of forest products is an activity that has been developed for thousands of years in all peoples and cultures (Padoch, 1992), and over time has become an object of interest worldwide, due, among other reasons, to concerns about the environment, deforestation and the welfare of communities (FAO, 1991). Thus, NTFPs through sustainable forest management (SFM) have become a mechanism to improve the income of local communities, provide food security and help conserve biological and cultural diversity (De la Peña and Illsley, 2001).

In addition, Alexiades and Shanley (2004) mention that NTFPs are immersed in the political, institutional and cultural life of society. Many policies such as restricting access to the forest,

transaction and commercialization policies negatively affect the production costs, sales prices and consumption of NTFPs at the national level (Marshall et al., 2006). Despite this, NTFPs are of great importance at the local level, as they generate economic returns to rural villages, and at the national level they can be considered an important source of foreign exchange earnings (Chandrasekharan et al., 1996).

In this context, Ecuador's biological diversity is evident in the different species of flora and fauna that are a source of NTFPs. In addition, the Ecuadorian Andes are home to a great diversity of ethnic groups, with their own culture and traditions, which over time have taken advantage of the diversity of flora and fauna in the forests.

However, the overexploitation exercised by societies on forests generates an imbalance in the management and use of natural resources (Pérez et al., 2008); this is evidenced by the gross deforestation rate in the period 2016-2018, was 165 057 hectares nationwide (Ministry of Environment of Ecuador, 2018), mainly due to anthropogenic activities. Particularly in the province of Loja, the gross deforestation rate is 6 466.19 hectares in the period 2016 - 2018, evidencing that the deterioration of plant resources is drastic (MAE, 2018).

Thus, the scenario in the Quilanga canton is no different, since in the nine-year period livestock land use increased by 42%, causing 53.91% of the canton to be intervened by crops and human settlements (Terra-Green, 2014).

In addition, there are social processes that influence the use and exploitation of NTFPs, such as the scarcity of sources of work, which forces a large number of people to migrate, and the lack of interest of new generations in conserving traditional knowledge about the use of NTFP species.

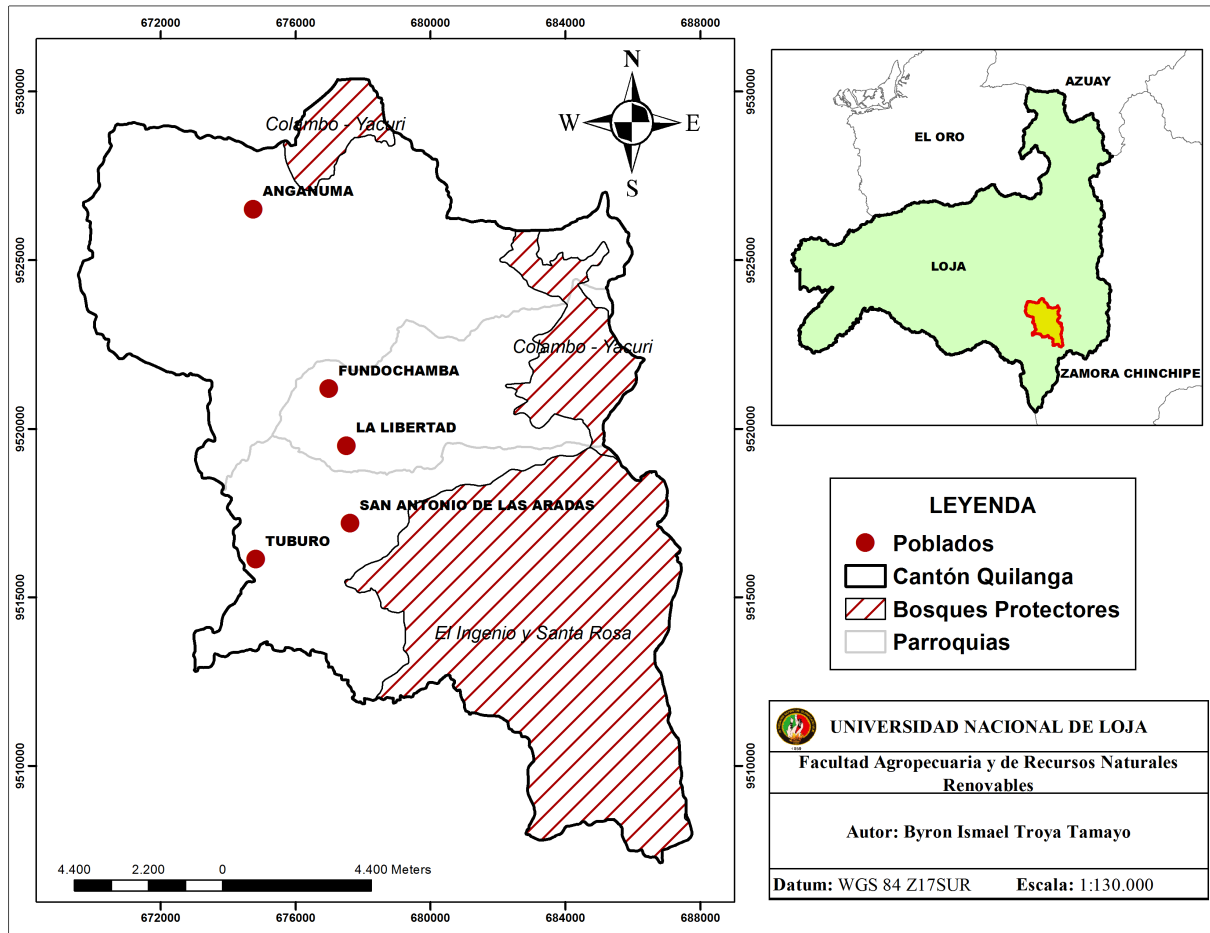
Therefore, this research was carried out with the objective of characterizing the plant species that provide NTFPs, through the investigation of their traditional and current uses, which allow their knowledge, use and management in the rural communities of Quilanga canton.

