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## An ethnobotanical survey of medicinal plants used by inhabitants of Holguín, Eastern Region, Cuba

[Estudio etnobotánico de las plantas medicinales usadas por los habitantes de Holguín, Región Oriental, Cuba]

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**Abstract:** The present study was aimed to archive the ethnomedicinal knowledge of plants used by inhabitants of seven villages of Holguín, Eastern region, Cuba. The ethnomedicinal information was collected through interviews. The collected data were analyzed through use value (UV), informant consensus factor (Fic) and fidelity level (FL). A total of 195 species of plants distributed in 166 genera belonging to 70 families were identified for the treatment of 17 ailment categories. The most treated conditions were digestive and liver disorders. The most important species according to their use value were *Lippia alba* (Mill.) N.E. Br. ex Britton & P. Wilson (0.236) and *Annona muricata* L. (0.194). Cancer and tumors had the Fic value of 0.94. A total of 19 species has a highest FL of 100 percent. This was the first ethnobotanical survey conducted in Holguín region, which will contribute to preserve valuable information of medicinal plants that may otherwise be lost to future generations.

**Keywords:** Traditional knowledge, herbal medicines, ethnobotanical indices

**Resumen:** El presente estudio tuvo como objetivo registrar el conocimiento etnomedicinal de las plantas usadas por los pobladores en 7 comunidades de Holguín, Región Oriental, Cuba. La información fue recogida a través de entrevistas y analizada cuantitativamente mediante indicadores etnobotánicos: valor de uso (UV), factor del consenso de los informantes (Fic) e índice de fidelidad (FL). Fueron reportadas un total de 195 especies de plantas, distribuidas en 166 géneros y 70 familias, para el tratamiento de 17 categorías de usos. Las indicaciones más frecuentes fueron los problemas digestivos y del hígado. Las especies medicinales con mayor UV fueron *Lippia alba* (Mill.) N.E. Br. ex Britton & P. Wilson (0.236) y *Annona muricata* L. (0.194). Cáncer y tumores tuvieron el valor más alto de Fic (0.94). Solo 19 especies presentaron un valor de FL de 100 %. Este primer estudio contribuirá a preservar la información de las plantas medicinales y que esta no se pierda en las futuras generaciones.

**Palabras clave:** Conocimiento tradicional, plantas medicinales, índices etnobotánicos

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## INTRODUCTION

For a long time, medicinal plants have played a very important role to treat various disorders and ailments in people's health. Nowadays, the use of herbal remedies as a way of treatment is still very important for human beings (Dolatkhahi *et al.*, 2014). There are about 35 000 to 70 000 plant species that have been used for medicinal purposes worldwide (Rajaei & Mohamadi, 2012). The World Health Organization (WHO) reports that about 65 - 80 percent of the world's inhabitant in emerging nations depends principally on plants for their primary health care (Calixto, 2005).

In recent years, there has been a continuous growth of the use of medicinal plants and/or formulations to provide health in the public healthcare system of many countries. The herbal remedies, frequently have higher acceptability than synthetic substitutes, due to their relative security, cost-effectiveness, biomedical benefits and accessibility (Rabearivony *et al.*, 2015).

Historically, medicinal plants have played an important role in pharmacological researches and new drug discovery, not only when plant constituents are used directly as therapeutic agents, but also as starting materials for the synthesis of drugs and/or development of new herbal formulations (Newman & Cragg, 2007; Zhang, 1998).

The knowledge of medicinal plant use is vast, but if this is not documented and recorded can be lost from one generation to another over the years (Tugume *et al.*, 2016). Currently, the ethnobotanical information on medicinal plants has gained considerable attention in segments of the scientific community (WHO, 2018). Ethnobotanical studies are a valuable tool to achieve the documentation of this ethnomedicinal knowledge, which includes: identification of local names, scientific names use, preparation form, route, etc. In addition, it contributes to the future researches on safety and efficacy of medicinal plants in treatment of various ailments as well as the conservation, sustainable management and use of plant resources (Simbo, 2010; Bagai, 2000).

