



Uso de productos forestales no maderables en comunidades de Cupeyal del Norte

Use of non-timber forest products in North Cupeyal communities

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Resumen

En el Sector Cupeyal existe una gama de Productos Forestales No Maderables de interés, no siendo muy claro el nivel de uso de estos productos por los habitantes de las comunidades aledañas. Para contribuir a resolver la situación mencionada se identificaron las especies que aportan productos forestales no maderables, se determina su presencia en la estructura de los bosques y se calculan los valores Frecuencia y Nivel de uso. Para esto se encuestaron a 58 personas nativas teniendo en cuenta todas las edades, en particular, a las de más experiencia.

Palabras clave: Productos forestales; Maderables; Especie; Bosques

Abstract

In the Cupeyal Sector there is a range of interesting non-timber forest products, but the level of use of these products by the inhabitants of the surrounding communities is not very clear. To help resolve this situation, the species that provide non-timber forest products were identified, their presence in the forest structure was determined and the values of frequency and level of use were

calculated. For this purpose, 58 native people were surveyed, taking into account all ages, particularly those with more experience.

Keywords: Forestry products,, Timber; Species; Forests

Introduction

According to FAO (2002), humanity is going through a decisive moment in its development; never before have the planet's ecosystems been so affected by human presence, vast areas of the world's forests that have served as sustenance for human survival and progress have been seriously degraded, "where it is clear that natural resources are not infinite and that their judicious and sustainable use is necessary for survival" (p. 140).

Non-timber forest products (NTFPs) are important resources for human development, considered by Aguirre (2012) as: "goods of biological origin other than wood, from forests, other forest areas, wooded land and trees outside forests" (p. 54), which are used to generate production and satisfy their needs. These are present in all types of forests; the difference lies in their knowledge, abundance, conservation status and forms of use.

In Cuba, non-timber forest products have begun to be revalued, acquiring, for the first time, a certain level of interest. For various reasons, they were not exploited at all or were exploited in a limited way. Today, one of the main justifications that has encouraged the irrational use of NTFPs is the social benefits they provide, mainly those that contribute to cover urgent needs, according to Orta and Quintana (2015).

The Alejandro de Humboldt National Park (PNAH) has the greatest plant diversity in the Cuban Archipelago and the Insular Caribbean, so the different resources it provides can be used sustainably. Lioger (2004), states that it concentrates 2% of the flora species of the Earth, and has a flora of 905 endemic species, almost 30% of those reported for Cuba, so it is necessary to use the resources in a harmonious way with the environment.

According to FAO (2001), studies have shown that the use of biodiversity resources is a direct or indirect source of well-being and provides solutions to important needs of the human population. In particular, cultivated and wild plants constitute an indispensable biological resource for man,

who has historically made use of them from the first communities to the most advanced societies of today's world.

In this perspective, non-timber forest products of plant origin play an important role due to their variety, type of product and form of use, suggest Cárdenas et al. (2008). In this area there have been no studies on the subject, so this research constitutes a first approach to the knowledge of the use of non-timber forest products in North Cupeyal Sector. Therefore, the objective is to determine the use of non-timber forest products in the communities of North Cupeyal.

Development

The study was conducted in the communities of Mucaral, Las Municiones and the Conservation Department belonging to the Cupeyal del Norte Sector of the Alejandro de Humboldt National Park in Yateras municipality, Guantánamo province, during the period from February 2019 to December 2020.

First, it was necessary to determine the use of non-timber forest products by the communities in the Cupeyal del Norte Sector. For the identification of the species, the criteria of the native people with more experience were taken into account, and rectangular plots of 20 x 25 m (1,000 m²) were established, sampling 100 plots. In addition to counting the floristic species present in the different strata defined by Alvarez and Varona (2006), 68): herbaceous (up to 0.99 m), shrub (1 to 4.99 m) and tree (greater than 5 m).

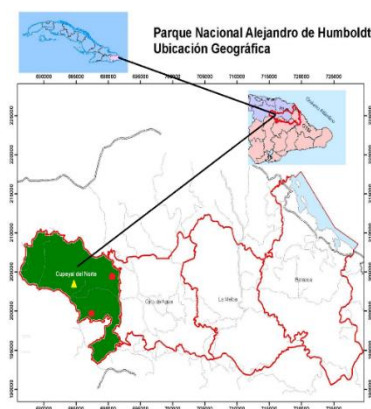


Figure1. Location of the study area

Source: Adapted from Pérez, 2011

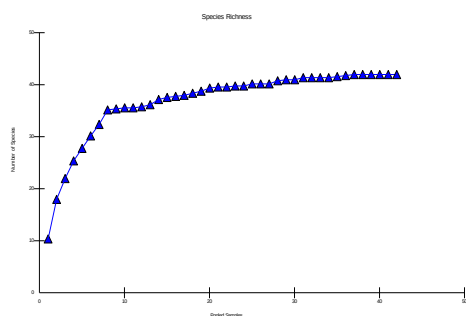
For the information collection on the use of non-timber forest products, the empirical method of structured surveys was used, as proposed by Jiménez et al. (2010). The number of people surveyed in each community was calculated using the formula proposed by Torres et al. (2011).