## **Materials and methods**

The research was carried out in the Quilanga canton, which is located in the southeast of the province of Loja, 96 km from the provincial capital. It has a territorial extension of 240.69 km<sup>2</sup>, representing 2.1% of the total area of the province of Loja (Figure 1). The canton has a temperate climate and its average temperature is 19.8 °C (Terra-Green, 2014). The Quilanga canton is bordered to the north by the Gonzanamá canton, to the south by the Espíndola canton, to the east by the Loja canton, and to the west by the Calvas canton (Terra-Green, 2014). The

geographic coordinates are: Latitude: 953085 to 9507000 North, Longitude: 699750 to 688275 East.

**Figure 1.** Map of the study area of Quilanga Canton.



The methodology implemented by Jiménez et al. (2010), which consists of using the structured survey method, was used to collect information and diagnose NTFPs. To determine the total number of people to survey in each community, the formula proposed by Gabaldón (1980) was used:

$$n = \frac{N \cdot Z^2 \cdot p \cdot q}{(N - 1)d^2 + Z^2 \cdot p \cdot q}$$

A sample size of 234 people was determined; the surveys were conducted randomly in the five communities, considering two sexes and three age groups: 15 to 30 years old, 31 to 50 years old and over 51 years old. The form used to collect the information is shown in Table 1.

**Table 1.** Form for the collection of information on NTFPs in five communities of Quilanga Canton.

<b>Neighborhood:</b>	<b>Surveyor:</b>	<b>Date:</b>			
Respondent:	<b>Sex: M / F</b>	<b>Age:</b>			
	<b>Ethnicity:</b>	<b>Level of schooling:</b>			
	<b>Occupation:</b>	<b>Cel:</b>			
	<b>Survey No:</b>	<b>Time:</b>			
Common name of the plant	a.	b.			
	c.	d.			
2. Life forms	Tree ( )	Shrub ( )	Grass ( )	Liana ( )	Epiphyte ( )
2. Uses	Food and beverages ( )		Human medicine ( )		Veterinary Medicine ( )
	Essential oils ( )		Handicrafts ( )		Colorants, dyes ( )
	Latex, resins ( )		Forage ( )		Mystics/rituals ( )
	Ornamental ( )		Animal feed ( )		Fiber for ropes/fences ( )
	Toxic ( )		Insect honey ( )		Construction materials ( )
3. Part of the plant used	Root ( )	Stem ( )	Sheets ( )	Seeds ( )	Flowers ( )
	Fruits ( )	Bark ( )	Resins ( )	Latex ( )	The entire plant ( )
4. Form of use	Stew ( )	Infusion ( )	Crude ( )	Fabric ( )	Prv. Prepared ( )
	Other:				
5. Habitat	Forest ( )	Thicket ( )	Ravine/Depth Rivera ( )		Open areas ( )
6. Frequency of going to the forest for harvesting / month	1-3 days ... rare ( )				
	4-5 days ... moderately frequent ( )				
	6-7 days ... very frequent ( )				
7. Amount used	product weight				
	< ¼ pound		¼ - 1 pound		> 1 pound
	Little ( )	Medium ( )	Abundant ( )		
8. Perception of plant abundance	Little ( )	Medium ( )	High ( )		
9. Collection methods	Total harvest ( )		Useful part of the plant ( )	Collect seeds for sowing ( )	
10. Harvest objective	Sales ( )		Consumption ( )	Sale/consumption ( )	
11. Harvesting time	Rainy season ( )		Dry season ( )	Both ( )	
12. Loss or maintenance of the tradition of use of the plant (NTFP).	Informant knows of use but has never used it (or does not remember/does not want to admit) ( )				
	The informant used to do it before, but not anymore ( )				

