Revista Cubana de Ciencias Forestales

Volumen 13, issue 3; 2025, September-December

liberciencia
EDITORIAL CIENTÍFICA UNIVERSIDAD DE PINAR DEL RÍO

UNIVERSIDAD DE PINAR DEL RÍO
HERMANOS SAÍZ MONTES DE OCA

CFORES
REVISTA CUBANA DE CIENCIAS FORESTALES

ISSN: 2310-3469 RNPS: 2347
CFORES Journal, September-December 2025; 13(3): e880

Original article

Traditional use of biodiversity components by rural families in the communities of Las Peñas and Las Piñas

Uso tradicional de componentes de biodiversidad por familias rurales de las comunidades Las Peñas y Las Piñas

Uso tradicional de componentes da biodiversidade por famílias rurais nas comunidades de Las Peñas e Las Piñas

René Gras Rodríguez [1] *, *Juan Manuel Guerrero Calero* [1], *Sheila Johanna Cañarte Baque* [1] *Kiara Lilibeth Espinoza Cercado* [2]

[1]Southern State University of Manabí. Faculty of Natural Sciences and Agriculture, Ecuador.

[2]Self-employed Professional, Portoviejo, Manabí, Ecuador.

*Corresponding author: rene.gras@unesum.edu.ec

Received: *15/01/2025.*
Approved: *01/11/2025.*
Published: *13/11/2025.*

ABSTRACT

An ethnobiological investigation was conducted in the communities of Las Peñas and Las Piñas in Julcuy, based on the lack of information regarding the components of biodiversity used by the inhabitants of these rural communities. The main objective was to identify the biological resources used by families in the Peñas and Piñas communities

of the Julcuy parish, with an emphasis on their use in natural and traditional medicine practices. A semi-structured interview using snowball sampling technique was employed for this project. The results show that the interviewees in both communities were over 51 and 60 years old. Among the plants most frequently used for medicinal purposes were *Origanum vulgare* L. and *Mentha spicata* L., while the most frequently cited fauna were *Bothrops atrox* L. and *Capra hircus aegagrus*. The most frequently cited illnesses or ailments are those of the digestive system, and these are treated with various parts of plants, such as the leaf or the entire plant, respectively. From animals, they use meat and other body parts. Regarding plant habitats, the inhabitants mostly cultivate plants in home gardens and raise small animals in their yards. Understanding the diversity of the area will allow for the development of management plans for the appropriate use of the species with medicinal properties that have been recorded, thus maximizing the benefits they provide.

Keywords: ethnobiology, species, medicinal, rural, uses.

RESUMEN

En las comunidades Las Peñas y Las Piñas de Julcuy se realizó una investigación etnobiológica, sustentada en los vacíos sobre información referente a los componentes de la diversidad utilizados por los habitantes de las comunidades rurales. El objetivo principal fue identificar los recursos biológicos empleados por las familias de las comunidades Peñas y Piñas, de la parroquia Julcuy, con énfasis en su uso dentro de las prácticas de medicina natural y tradicional. Para la realización de este proyecto se aplicó una entrevista semiestructurada, mediante la técnica de Bola de Nieve. Los resultados evidencian que los entrevistados superan los 51 y 60 años en ambas comunidades. Entre las plantas más aprovechadas con fines medicinales se mencionan a, *Origanum vulgare* L. y *Mentha spicata* L., y en lo referente a la fauna, los más citados fueron: *Bothrops atrox* L. y *Capra hircus aegagrus*. Las enfermedades o dolencias más citadas son las del sistema digestivo y estas son tratadas con diversas partes de las plantas, como lo es la hoja o la planta completa, respectivamente, en tanto que de los animales usan la carne y otras partes del cuerpo. Sobre el hábitat de las plantas los moradores cultivan en su mayoría en huertos caseros y en sus patios crían animales menores. Al conocer la diversidad del

sector se podrá realizar planes de manejos para el uso adecuado de las especies con propiedades medicinales que se registraron aprovechando los beneficios que estos aportan.

Palabras clave: etnobiología, especies, medicinal, rural, usos.

RESUMO

Uma investigação etnobotânica foi conduzida nas comunidades de Las Peñas e Las Piñas, em Julcuy, devido à falta de informações sobre os componentes da biodiversidade utilizados pelos habitantes dessas comunidades rurais. O principal objetivo foi identificar os recursos biológicos utilizados pelas famílias das comunidades de Las Peñas e Las Piñas, na paróquia de Julcuy, com ênfase em seu uso em práticas de medicina natural e tradicional. Para este projeto, foi empregada uma entrevista semiestruturada utilizando a técnica de amostragem em bola de neve. Os resultados mostram que os entrevistadas em ambas as comunidades tinham mais de 51 e 60 años de idade. Entre as plantas mais frequentemente utilizadas para fins medicinais estavam *Origanum vulgare* L. e *Mentha spicata* L., enquanto os animais mais citados foram *Bothrops atrox* L. e *Capra hircus* aegagrus. As doenças ou enfermidades mais frequentemente citadas são as do sistema digestivo, e estas são tratadas com diversas partes das plantas, como a folha ou a planta inteira, respectivamente. De origem animal, utilizam a carne e outras partes. Em relação ao habitat vegetal, os habitantes cultivam as plantas principalmente em hortas domésticas e criam pequenos animais em seus quintais. Compreender a diversidade da área permitirá o desenvolvimento de planos de manejo para o uso adequado das espécies com propriedades medicinais registradas, maximizando assim os benefícios que elas proporcionam.