The Caribbean region has a long history using herbal medicines for disease management and health maintenance. The native Amerindians incorporated indigenous medicinal plants in their rituals as part of their health care. These first nation inhabitants were gradually replaced by the sequential

arrivals of European settlers, enslaved Africans, hired Asian Indians and other minority ethnic groups. The people who came to the region brought with them inherent knowledge of the use of medicinal plants, searching "substitutes" within the local flora, which over the time has led to the development of the current herbal practices in Caribbean region, different by default from those from which it came. (Clement *et al.*, 2015).

In Cuba, current traditional medicine is also the result of influences of Aborigines, Spaniards, Africans and Chinese. In the 40's of the last century, Dr Juan Tomas Roig (Botanic, pharmacist and agronomist) identified and reported a total of 595 vegetal species, which were used by the Cuban people to treat diverse ailments. This vast research is recorded in his book "Plantas Medicinales, Aromáticas o Venenosas de Cuba" (Roig, 1974). In studies carried out by Fuentes (1980s) reported 1124 medicinal plants grouped in 615 genus belonging to 148 families, which represent the 18.76 percent of species of Cuban flora (Fuentes, 2008). These studies have contributed to the future scientific researches that support the uses of many of these vegetal species. Since then, few ethnobotanical studies have been carried out in some regions of Cuba, especially in the Eastern Region. Just a few and related with a restricted geographical area studies has been published as those make by Riverón *et al.*, (2015); Vargas *et al.*, (2011) and Beyra *et al.*, (2004). According to the high diversity and endemism of Cuban flora, as well as the wide knowledge of medicinal plants in his inhabitants, the present study is aimed to explore and report the ethnomedicinal knowledge of plants used by inhabitants of Holguín, Eastern Region, Cuba.

## MATERIALS AND METHODS

### *Study area*

The Holguín province is located in the northeastern region of Cuba. It is characterized by a great floristic diversity (% high endemism) due to the combination of different types of soils and the presence of flat areas and mountains, which cause different types of vegetation: coastal xeromorphic scrub and rain forests. The weather's Holguín is tropical humid, with two well defined periods, one of rain and other dry (Gutiérrez *et al.*, 2009). The study was conducted in 7 villages belonging to three municipalities of Holguín province: Mayarí, Urbano Noris and

Holguín (Figure N° 1).

Mayarí municipality is located in the central-eastern part of Holguín province and covers an area of 1304.2 km<sup>2</sup>, with a population of 101465 inhabitants, distributed in 65592 sub-urban areas and 35 873 in rural areas. It limits to the north with Gibara and Rafael Freyre municipalities, to the south with Cacocum and Báguanos, to the east with Báguanos and Rafael Freyre municipalities and to the west with Calixto García municipality (ONEI, 2015).

Urbano Noris municipality is located in the southern and covers an area of 770.12 km<sup>2</sup>, with a population of 40917 inhabitants, distributed in 25843 sub-urban areas and 15074 in rural areas. It limits to the north with Báguano municipality, to the east with Cueto, to the west with Cacocum and to the south with Santiago de Cuba and Granma provinces (ONEI, 2015). Holguín

municipality covers an area of 689.8 km<sup>2</sup>, with a population of 350987 inhabitants, distributed in 299377 urban areas and 51610 in rural areas. It limits to the north with Gibara and Rafael Freyre municipalities, to the south with Cacocum and Báguanos, to the east with Báguanos and Rafael Freyre municipalities and to the west with Calixto García municipality (ONEI, 2015).

Holguín is the municipality in which is placed the main city of the province with prevalence of urban population and industry as the predominant economic activity. On the other hand, the economic base of Urbano Noris and Mayari municipalities is the agriculture with dominance of rural inhabitants. In the first case, the cultivation of the sugarcane is the most important while for Mayari is the coffee crop (ONEI, 2015).