The informant continues to use ( )

13. Distance from the forest or vegetation type where the species is collected: .....km

Source: Aguirre (2020)

The data were tabulated, systematized and organized in an Excel database, using descriptors such as: family, genus, species, life form, habitat, abundance and category of use. Data were tabulated and systematized for each of the questions in the questionnaire; tables and figures were obtained with relevant information and traditional statistical descriptors. In addition, the parameters of quantitative ethnobotany were calculated (Table 2).

**Table 2.** Calculation of quantitative ethnobotanical parameters for the analysis of non-timber forest products.

Parameter	Formula	Observation
Use value of the species	$VU = \sum uc$	The number of uses is summed within each NTFP category to assess the use value of a species.
Frequency of species use by NTFP category.	$\% F = (fn/N) * 100$	Number of citations of a species in each category, divided by the total sum of citations per category divided by 100.
Meaningful use level (NUS)	$NUS = \frac{N}{UPI} * 100$	It is calculated by dividing the number of citations for the main use of the species by the number of informants multiplied by 100.

Source: Carrillo and Moreno (2006); Marín et al. (2005).

## Result

### General diagnosis of NTFPs of plant origin in five communities of the Quilanga canton.

The number of species identified was 139 within 130 genera and 68 families, including trees, shrubs, herbs, epiphytes and lianas. Of the total number of species listed, 49 correspond to herbs, 46 trees, 36 shrubs, 6 lianas and 2 epiphytes ; the most used life form corresponds to trees ranging from 34.31 % in the community of Fundochamba, to 42.25 % in the community of La Libertad, herbs are the second most used life form. The most used part in the five communities is the use of the whole plant with percentages from 20.63 % in Fundochamba to 25.00 % in the community of La Libertad, followed by the use of leaves.

The way in which the communities consume these species is in a raw form, many of them used in the elaboration of handicrafts, for spiritual cleansing and as food. The inhabitants of the five communities mentioned that they mainly use plants found in the forest, with an average of 46.82%, with the community of La Libertad using the most forest species, 49.30%. The frequency with which the inhabitants go to collect the species is infrequent, this is mainly due to the lack of interest they have in consuming these plants and they opt for new alternatives. The amount of plants used is abundant, this is due to the fact that the communities use several plants that fall into the categories of mystical, celebrations and rituals, handicrafts, utensils and construction and ornamental materials. Tuburo is the community where plants are used most abundantly with 50.00%, followed by the Anganuma community with 48.35%.

The perception of species abundance varies according to the community, in La Libertad it is high, with a percentage of 43.66%, followed by the community of Las Aradas with 38%, on the contrary, there is a low perception of abundance in the community of Tuburo with 19.10%. The inhabitants of the five communities indicate that the most common form of harvesting is to collect the useful part of the silver with values higher than 60%, and seed collection is an activity that is not practiced by the inhabitants. Plants are used especially for home consumption, with a percentage of 99%. The time of collection of the species is mainly during the rainy season. The collection distance for most of the plants in the five communities varies from 1 km to 3 km, the longest distances are between 7 km to 8 km for the collection of *Chuquiraga jussieui*, *Maclura tinctoria*, *Cedrela montana* and *Cinchona officinalis* among other species.

#### **Use value of the species.**

The use value of a species indicates the different ways in which a plant is used by people. Table 3 lists the ten species with the highest use value (UV= 4 to 7) reported by the inhabitants. The categories with the highest number of species are human medicine, handicrafts, food and beverages, and mystics, celebrations and rituals. The species with the highest use value is *Jacaranda sparrei*, which is used in: handicrafts, utensils and construction materials, human medicine, veterinary medicine, mystic, celebrations and rituals, ornamentals and insect honey, followed by *Cordia alliodora*, *Inga insignis* and *Persea caerulea*, which are present in five categories.