Palavras-chave: Etnobotânica, espécies, medicinal, rural, usos.

INTRODUCTION

Biodiversity is a fundamental, complex and general concept, encompassing the entire spectrum of biological organization, from genes to communities and their structural, functional and compositional components, as well as the scales of space and time. The multiple elements that compose it and its varied meanings often generate confusion, limiting its usefulness (Jiménez *et al.*, 2020).

According to the World Health Organization (WHO) (2007), biodiversity sustains life on Earth and refers to the variety contained within the biota, from the genetic makeup of plants and animals to cultural diversity. The biophysical diversity of microorganisms, flora, and fauna offers extensive knowledge that has significant benefits for biology, health sciences, and pharmacology. A greater understanding of Earth's biodiversity fosters important medical and pharmacological discoveries. The loss of biodiversity can limit the discovery of potential treatments for many diseases and health problems.

Flora is the main component of biodiversity used by Ecuadorian families for medicinal purposes; species of fauna and fungi have also been recorded, but in smaller quantities. It is estimated that, on average, the population uses more species of flora than of fauna and fungi for medicinal purposes (Jiménez, Rosete, Tapia, & Rodríguez, 2019).

This work seeks to contribute to the limited existing documentation on ancestral knowledge related to traditional medicine in the Julcuy parish and in the southern area of Manabí, with emphasis on the species of flora and fauna used by Ecuadorian families to alleviate ailments or diseases. Furthermore, the research is in accordance with what was stated in the formulation of the project, related to the dispersion and outdated information that the Ecuadorian family has on the knowledge of medicinal flora and fauna, present in forest ecosystems, prioritizing the species used to treat the main health problems, emphasizing chronic diseases that constitute the first cause of morbidity and mortality in Ecuador (Jiménez *et al.*, 2019).

In the Manabí region, the growing agricultural and livestock development is one of the main causes of the disappearance of a large part of the forests. These impacts on the vegetation lead to a decrease in flora and fauna, about which little local information is

available due to the limited research that has been carried out in the area (Rosete, Sáenz, & Pin, 2019).

The diversity of tree species is relatively well known and quantified, and plant species are fairly well characterized; however, much remains to be discovered about animal and microbial species, their identities, genetic variation, interactions, and uses for humans. But even among plants and animals, attention and resources are primarily focused on visually appealing or charismatic species rather than on less visible and attractive ones that may be equally important to the ecosystem as a whole. Some of these less "popular" species may have as-yet-unknown uses. Conservation and ecotourism are often promoted using striking images of large mammals, birds, and ants, which are valid indicators of environmental change (Burley, 2002).

This research aimed to determine the components of biodiversity used by families in the parish. The components of biodiversity used by families in natural and traditional medicine were identified. In addition, the uses of flora and fauna species employed by families in the communities under study were characterized.

The research was carried out within the framework of the project "Components of biological diversity used by Manabí families in natural and traditional medicine", of the Forestry Engineering Career, approved by RESOLUTION N.07-16-2019 of the Higher Academic Collegiate Body of the Southern State University of Manabí.

MATERIALS AND METHODS

Geographical location of the research

Julcuy is a rural parish of the Jipijapa Canton, belonging to the Manabí province in Ecuador. It was created on June 25, 1824. Its political division of the parish is bordered to the North by the Jipijapa Canton; to the South by the Pedro Pablo Gómez parish; to the East by the La América and El Anegado parishes; and to the West by the Puerto López Canton and Puerto Cayo Parish (Figure 1).