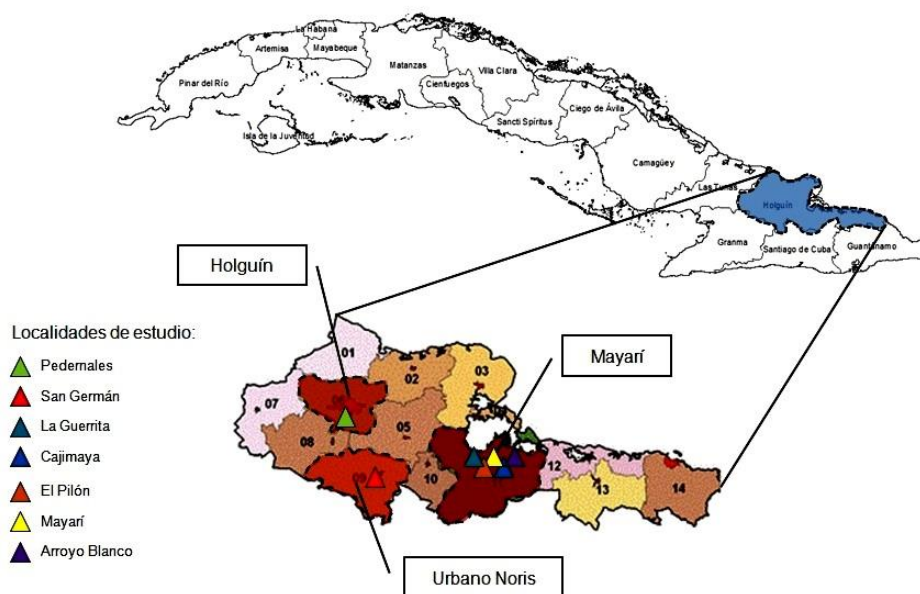


Figure N° 1

Geographical location of the study area, Province of Holguín, Cuba. (January to June 2016)

### Data collection

The universe of study was constituted by all the inhabitants of the communities, Pedernales (Holguín Municipality), San Germán (Urbano Noris Municipality), Mayarí, La Guerrita, El Pílon, Cajimaya, and Arroyo Blanco (Mayarí Municipality). The sample was selected through consecutive non-

probabilistic sampling including people of both sexes, different ages, traditional healers, housewives, retirees, students and professionals in the study areas (Sampieri, 2006). This survey was carried out from January to June 2016 following the protocols for ethnobotanical data documentation. Participants face-to-face interviewed were informed about the

objectives of the study and prior informant's consent (PIC) was obtained in written.

Data information was collected through an interview based on a semi-structured questionnaire elaborated on the basis of criteria of "Traditional Medicine in the Islands" (TRAMIL, 2018) and the objectives of this research. From each participant, the following information was gathered: name, age, sex, cultural level, occupation, name of the plant (botanical name and vernacular name), parts used, medicinal plants use, preparation's way and administration route.

### **Botanical identification**

All the vegetal species reported were collected and processed for taxonomic identification by taxonomist from the Eastern Biodiversity and Ecosystem Center (BIOECO), in Santiago de Cuba. The "guided tour" method was used to collect the mentioned plants by the informants. (Albuquerque, 2014). The rest were collected by the authorship team and confirmed his used by at least one informant, before to be taxonomically classified by BIOECO specialist.

Vouchers specimens in the form of dried plants were deposited at Herbarium of BIOECO. The scientific names of the plant species were identified according to the specialized scientific literature on Cuba and Caribbean flora, besides the plants were classified according to their endemism. (León & Alain, 1946; Roig, 1965; Roig, 1974; Saralegui, 2004; Acevedo & Strong, 2012; Govaerts, 2014). The scientific names of species were checked helped by The Plant List website (The Plant List, 2013) and the book: Catalogue of Seed Plants of the West Indies (Acevedo & Strong, 2012). Plants with their correct nomenclature were arranged alphabetically by botanical family.

### **Data analysis**

The data collected were stored on a database designed for the research. Based on the information obtained from the traditional healers in the study area, all the reported ailments were categorized into 17 categories according with literature (Morvin-Yabesh *et al.*, 2014). The use of quantitative indices in ethnobotanical research was calculated informing the use value (UV), the fidelity level (FL) and the Informant consensus factor (Fic) (Medeiros *et al.*, 2011).