**Table 3.** Species with the highest use value in five communities of Quilanga Canton.

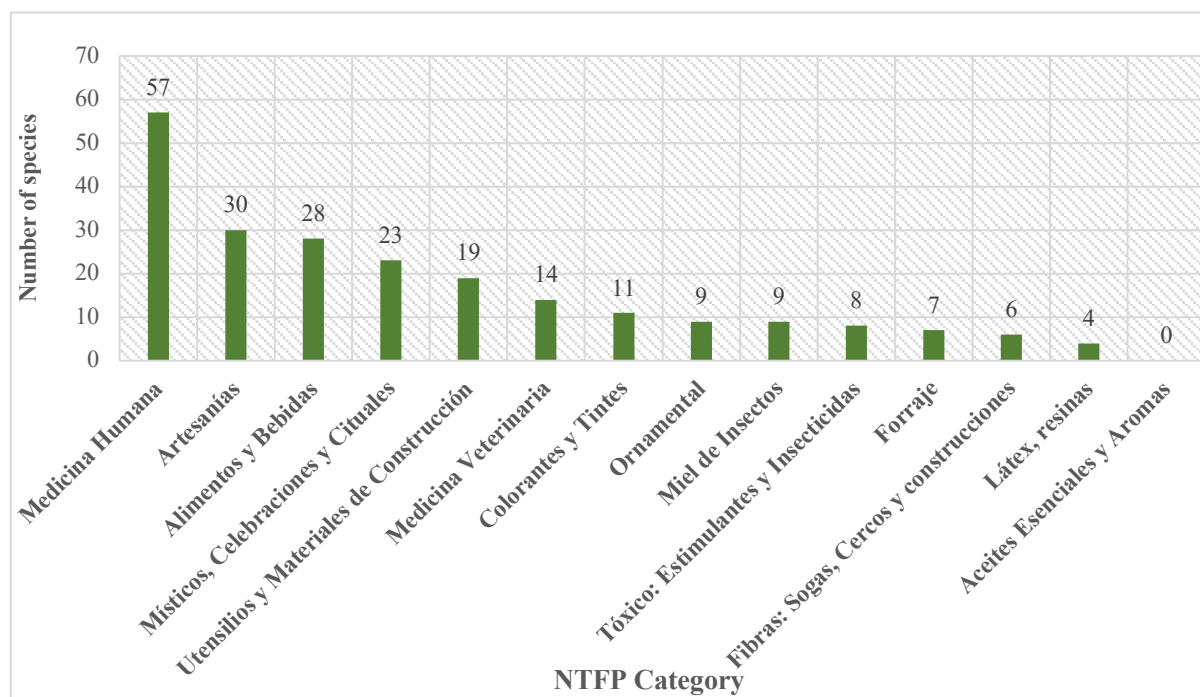
Common name	Name scientist	Species use categories												
		AB	AR	C/T	F: s/c/c/c	FO	L/R	U/MC	MH	MV	M/C/R	OR	MY	TO
Arabisco	<i>Jacaranda sparrei</i> A.H. Gentry		X					X	X	X	X	X	X	
Laurel	<i>Cordia alliodora</i> (Ruiz & Pav.) Oken		X					X	X	X		X		5
Guabo	<i>Inga insignis</i> Kunth	X	X				X	X					X	5
Paltón	<i>Persea caerulea</i> (Ruiz & Pav.) Mez.		X	X				X		X			X	5
Faique	<i>Acacia macracantha</i> Willd.		X	X			X	X						
Black elderberry	<i>Cestrum cf. racemosum</i> Ruiz and Pav.			X					X	X	X			
Sauco	<i>Cestrum cf. tomentosum</i> L.f.			X					X	X	X			
Balzo	<i>Heliocarpus americanus</i> L.		X					X	X	X				
Walnut	<i>Juglans neotropica</i> Diels			X				X	X		X			

Note: AB = Food and beverages; AR = Handicrafts; C/T = Colorants and dyes; F: s/c/c/c = Fibers: ropes, fences and constructions; FO = Fodder; L/R = Latex, resins; U/MC = Construction tools and materials; MH = Human medicine; MV = Veterinary medicine; M/C/R = Mystics, celebrations and rituals; OR = Ornamental; MI = Insect honey; TO = Toxic: stimulants, insecticides.