ISSN: 2310-3469 RNPS: 2347
CFORES Journal, September-December 2025; 13(3): e880

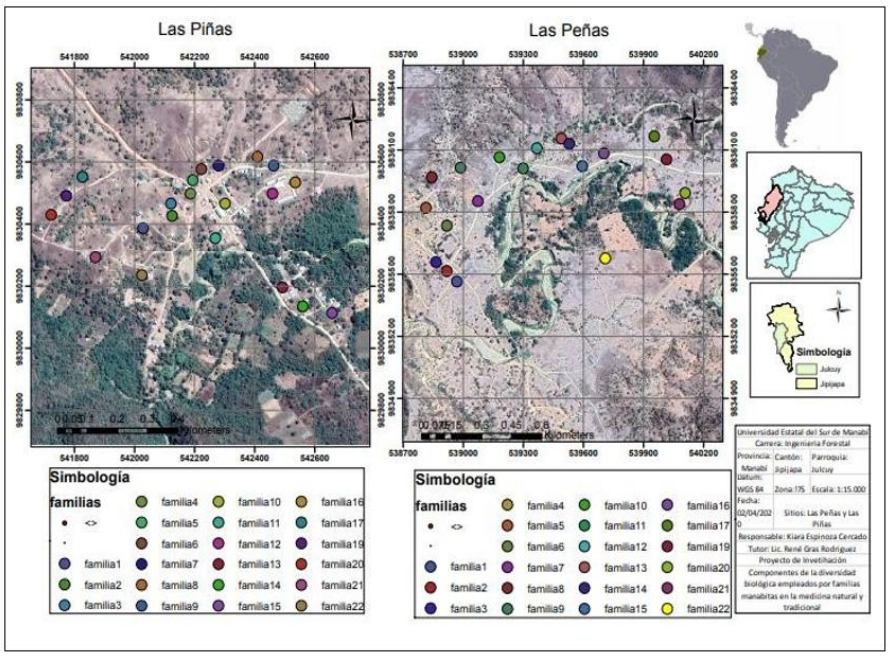

Figure 1. *- Map of the location of the communities of Las Peñas and Las Piñas*

The Julcuy parish has different zones, among them the commune of Las Peñas stands out, a place where information could be gathered about its locality, in a great passage of different cultures through time denotes that the index of knowledge in ancestral medicine has been deteriorating because generations migrate to the city for better days.

Population and universe

The approximate population of the communities of Las Peñas and Las Piñas in the Julcuy parish is 1,994 inhabitants. Julcuy has several settlements, which are: Parish Head, Mero Seco, Barbal, El Limón, Chacras, Las Peñas, Soledad, Carrizal, Las Pampas, Las Piñas, Guale, Pepa De Uso, Las Pila, Cancagua, Aguapato, El Secal, Guarango, Los Laureles, Pampas Del Norte De Julcuy, and Santa Rita.

Sampling

The Las Peñas community has approximately 50 established families, and another 200 families live in Las Piñas. The sample selection was not based on any criteria such as age, sex, or occupation. The snowball sampling technique was used to select the interviewees. This technique involves asking local people about community members considered

"knowledgeable" (Ghirardini *et al.*, 2007), who have been identified by other authors as key informants.

The research was conducted between June 1 and October 30, 2019, through visits to the town, followed by ethnobiological workshops where the community members themselves contributed their knowledge about the plants they cultivate at home.

Methodology

For the development of this study, field trips were conducted to verify the potential of medicinal plants and their use by community members. Meetings were held with local leaders to request permission to conduct research in the different communities, fulfilling the requirements of the Local Workshops activity for community selection and data collection (sociodemographic characterization of families and uses of biodiversity components).

On the other hand, diseases or conditions are treated with ethnomedicine, or ancestral medicine mentioned by the inhabitants of the two localities who were interviewed and which, according to the International Statistical Classification of Diseases and Related Health Problems, established by the World Health Organization (WHO, 2022), is grouped as shown in Table 1.

Table 1. *- Categories of diseases listed by the International Classification of Diseases*

Category of diseases
Diseases of the digestive system, infectious and parasitic.
Inflammation in general.
Diseases of the nervous system and the sense organs.
Diseases of the skin and cellular tissue.
Respiratory diseases. Diseases of the genitourinary system.
Blood diseases and certain disorders that affect the immune mechanism.
Cardiovascular diseases.
Hyperlipidemia diseases.
Diseases of the musculoskeletal system and connective tissue.
Cultural syndromes.

Adapted from: World Health Organization.

Source*: https://icd.who.int/es*

Statistical procedure

Once the medicinal knowledge of both communities was obtained, the frequency of use of plants and animals was calculated, for which the information provided by the inhabitants of the study area was organized in a database, using a Microsoft Office Excel 2016 spreadsheet and the equation proposed by Aguirre, Betancourt, and Geada, (2013), was used, through equation [1]

$$\%\ de\ uso\ de\ una\ especie\ = fn/N * 100 \quad (1)$$

Where:

fn: Absolute frequency of the species.

N: Total number of citations by the interviewees.

RESULTS AND DISCUSSION

Results obtained in the interviews in Las Peñas and Las Piñas

Age of the inhabitants

Results of the interviews carried out in the two communities and the distribution of inhabitants by age (Table 2), the highest number of citations was reached by the inhabitants aged 51-60 years in Las Peñas and in Las Piñas the inhabitants with the highest citation are over 60 years old.

Table 2. *- Age ranges of the inhabitants of Las Peñas and Las Piñas*

Age (years)							
Community	5 – 10	11 – 20	21 – 30	31 – 40	41-50	51-60	more than 60
Las Peñas Las Piñas	4 1	4 4	6 5	3 3	5 3	18 11	14 21
Total	5	8	11	6	8	29	35

Gender

The results regarding gender in the town of Las Peñas showed that the majority of those interviewed were men, with 25 men and 23 women, while in Las Piñas the results varied with 32 men and 22 women.