To verify whether the species cited as non-timber forest products by the community members are present in the area, Kvist et al. (2006) recommended verification through sampling in forested areas surrounding each community. All tree and shrub individuals in each plot were recorded, and then verification rounds were carried out with informants knowledgeable about the plants. To describe the horizontal structure, relative abundance, relative frequency and relative dominance were determined, according to Moreno (2001). From the point of view of Keels et al. (1997), we calculated the Ecological Importance Value Index obtained through the sum of the parameters of the horizontal structure; the latter was evaluated by determining the values of abundance, dominance and relative frequency of each species.

The data obtained from the surveys were analyzed with Bio Diversity Pro software to perform the species area curve and SPSS 15 for Windows, where a hierarchical cluster analysis was applied to establish the correspondence between the variables.

Species Use Value (SUV). The sum of uses approach according to Phillips, (1996) was used. In this methodology, the number of uses is summed within each category of non-timber forest products to evaluate the use value of a species.

According to the area-species curve, Graph 1, the sampling is representative of the species diversity of the areas studied. As shown, from plot thirty-six, the curve reaches the asymptote,



indicating that most of the species were identified in the first plots. Taking into account the characteristics of the area where the study is being carried out, it is very likely that new species with the same characteristics will appear, providing NTFPs in similar environmental conditions.

Graph 1. Species area curve.

Source: Own elaboration: Own elaboration.

From the hierarchical cluster analysis, based on the similarity between the plots, three groups were identified within the studied forests that correspond to different formations by their physiognomy, structure and location in the field. Group I represents the pine forest, formed by two plots, Group II with four plots represents the evergreen forest and Group III with 15 plots represents the pluvisilvasubmontane forest.

In general, the three groups share the following species: *Clusia rosea* Jacq. (Cupey), *Nephrolepis exaltata* Schott. (Fern) and *Cecropia peltata* Lin. (Yagruma). These species are always found in these forest formations due to the cool environmental conditions and abundant rainfall.

Between the two communities and the department, a total of 58 people were surveyed (30 men and 28 women), with an average age of 44 years; the respondents recognized 106 species belonging to 69 genera and 40 families as non-timber forest products. For future studies, it is very important to take into account the opinion of the people living near the study areas, as they are an important source of empirical information and use these products in their daily activities.

On the other hand, Pérez (2007), conducting ethnobotanical interviews in the dry forests of Mangahurco, Ecuador, identified 60 species, a lower value than that obtained in this study, demonstrating that the forests studied, being humid, have a greater variety and diversity of species thanks to the climatic conditions present in this sector.

The species that stood out in the Myrtaceae family were: *Psidium guajaba* L., *Syzygium jambos* Alston, *Psidium guajaba* L. Between the two communities and the department, a total of 58 people were surveyed (30 men and 28 women), with an average age of 44 years; the respondents recognized 106 species belonging to 69 genera and 40 families as non-timber forest products. For future studies, it is very important to take into account the opinion of the people living near the study areas, as they are an important source of empirical information and use these products in their daily activities.

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The species that stood out in the Myrtaceae family were: *Psidiumguajaba*L, *Syzygium jambos*Alston, *Psidium guayabita* A. Rich, *Eucalyptusresinifera* Sm; in the Rutaceae: *Citrus lemon* Risso, *Zanthoxylummartinicense* Lam, *Citrus reticulata* Blanco, *Citrus limetta* Risso; Boraginaceae: *Eupatoriumvillosum*Sw, *Cordia globosa* H. B. K, *Eupatoriumodoratum*Lin, *Lippia alba* L; Cluciaceae: *Clusia rosea* Jacq, *Calophyllunantillanum*Britton, *Rheediaaristata* L. Herit, *Calophyllunutile*Bisse; Sapoteaceae: *Achrassapota*Lin, *Pouteriamicrantha*Urb, *Chrysophyllumoliforme* L, and Verbenaceae: *Verbena officinalis*Lin, *Cornutiapyramidata*Lin, *Broughtoniacubensis* (Lindl) Cogn).ita A. Rich, *Eucalyptusresinifera* Sm; in the Rutaceae: *Citrus limón* Risso, *Zanthoxylummartinicense* Lam, *Citrus reticulata* Blanco, *Citrus limetta* Risso; Boraginaceae: *Eupatoriumvillosum*Sw, *Cordia globosa* H. B. K, *Eupatoriumodoratum*Lin, *Lippia alba* L; Cluciaceae: *Clusia rosea* Jacq, *Calophyllunantillanum*Britton, *Rheediaaristata* L. Herit, *Calophyllunutile*Bisse; Sapoteaceae: *Achrassapota*Lin, *Pouteriamicrantha*Urb, *Chrysophyllumoliforme* L, and Verbenaceae: *Verbena officinalis*Lin, *Cornutiapyramidata*Lin, *Broughtoniacubensis* (Lindl) Cogn).