#### Frequency of use of species by NTFP category

It was determined that the category with the highest number of species is human medicine with 57 species, the most used are: *Piper aduncum* and *Cinchona officinalis*, with a frequency of 11.09 % and 7.92 %; followed by the category of handicrafts with 30 species, the most used are: *Zanthoxylum* sp. and *Psidium guajava* with a frequency of 19.51 % and 10.98 %. In food and beverages there are 28 species, the most used are: *Annona cherimola* and *Psidium guajava*, with a frequency of 18.23 % and 17.71 %. Within mystical uses, celebrations and rituals, 23 species are found, the most used are: *Brugmansia x candida* and *Gynoxys verrucosa*, with a frequency of 24.19 % and 10.97 %. In utensils and construction materials 13 species are cited, the most used are: *Lafoensia acuminata* and *Acacia macracantha*, with a frequency of 14.91 % and 14.04 %.

**Figure 2.** Number of citations by category of NTFP use in the five communities of Quilanga Canton.



### Level of significant use (NUS) of species providing NTFPs

In the communities there were several species that exceeded the significant use level of 20%, which indicates that they have high cultural acceptance by the inhabitants. Table 4 shows the three main species with the highest NUS in each of the communities, the species that stand out in the five communities are *Bixa orellana* and *Psidium guajava*, mainly used as natural dyes and food.

**Table 4.** Species with the highest level of significant use (NUS) in each of the communities that provide NTFPs.

Community	Name common	Name scientist	Number of citations	NUS (%)
Guayabo		<i>Psidium guajava</i> L.		71,43
Las Aradas	Achote	<i>Bixa orellana</i> L.		60,71
	Arabisco	<i>Jacaranda sparrei</i> A.H. Gentry		46,43
Tubide	Achote	<i>Bixa orellana</i> L.		68,75

	Guayabo	<i>Psidium guajava</i> L.	68,75
	Red sprocket	<i>Euphorbia cotinifolia</i> L.	60,42
La Libertad	Achote	<i>Bixa orellana</i> L.	84,62
	Cabuyo	<i>Furcraea andina</i> Trel.	76,92
	Guabo	<i>Inga insignis</i> Kunth	76,92
Fundochamba	Achote	<i>Bixa orellana</i> L.	72,55
	Guayabo	<i>Psidium guajava</i> L.	70,59
	Custard Apple	<i>Annona cherimola</i> Mill.	62,75
Anganuma	Guayabo	<i>Psidium guajava</i> L.	96,23
	Custard Apple	<i>Annona cherimola</i> Mill.	69,81
	Achote	<i>Bixa orellana</i> L.	66,04

### Trend of knowledge of the uses of plants that provide NTFPs in five communities of Quilanga Canton.

Table 5 shows the number and percentage of species known by women, men and age group in the five communities of Quilanga canton. The older adult group knows more NTFP species and the younger group knows less. In relation to knowledge between men and women, women know 91.37% and men 89.21% of the species.

**Table 5.** Knowledge of species by sex and age group by inhabitants of the five communities of Quilanga Canton.

	Youth (15-30 years)		Adults (31-50 years old)		Older adults (>51 years old)		General Knowledge	
	F	M	F	M	F	M	F	M
Number of known species				92				
Percentage of known species	46,04	50,36	74,82	66,19	80,58	83,45	91,37	89,21

Note: F: Female; M: Male

### Loss or maintenance of the tradition of use of species that provide NTFP in five communities of Quilanga Canton.

The older age group is the one that maintains the tradition of using the species, since, although they do not use or have stopped using them, they know about their use. Young people know about their use, but have never used them or have stopped practicing these traditions, due to

migration and the lack of interest that young people have in learning about the use of native plants.

**Table 6.** *Loss or maintenance of the tradition of species use in the five communities of Quilanga Canton.*

Community	Youth 15-30 years			Adults 31-50 years			Senior Citizens > 51 years		
	VU1	VU2	VU3	VU1	VU2	VU3	VU1	VU2	VU3
	Las Aradas								
Tubide									
La Libertad									
Fundochamba									
Anganuma									
Total									

VU= Value in use

VU1= Informant knows of its use, but has never used it (or does not remember/does not want to admit).

VU2= The informant did it before, but not anymore.