Level of education

Table 3 presents the results regarding the educational level of the inhabitants of the two communities. According to the results, in both locations, the highest number of citations was for the primary education level.

Table 3. *- Education level of the inhabitants of Las Peñas and Las Piñas*

Community		**Level educational**		
	Primary	**Secondary**	**University**	**None**
The Rocks	24	7	1	16
The Pineapples	29	14	1	10
Total of quotes	**53**	**21**	**2**	**26**

Results on plants and animals that help cure diseases

Table 4 specifies the main diseases mentioned by the inhabitants of the communities of Las Peñas and Las Piñas, where they clearly emphasize the use of components (Vegetation and Animals) as an option to conventional medicine and treat the following types of diseases categorized by the proposal of the World Health Organization.

Table 4. *- Main diseases affecting the residents of the Las Peñas and Las Piñas communities*

Conditions treated with medicinal plants according to information from the interviewees			
No.	**Category of diseases**	**The Rocks**	**Pineapples**
1	Diseases of the digestive system, infectious and parasitic.	Stomach aches, diarrhea, indigestion, menstrual cramps, gastritis, parasites, gas,	Diarrhea, indigestion, stomach aches, menstrual cramps, parasites, gastritis.
2	Inflammation in general.	Prostate, hemorrhoids, acute and severe infections, stones.	Hemorrhoids, various inflammations, prostate.
3	Diseases of the nervous system and the sense organs.	Headaches, earaches, toothaches.	Ear pain, nerve disorders.
4	Diseases of the skin and cellular tissue.	Burns, white cloth, wounds.	Itching, burns, rashes.
5	Respiratory diseases	Asthma, lung cleansing, catarrh, shortness of breath, cough.	Asthma, flu, air sickness, lung cleansing, catarrh.
6	Diseases of the genitourinary system.	Urinary tract infection	Urinary tract infection.
7	Blood diseases and certain disorders that affect the immune mechanism.	Diabetes, cancer, leukemia, sores.	Cancer, diabetes, anemia.
8	Cardiovascular diseases.	Tachycardia, high blood pressure, poor blood circulation.	Heart problems, blood pressure, tachycardia.
9	Hyperlipidemia diseases.	Fatty liver, cholesterol.	Fatty liver.
10	Diseases of the musculoskeletal system and connective tissue.	Muscle pain, rheumatism, arthritis, bone pain.	Fractures, arthritis, muscle pain, rheumatism.
11	Cultural syndromes.	Evil eye, various allergies, snake bites, lack of appetite, insomnia, bee sting,	Scorpion sting, air sickness, sexual impotence, dizziness, blows, bee sting, various

		scorpion sting, blows and dizziness.	allergies, lack of appetite, insomnia and viper bite.

***Adapted from**: World Health Organization.*

What plants do they use as medicine?

Table 5 shows the results for the most commonly used plants in natural and traditional medicine. According to the data obtained, these are similar, as they are present in both study locations, and the most prevalent species are *Origanum vulgare* L. and *Mentha spicata* L.

***Table 5.** - Plant species with the highest number of citations in the localities*

N. Scientist of the species in The Rocks	**Frequency**	**N. Scientist of the species in The Pineapples**	**Frequency**
Origanum vulgare L.	17	*Origanum vulgare* L.	16
Mentha spicata L.	17	*Mentha spicata* L.	14
Route graveolens L.	14	*Cymbopogon citratus* D.	12
Cymbopogon citratus D.	13	*Thunbergia Alata*	11
Musa textilis Born	11	*Route graveolens* L.	10
Moringa oleifera Lam.	6	*Aloe vera* (L.) Burm.f.,	9
Mentha piperita L.	6	*Sage rosemary* Schl	7
Chamaemelum noble L.	5	*Chamaemelum noble* L.	7
Sage rosemary Schl	5	*Symphoricarpos m.*	6
Azadirachta indicates TO.	4	*Citrus lemon* L.	6
Total	**98**	**Total**	**98**

The parts of the plant that are used as natural and traditional medicine

Figure 2 presents the results for the parts of the plant used in natural and traditional medicine in Las Peñas and Las Piñas. According to these results, in both locations, the most frequently cited plant parts were the leaf, followed by the whole plant.