This shows that the existing species in the forests, used by the inhabitants of the communities where the study was conducted, represent a considerable diversity in terms of the categories of non-timber forest products, which have also been reported as the best represented for these formations.

According to the analysis of the age of the respondents, it was found that there is no one under 20 years old, the composition of the ethereal groups is concentrated between 29-60 years old, for 81.58 %, and over 60 years old represent 5.62 %; this means that the surveyed people had knowledge of the different species that inhabit the area and their possible uses.

The 10.34% of the people surveyed only studied up to the 6th grade, they are the oldest people and the most knowledgeable about non-timber forest products. Forty-five percent and 40% finished high school and pre-university studies, respectively; only 5% managed to go on to university. Fifteen percent are unemployed or self-employed. Therefore, there are difficulties in the management of non-timber forest products, since 85% state that the objective of harvesting and gathering is for consumption, while the exploitation of the forest's natural resources is a family's economic livelihood.

Given the need to comply with the Cuban Government's call for import substitution, it is important to know these products, their uses and qualities by and for industries, companies and everyone in general, being a wide way to introduce them in many national and foreign markets as long as it is done through a sustainable use.

Of the 106 species identified by the inhabitants of Las Municiones and Mucaral, together with the Conservation Department workers, 80 species were found in the 20 m x 25 m plots that provide non-timber forest products in the forest, which shows that the exploitation of non-timber forest products is high, demonstrating that the forest structure may be slightly affected.

The species with the highest use value in North Cupeyal Sector were identified as being used in 4 different categories and the species with the lowest use in only one category.

A significant number of the species mentioned by the respondents are used in more than one NTFP category, so the value of use is higher, the following stand out: *Eucalyptus resinifera* Sm. (Eucalyptus), *Psidiumguajaba* L. (Guava), *Pipersphaerocarpum* Gris. (Guayuyo macho), *Dophropsis americana* Mill. (Guacacoa), *Cecropiapeltata* Lin. (Yagruma), *Protiumcubense* Rose. (Copal), *Clusia rosea* Jacq. (Cupey), *Leucaena glauca* L. (Ipil ipil), *Roystonea regia* Cook. (Royal Palm), *Bauhinia purpurea* L. (Common Orchid), *Cupania americana* L. (Guáramo), *Rhea* (Guáramo). (Guáramo), *Rheediaaristata* Griseb. (Manajú), *Pinuscubensis* Griseb. (Pine).

Rheediaaristata Griseb. (Manajú) is a critically endangered species, with criterion A3 (reduction of population size), B2ab, this is in terms of geographic distribution, area of occupancy severely fragmented, according to González and Palmarola (2016).

It is important to highlight that two of the species that are most used for medicine are *Eucalyptus resinifera* and *Smy Protiumcubense* Rose, the first species is recognized as an exotic plant and the second as a threatened species in the studied area, being of importance for the conservation of the area; corroborating this result with those of MINAG (2014) where these species are declared as of important in relation to their use value.

The motivation for the collection, cultivation and commercialization of some forest products is mainly based on the local people's own consumption and the market, probably due to the

insufficient supply of jobs and the poor remuneration of workers, among the fundamental economic causes; the same results were obtained by Manzanares (2014).

Species with significant use value (SUV) $\geq 10\%$, are those recognized by the local population and frequently used. They recognize some of these species as the most important for their use.

The species with the highest significant use value correspond to those with the lowest ecological importance value index with the exception of *Pinus cubensis* Griseb, evidence that the pressure for harvesting is directed to floristic elements that are not part of the typical physiognomy of the forest, but are structural components; this implies a risk for their permanence in the forest structure, in this type of formation there are valuable species, predominantly *C. peltata*, *G. guidonea*, *L. domingensis*, and *B. simaruba*.

In the community of Las Munciones, the following species are used as medicinal plants: *Eucalyptus resinifera* Sm. (Eucalyptus), *Cecropia peltata* Lin. (Yagruma), *Allophylus cominia* Sw. (Palo de caja), and *Protium cubense* Rose. (Copal), *Bidens pilosa* L. (Romerillo); also used for making beverages, *Citrus limón* Risso. (Lemon), *Pinus cubensis* Griseb. (Pine), *Citrus aurantium* Lin. (Sour orange) and *Smilax domingensis* Willd. (China root). In the religion category *Eupatorium odoratum* Lin. (Saraguey breaker) and the aforementioned Yagruma.