VU3= The informant continues to use

### **Plant species that provide NTFPs in the five communities of Quilanga Canton.**

A total of 139 species were reported, a result close to that obtained by Hurtado and Ulloa (2013), who report 128 species in three parishes of the Espíndola canton and also to that reported by Andrade and Jaramillo (2012) who report 111 species in the Macará canton. And they are higher than those reported by Pineda et al. (2019), who recorded 89 species in five communities in the parish of Manú. Therefore, the knowledge and utilization of plant species that provide NTFPs is important and still present in the communities under study, since many of the species cited are still used or at least known despite factors that cause disinterest in the younger ones.

### **Use value of the species**

The value of use of the species characterized in five communities of Quilanga canton fluctuates between 1 and 7, *Jacaranda sparrei* stands out with the highest level of use by the villagers, this species is used in the categories of handicrafts, utensils and construction materials, human medicine, veterinary medicine, mystical, celebrations and rituals, ornamental and insect honey, similar to what was mentioned by Hurtado and Ulloa (2013) in the parish of Santa Teresita,

from this species are made handles for farming tools, its bark is used as human medicine and the striking flowering power it as an ornamental plant and food source for insects.

### **NTFP use categories**

The most relevant category of use in the five communities studied in Quilanga corresponds to human medicine with 57 species among trees, shrubs, herbs, lianas and epiphytes, data close to those reported by Andrade and Jaramillo (2012) who report 64 species in this category in 10 communities of Macará, also similar to that mentioned by Minga et al. (2017) who recorded 68 species in this category of use in Yacuambi canton. But they differ from Pineda et al. (2019) who report 30 species for this category in Manú parish; and, it differs from Hurtado and Ulloa (2013), who report 32 species with human medicinal use in three parishes of Espíndola canton. In the category of handicrafts, 30 species were recorded, which are used by the inhabitants, a result similar to that indicated by Minga et al. (2017) who recorded 28 species within this category in five communities of Yacuambi canton, different from that reported by Hurtado and Ulloa (2013) in the parish of Santa Teresita and by Pineda et al. (2019) in the parish of Manú. In the food and beverages category, 28 species were identified, similar to what was found by Pineda et al. (2019) in five communities of the Manú parish, who cited 24 species within this category and different from what Rivera et al. (2019) reports, which identified 16 species in five communities of the Zapotillo canton.

The category of mystics, celebrations and rituals is represented by 23 species, distributed in three families Asteraceae, Solanaceae and Lamiaceae, this is corroborated by Andrade and Jaramillo (2012), who report 20 species within this category. In addition, De la Torre et al. (2008) mention that the Lamiaceae family is one of the most used within this category, due to the presence of strong and attractive odors being plants subject to many beliefs, also Solanaceae is another family with records of uses for rituals. Also, Rodriguez et al. (2020), in their study on ritual plants carried out in Ecuador, mention that species of the Asteraceae family are the most used by the yerbateros, to perform cleansing with the combination of several species in a bundle. The results differ from those reported by Pineda et al. (2019) who identified 12 species within this category and 10 identified by Rivera et al. (2019).

In the category of construction materials, 19 species were reported; this is corroborated with the study conducted by Hurtado and Ulloa (2013) who reported 22 species in the parish of Santa Teresita. Similar to what was reported by Andrade and Jaramillo (2012), who identified 19 species within this category.

In the veterinary medicine category, 14 species were reported, mainly from the Solanaceae family, a value close to that reported by Rivera et al. (2019) which is 8 species within this category; similar to that reported by Hurtado and Ulloa (2013) who report 6 species. According to Guamán (2014), he mentions that these practices are gradually deteriorating due to acculturation.

Within the category of colorants and dyes, 11 species were identified; the number of species differs from that reported by Hurtado and Ulloa (2013), who reported 2 species for this use in three parishes of the Espindola canton. Similarly, it differs from Rivera et al. (2019), who report only one species for Macará canton. Therefore, knowledge in the Quilanga canton is quite extensive when compared to other areas of the province of Loja. According to Bermeo (2016), he mentions that it is essential to recognize the importance of preserving this knowledge, since it is part of our identity.

In the insect honey category, 9 species were reported, similar to what was identified by Hurtado and Ulloa (2013), who recorded 6 species in this category, and Rivera et al. (2019), cited 7 species within this category; different from what was reported by Pineda et al. (2019), who reported only one species.