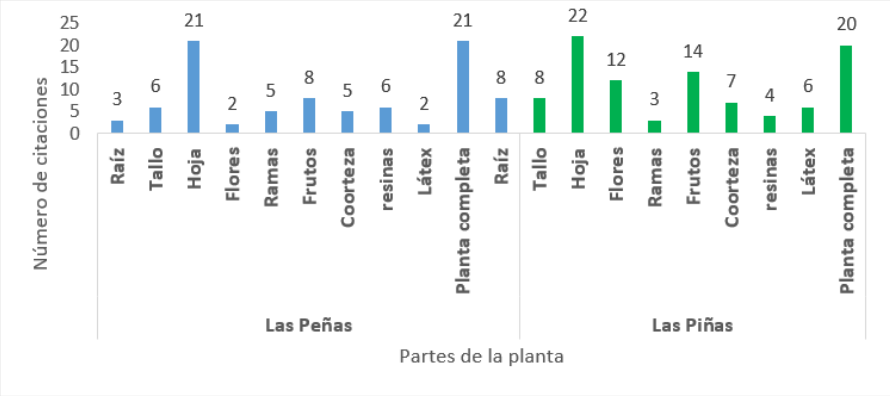

Figure 2. *- Parts of the plant that are used as natural and traditional medicine*

Perception scale

The results of the 1 to 5 perception scale of the abundance of plants and animals used in natural and traditional medicine in Las Peñas and Las Piñas, showed that in both communities the highest perception scale of abundance of plants and animals is 3 (Table 6), that is, they perceive that the species are moderately high in the area of influence of their communities.

Table 6. *- Perception scale in Las Peñas and Las Piñas*

Locations	**Perception Scale**				
	1	**2**	**3**	**4**	**5**
The Rocks	0	1	10	8	3
Pineapples	0	1	10	10	1

Figure 3 shows the animal species most commonly used in natural and traditional medicine in Las Peñas and Las Piñas. The results obtained are similar in both locations, although the species *Bothrops atrox* and *Capra hircus aegagrus* received more citations.

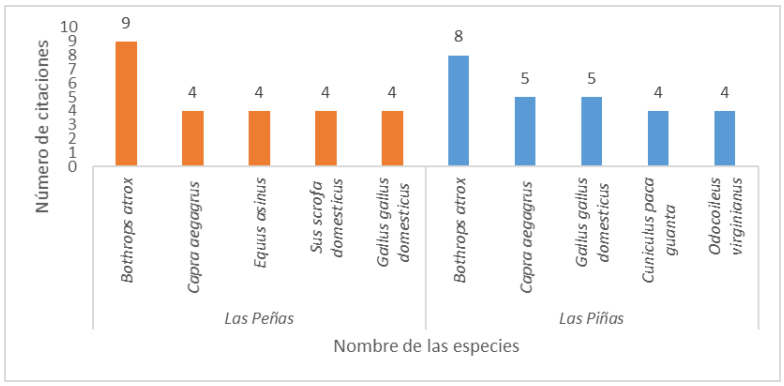

Figure 3. *- Distribution of fauna in the communities of Las Peñas and Las Piñas*

Main ways of consuming animal parts

Figure 4 presents the results regarding the animal parts used in traditional and natural medicine in Las Piñas and Las Peñas. In both locations, the most frequently cited animal parts were those such as eggs, lard, and milk, followed by meat, which also received a high number of citations in both communities.

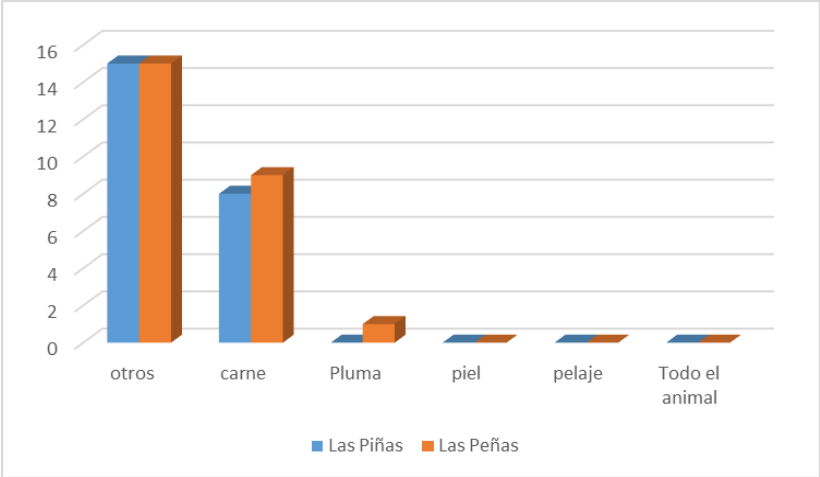

Figure 4. *- Parts of the animal that are used as natural and traditional medicine*

Table 7 presents the results regarding the consumption of plant-derived products in natural and traditional medicine in Las Peñas and Las Piñas. According to the results, the most frequently cited methods of consumption in both locations were decoction and infusion.

Table 7. *- Main forms of plant consumption*

Ways to use	Frequency	
	The Rocks	Pineapples
Cooked	17	13
Infusion	15	17
Raw	2	12
Plaster	0	0
Others	1	0
Total	35	42

Environment, route and its purpose in the use of the products

Figure 5 presents the results regarding the environments where plants and animals used for medicinal purposes grow in Las Peñas and Las Piñas. According to these results, open areas received the highest number of citations in both locations, followed by patios or home gardens, which were the most frequently cited locations for plant and animal growth.