In the community of Mucará, they also use for medicinal purposes the species previously mentioned in the other community, however, in this same category they use other species such as: *Cupania americana* L. (Guáramo), *Piper sphaerocarpon* Griseb. (Guáramo), *Piper sphaerocarpon* Griseb. (Guayuyo macho), *Daphnopsis americana* Mill. (Guaguacoa). For beverages and food, fruit species are used, as well as *Illicium cubense* A.C. Smith. (Anise) and *Lippia alba* L. (Mint) for alcoholic beverages. The species *Clusia rosea* Jacq. V. (Cupey) and *Pinus cubensis* Griseb. (Pine) for handicrafts.

In the Conservation Department, the use of almost the same species is frequent, since the workers live in these communities and are the park guards, finding some of these species and even others not mentioned (they were not found in the surrounding forests) easier to find because they are not easy to access or collect.

Of the 80 species recorded that provide non-timber forest products in the plots, 40 are referred to as useful by the population, which means that 50% of the plants that the population reported in the surveys are present in the forest structure of the sector. The rest of the species exist, but the population collects them from the orchards, open areas and gallery vegetation.

The values of relative abundance, relative frequency and relative dominance of the most representative species of the sampling check in the two communities of North Cupeyal Sector and the Conservation Department are shown below:

Scientific Name	Family	AR (%)	FR (%)	DR
<i>Clusia rosea</i> Jacq.	Cluciaceae	23,25	8,67	204,547
<i>Cecropiapeltata</i> Lin.	Moraceae	17,33	5,34	393,898
<i>Nephrolepisexaltata</i> Schott.	Polipodiaceae	12,66	5,57	64655
<i>Lonchocarpusdomingensis</i> Pers.	Fabaceae	12,07	8,67	69346

Table 1. Values of the most representative species of the sample.

Source: Own elaboration

The species with the highest abundance and frequency in North Cupeyal Sector, with abundance values of 23.25% *Clusia rosea* Jacq, 17.33% *Cecropiapeltata* Lin, 12.66% *Nephrolepisexaltata* Schott, 12.07% *Lonchocarpusdomingensis* Pers. Coinciding with Berazaín, (2011), where many of these species are indicators of this type of formation.

The species with the highest abundance and frequency have a low level of significant use as non-timber forest products, with the exception of *Cecropiapeltata* Lin, which is widely used by the villagers and would not pose a risk to its permanence in the forest structure, as its natural regeneration is good.

The excessive use of non-timber forest products can cause a decrease in the population size of some of the species that provide them, especially those with low natural regeneration and that have a frequent demand, such is the case of *Lonchocarpusdomingensis* Pers, a species of importance for the conservation of the area; corroborating this result with MINAG (2014), the

abundance values of this species indicate the increase in the number of individuals, a factor that is favorable for the conservation of this species and the integrity of the forest and other factors.

Species with lower IVIE manifest higher use, most of them are less frequent and abundant, because the use levels are high, indicating that the forest structure is disturbed irregularly.

Scientific Name	Family	IVIE
<i>Cecropiapeltata</i> Lin.	Moraceae	61,95
<i>Clusia rosea</i> Jacq.	Cluciaceae	50,79
<i>Protiumcubense</i> Rose.	Burseraceae	30,66
<i>Nephrolepisexaltata</i> Schott.	Polipodiaceae	26,17
<i>Allophylluscominia</i> Sw.	Sapindaceae	24,09

Table 2. Species with the highest IVIE in the forests of the Cupeyal del Norte Sector.

Source: Own elaboration

The species with the highest IVIE, *Cecropiapeltata* Lin, *Clusia rosea* Jacq, *Protiumcubense* Rose, *Nephrolepisexaltata* Schott, *Allophylluscominia* Sw. are the most important because of their dominance, abundance and relative frequency and also because they are typical species to develop in this type of forest. Sánchez (2015) also states that taking into account the index of ecological importance value (IVIE) at the species level, the vegetation will be characterized, in general, as heterogeneous, because the ecological weight of the species has a diameter greater than or equal to 5 cm.

These results are among the first on this subject in all the communities of the Cupeyal del Norte Sector, where it is evident that with the unsustainable extraction of non-timber forest products, the forest structure can decline, since the inhabitants of these communities report having the right to these products even when there is a degree of biodiversity loss, many of these being their source of income.

Conclusions

The use of non-timber forest products in the communities of North Cupeyal Sector falls into three categories (Medicinal, Drink and Food/Fodder), which are of great interest to the villagers as a natural alternative and an escape route in situations of scarcity and scarce resources that they may have at certain times.

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