In the toxic category, 8 species were identified, close to that obtained by Minga et al. (2017) which reports 7 species respectively within this category, but differs from that identified by Andrade and Jaramillo (2012) who cite 18 species within this category. Thus, Montalván (2017) mentions that plant species in this category present active principles that give them toxicity, either by contact or ingestion, as is the case of plants of the Solanaceae family.

Regarding the forage category, 7 species were identified, a result that differs from that obtained by Hurtado and Ulla (2013) who report 12 species in their study carried out in Santa Teresita. In the category of fibers: ropes, fences and constructions, 6 species were recorded, similar to that reported by Hurtado and Ulloa (2013), and also close to that reported by Andrade and Jaramillo (2012), who cited 3 species. The process of obtaining fibers is a practice that generated economic income for families, it is an activity that is still known, but is no longer practiced in the canton, the species used to make ropes was *Furcraea andina*. Finally, in the category of latex and resins, 4 species were identified, which were used as glue due to the scarcity of economic resources. These data are similar to those reported by Rivera et al. (2019), which reported 2 species for this use and differ from those cited by Hurtado and Ulloa (2013), who identified only one species.

#### **Level of significant use (NUS) of the species**

In the five communities of the Quilanga canton, it was found that there are species above 20% according to the methodology that assures that they have cultural importance for the inhabitants. These species are mainly within the category of human medicine, food and beverages, fibers: ropes, fences and constructions and mystics, celebrations and rituals, this is corroborated with what Hurtado and Ulloa (2013) indicate, who mention that in the category of human medicine are the species with the highest level of significant use in their research, but differs from the results obtained by Pineda et al. (2019), who does not report any species

that equals or exceeds 20%, mentioning that this is the result of overexploitation and loss of cultural roots.

### **Trend in knowledge of the uses of plants that provide NTFPs**

Regarding the knowledge of species, women know 91.37 % while men know 89.21 % of the total of 139 species cited in five communities of Quilanga canton, so there is a difference regarding knowledge of plants, this result is similar to that stated by Rivera et al. (2019), which mentions that there is a minimal difference in knowledge about the use of species between men with 66.66 % and women with 68.96 %; while Pineda et al. (2019) in their study in the Manú parish, mentions that it is women with 67.42 % who know more compared to men with 59.6 % who know less.

In relation to age groups, older adults are the most knowledgeable about the use of NTFP species, this is due to the influence they had when they were children, since many of their needs were covered using plants, in addition to the farming activity that many inhabitants of the rural rector practice and even as healers. Adults have extensive knowledge, but to a lesser extent they use plants. In young people it is evident that knowledge is relatively lower, this is the result of migration due to lack of employment, there is also a lack of interest in learning or using these plants, since they prefer to go to a medical clinic, this is corroborated by Mora (2013) and Rivera et al. (2019).

### **Conclusions**

In the five communities of Quilanga Canton, 139 NTFP species were recorded, 49 are herbs, 46 trees, 36 shrubs, 6 lianas and 2 epiphytes, with trees being the form of life most used by the inhabitants. The habitat where most of these species develop is in the forest and in open areas. The species with the highest use value is *Jacaranda sparrei*, which is used in seven use categories: handicrafts, utensils and construction materials, medicine and pharmaceutical principles, veterinary medicine, mystical celebrations and rituals, ornamentals and insect honey. Also, the species *Cordia alliodora*, *Inga insignis* and *Persea caerulea* stand out in five categories.

The categories of use with the highest number of species are: human medicine with 57 species, represented by *Piper aduncum*, *Cinchona officinalis*, *Plantago major*, *Urtica urens* and *Psidium guajaba*, the handicrafts category with 30 species: *Zanthoxylum* sp. *Psidium guajaba*, *Jacaranda sparrei* and *Annona cherimola*, the food and beverages category with 28; *Annona cherimola*, *Psidium guajaba*, *Rubus niveus* and *Inga insignis* stand out, and the category of mystics, celebrations and rituals with 23 species: *Brugmansia x candida*, *Valeriana microphylla*, *Solanum americanum* and *Petiveria alliacea*.

The species with the highest level of significant use are *Psidium guajava*, *Bixa orellana*, *Inga insignis* and *Furcraea andina*, which are considered of high cultural value for the inhabitants of the canton.

There is a minimal difference in the knowledge of plant species that provide NTFPs between men and women. And there is evidence of erosion of knowledge and uses among young people, who claim to know about the existence of plants and their uses, but do not use them.

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