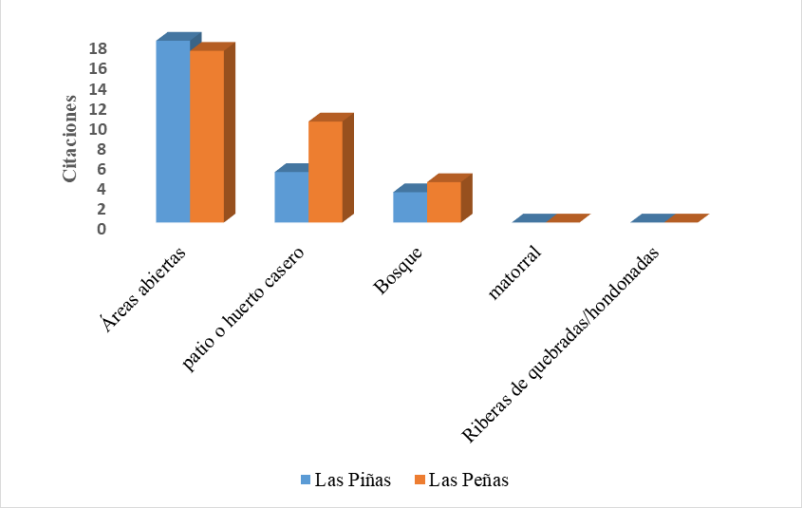

Figure 5. *- Environment where species for medicinal purposes develop*

The results of the question regarding the days on which people travel to areas where plants or animals are found, in the towns of Las Peñas and Las Piñas, show that they most frequently travel to these areas when needed. Regarding the distance to the forest or other areas where they obtain plants and animals, the results indicate that they have

to travel between 0 and 5 km to find the products they need, and this is reflected in both communities.

DISCUSSION

The average age of the participants in the interview was over 60 years in Las Piñas, while in Las Peñas they reached a maximum of 51-60 years, different from what was found by Gallegos (2016), where he recorded that the average age is 36 years.

The results for gender in the town of Las Peñas showed that the majority of interviewees were male, while in the second community, males also predominated. This is similar to the study conducted by Mejías (2015), which also demonstrates the predominance of males.

According to the results of the educational level of the inhabitants in the two communities, the highest percentage reached the primary educational level, different from what was found by Gallegos (2016), where the results identified that the level of schooling of the inhabitants of the rural locality of Babahoyo, Ecuador is between primary and secondary.

On the other hand, in the study "Forms of transformation of traditional medicine knowledge in the Nahua peoples of the municipality of Hueyapan, Sierra Norte de Puebla, Mexico," conducted by Jorand (2008), the plants most used in traditional medicine are also the most common: *Mentha spicata and Origanum vulgare.* This is similar to the study sites of this research, where *Origanum vulgare and Mentha spicata* were recorded in the two communities of the Julcuy parish.

Regarding animals, the data collected through interviews with residents of the Las Peñas and Las Piñas communities revealed similarities in both locations. However, the most frequently cited species for traditional and natural medicine are *Bothrops atrox* and *Capra hircus aegagrus.* This differs from the findings of Arias and Trillo (2014) in their study, "Animals and Healing Plants: Advances in the Natural Pharmacopoeia of the Inhabitants

of the Laguna Mar Chiquita Area, Argentina," which recorded *Rhinella arenarum and Puma concolor* as the species used for medicinal purposes.

It is essential to mention that the perception scale is conditioned by changes in the specific requirements of the species, that is, by the changes that occur in individuals due to variations in physiological states, for example, reproduction, raising, juveniles, adults, and that habitat studies and their relationships with flora and fauna have been evaluated at appropriate spatial and temporal scales. It must be recognized that the perception of fauna and wildlife is high, and is totally different at various scales (Delfin, Gallina Tessaro, & López, 2013). According to the research, the abundance of plants and animals used in natural and traditional medicine in Las Piñas and Las Peñas showed that in both communities they have a perception scale of three in the abundance of plants and animals.

Regarding diseases or ailments, the results of the most common diseases are related to the digestive system in both locations, as investigated by Jorand (2008), who recorded that the most common disease is stomach pain.

On the other hand, the parts of the animals most used in the communities of Las Piñas and Las Peñas, recorded that the meat and other parts of the animal are used by its inhabitants for medicinal purposes, similar to the study on the medicinal use of wildlife in the highlands of Chiapas, Mexico, developed by (Vázquez. P. *et al.*, 2006), where it was recorded that meat and other parts are considered as products to treat one or more diseases.

The most common method of preparation is by infusion or decoction of the aerial parts, primarily the leaves, although poultices, steam inhalations, and smudging are also used. This practice is consistent in rural populations of Córdoba, as researched by Arias and Trillo (2014), which is similar to the present study. The study also found that the leaves are used and consumed as an infusion, a practice employed as a natural and traditional medicine by the inhabitants of Las Peñas and Las Piñas. Regarding the environment where these species develop, Acosta's research (2001) indicates a tradition of domestic cultivation of certain medicinal species in orchards, small plots, patios, gardens, and various containers. This aligns with the findings of the study conducted in Las Peñas

and Las Piñas, which found that these locations are highly suitable for the growth of medicinal plants and their use in treating common illnesses.

According to Fresquet (2001), and his study "Popular Use of Medicinal Plants in the Urban Environment: The City of Valencia," medicinal plant species are popularly used in the city of Valencia. Interviews with residents revealed that they use medicinal plants whenever needed, similar to the findings of this research. Residents also reported that they frequently visit areas where plants or animals grow in the Las Piñas and Las Peñas neighborhoods.

The work was carried out by Guerra *et al.* (2007) in the urban area of the municipality of San Luis, Pinar del Río province, Cuba, with the objective of conducting a floristic inventory of plants obtained from the gardens and patios of their homes, which are at a minimum distance of 0-5 km. This is consistent with the research conducted on the distance to the forest or other areas where plants and animals are obtained.

Regarding the intended use, the interviewees emphasized that everything is for the personal consumption of each family in both communities. This result coincides with another study conducted by Heisler *et al.* (2015), which states that complementary practices, including the use of medicinal plants, are being gradually expanded in health services. This justifies the use of medicinal plants and animals for personal consumption and economic benefit.

According to the results of the collection season of medicinal plants or animals in Las Piñas and Las Peñas, the inhabitants find them all year round, differing from the work done by Linares (2013), where he indicates that in the months of June and July one should take advantage of the flowering of various medicinal species among other plants that are obtained in different seasons or months of the year.

CONCLUSIONS

Within the community of Las Peñas, a total of 37 plant species and 13 animal species were identified, while in Las Piñas, 39 plant species and 16 animal species were identified, which are used for their medicinal properties to treat various diseases.

According to the plants, the main way to obtain them is in home gardens or open areas near your home, and the animals can be found in the wild.

In the communities, the aforementioned flora and fauna species are mainly used as natural medicine, with cooking and infusion being the most common forms of preparation for family and personal consumption.

REFERENCES

ACOSTA DE LA LUZ, L., 2001. Producción de plantas medicinales a pequeña escala: una necesidad de la Comunidad. Revista Cubana de Plantas Medicinales, [en línea], vol. 6, no. 2, ISSN 1028-4796. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1028-47962001000200006

AGUIRRE MENDOZA, Z., BETANCOURT F., Y. y GEADA L., G., 2013. Productos forestales no maderables de origen vegetal y usos tradicionales de los bosques secos del cantón Macará, en Loja-Ecuador [en línea]. Ecuador: Editorial Abya Yala. [consulta: 10 febrero 2025]. Disponible en: http://dspace.ups.edu.ec/handle/123456789/11210.

ARIAS TOLEDO, B. y TRILLO, C., 2014. Animales y plantas que curan: avances sobre la farmacopea natural de los pobladores del área de Laguna Mar Chiquita. En: Accepted: 2018-01-23T15:42:59Z, Revista de la Facultad de Ciencias Exactas Físicas y Naturales [en línea], vol. 1, no. 2, [consulta: 11 febrero 2025]. ISSN 2362-2539. Disponible en: https://ri.conicet.gov.ar/handle/11336/34267.

BURLEY, J., 2002. Panorámica de la diversidad biológica forestal [en línea]. 2002. S.l.: FAO. Disponible en: https://www.fao.org/4/y3582s/y3582s02.htm.

DELFÍN ALFONSO, C.A., GALLINA TESSARO, S. y LÓPEZ GONZÁLEZ, C., 2012. El hábitat: definición, dimensiones y escalas de evaluación para la fauna silvestre. Manual de Técnicas para el Estudio de la Fauna [en línea]. México: Secretaría de Medio Ambiente y Recursos Naturales, pp. 283-312. [consulta: 11 febrero 2025].

Disponible en: https://www.researchgate.net/publication/271849889_El_habitat_definicion_dimensiones_y_escalas_de_evaluacion_para_la_fauna_silvestre.

ENRÍQUEZ VÁZQUEZ, P., MARIACA MÉNDEZ, R., RETANA GUIASCÓN, Ó.G. y NARANJO PIÑERA, E.J., 2006. Uso medicinal de la fauna silvestre en los altos de Chiapas, México. Interciencia, vol. 31, no. 7, ISSN 0378-1844. Disponible en: https://www.redalyc.org/pdf/339/33911804.pdf

FRESQUET FEBRER, J.L., 2001. Uso popular de plantas medicinales en el medio urbano. Medicina y ciencias sociales [en línea], no. 13, [consulta: 11 febrero 2025]. Disponible en: https://www.uv.es/medciensoc/num2/plantas_valencia.html.

GALLEGOS ZURITA, M., 2016. Las plantas medicinales: principal alternativa para el cuidado de la salud, en la población rural de Babahoyo, Ecuador. Anales de la Facultad de Medicina, [en línea] vol. 77, no. 4, ISSN 1025-5583, Disponible en: http://www.scielo.org.pe/scielo.php?script=sci_arttext&pid=S1025-55832016000400002

GHIRARDINI, M.P., CARLI, M., DEL VECCHIO, N., ROVATI, A., COVA, O., VALIGI, F., AGNETTI, G., MACCONI, M., ADAMO, D., TRAINA, M., LAUDINI, F., MARCHESELLI, I., CARUSO, N., GEDDA, T., DONATI, F., MARZADRO, A., RUSSI, P., SPAGGIARI, C., BIANCO, M., BINDA, R., BARATTIERI, E., TOGNACCI, A., GIRARDO, M., VASCHETTI, L., CAPRINO, P., SESTI, E., ANDREOZZI, G., COLETTO, E., BELZER, G. y PIERONI, A., 2007. The importance of a taste. A comparative study on wild food plant consumption in twenty-one local communities in Italy. Journal of Ethnobiology and Ethnomedicine, [en línea] vol. 3, no. 1, ISSN 1746-4269. DOI 10.1186/1746-4269-3-22. Disponible en: https://ethnobiomed.biomedcentral.com/articles/10.1186/1746-4269-3-22

HEISLER, E.V., BUDÓ, M. de L.D., SCHIMITH, M.D., BADKE, M.R., CEOLIN, S. y HECK, R.M., 2015. Uso de plantas medicinales en el cuidado de la salud: la producción científica de tesis y disertaciones de enfermería brasileña. Enfermería Global, [en línea] vol. 14, no. 39, ISSN 1695-6141. Disponible en:

https://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1695-61412015000300018

JIMÉNEZ GONZÁLEZ, A., PIONCE ANDRADE, G.A., GRAS RODRÍGUEZ, R., CABRERA VERDESOTO, C.A. y TAPIA ZÚÑIGA, M.V., 2020. Componentes de la diversidad biológica empleados por las familias manabitas en la medicina natural y tradicional. Parte II [en línea]. Ecuador: Editorial Internacional Runaiki. [en línea] [consulta: 11 febrero 2025]. ISBN 9789942826718. Disponible en: https://www.researchgate.net/publication/351457233_Componentes_de_la_diversidad_biologica_empleados_por_las_familias_manabitas_en_la_medicina_natural_y_tradicional.

JORAND, B., 2008. Formas de transformación del conocimiento de la medicina tradicional en los pueblos nahuas del municipio de Hueyapan, Sierra Norte de Puebla. Cuicuilco, vol. 15, no. 44, ISSN 0185-1659. Disponible en: https://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S0185-16592008000300009

LINARES GIMENO, N., 2013. Plantas medicinales. Cuaderno de Trabajo. Taller La farmacia de la naturaleza [en línea]. 2013. S.l.: Centro de Empresas de Loeches. UPA Madrid. Disponible en: https://www.fademur.es/_documentos/ponencias/Ponencia_Fademur_farmacia_OK.pdf.

MEJIAS PUPO, M., OCHOA SALAS, T., CHACÓN CHACÓN, A., MARTÍNEZ RONDON, A., DÍAZ VARGAS, A.L. y REYES TORRES, M.M., 2015. Efectividad de la Medicina Natural y Tradicional en los servicios de urgencias. Revista Archivo Médico de Camagüey, [en línea] vol. 19, no. 5, ISSN 1025-0255. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1025-02552015000500007

RODRÍGUEZ GUERRA, Y., FUENTES MOLINA, J.E., MORALES CHALA, S., VILLATE GÓMEZ, M. y CARMONA TORRES, D., 2007. Contribución etnobotánica de plantas medicinales en el municipio de San Luis, Pinar del Río, Cuba. Revista Centro Agrícola [en línea], vol. 34, no. 4, [consulta: 11 febrero 2025]. Disponible

en: http://cagricola.uclv.edu.cu/index.php/es/volumen-34-2007/numero-4-2007/584-contribucion-etnobotanica-de-plantas-medicinales-en-el-municipio-de-san-luis-pinar-del-rio-cuba.

ROSETE BLANDARIZ, S., SÁENZ VÉLIZ, R.S., JIMÉNEZ GONZÁLEZ, A. y PIN FIGUEROA, F.E., 2019. Fitorecursos de interés para el turismo en los bosques secos de la región costa, Jipijapa, Manabí, Ecuador. Revista Cubana de Ciencias Forestales, [en línea], vol. 7, no. 2, ISSN 2310-3469. Disponible en: https://cfores.upr.edu.cu/index.php/cfores/article/download/435/html?inline=1

Conflicts of interest:

The authors declare no conflicts of interest.

Authors' contribution:

The authors have participated in the writing of the work and analysis of the documents.