### **Value use**

The use value (UV) is a quantitative method that demonstrates the relative importance of species known locally, considering the number of uses mentioned by an informant for a particular wild medicinal plant species. The UV is helpful in determining the plants with the highest use (most frequently indicated) in the treatment of an ailment and it was calculated using the following formula (Medeiros *et al.*, 2011):

$$UV_s = \frac{\sum Us}{n}$$

Where  $Us$  is the number of use-reports cited by each informant for a given plant species and  $n$  is the total number of informants. UV is generally high i.e., near (1) if the number uses are high and near (0) if the use reports for a species is considerably low. UV does not provide any information on the single or multiple uses of species.

### **Fidelity level**

To determine the most frequently used plant species for treating a particular ailment category by the informants of the study area, we calculated the fidelity level (FL). This index was calculated using the following formula (Medeiros *et al.*, 2011):

$$FL(\%) = \frac{N_p}{N_u} \times 100$$

Where  $N_p$  is the number of informants who suggested the use of a species for the same major ailment  $N_u$  is the total number of informants who mentioned the species for any use. Generally, high FLs are obtained for plants for which almost all use-reports refer to the same ailment category, whereas low FLs are obtained for plants that are used for many different purposes

### **Informant consensus factor**

The informant consensus factor (Fic) was used to see if there was agreement in the use of plants in the ailment categories between the plant users in the study area. The Fic was calculated using the following formula (Medeiros *et al.*, 2011):

$$F_{ic} = \frac{N_{ur} - N_t}{N_{ur} - 1}$$

Where  $N_{ur}$  refers to the number of use-reports for a

particular ailment category and  $N_i$  refers to the number of species used. The values are high (close to one) if the species are used by a high proportion of

informants. A low value indicates that the informants disagree on the taxa to be used in the treatment within a category of illness.

Table N° 1A

No	Family/scientific name	Cuban local name	Part used	Preparation	Administration
	<b>ACANTHACEAE</b>				
1	<i>Justicia adhatoda</i> L.	Justicia	Leaves	Decoction	Oral
2	<i>Justicia pectoralis</i> Jacq.	Tilo	Whole plant	Infusion	Oral
3	<i>Ruellia tuberosa</i> L.	Siqui traqui	Roots	Decoction	Oral
	<b>ADOXACEAE</b>				
4	<i>Sambucus nigra</i> subsp. <i>canadensis</i> (L.) Bolli	Saúco blanco	Leaves, flowers	Decoction, infusion and others	Oral
	<b>AIZOACEAE</b>				
5	<i>Sesuvium</i> sp.	Miaito	Leaves	Decoction	Oral
	<b>AMARANTHACEAE</b>				
6	<i>Achyranthes aspera</i> var. <i>aspera</i>	Rabo de mono	Whole plant	Decoction	Oral, Topical
7	<i>Beta vulgaris</i> var. <i>vulgaris</i>	Remolacha	Fruits	Vegetable	Oral
8	<i>Chenopodium ambrosioides</i> L.	Apazote	Leaves & whole plant	Decoction	Oral
	<b>AMARYLLIDACEAE</b>				
9	<i>Allium cepa</i> L.	Cebolla	Bulbs	Vegetable	Oral
10	<i>Allium sativum</i> L.	Ajo	Bulbs	Vegetable, infusion and maceration	Oral
11	<i>Zephyranthes atamasco</i> (L.) Herb.	Brujita	Flowers	Expression (juice)	Oral
	<b>ANACARDIACEAE</b>				
12	<i>Anacardium occidentale</i> L.	Marañón	Leaves	Decoction	Oral
13	<i>Mangifera indica</i> L.	Mango	Leaves	Decoction	Oral
14	<i>Spondias purpurea</i> L.	Ciruela	Leaves	Decoction	Topical
	<b>ANNONACEAE</b>				
15	<i>Annona muricata</i> L.	Guanábana	Leaves, flowers, fruits	Decoction, infusion, raw.	Oral
16	<i>Annona reticulata</i> L.	Anón manteca	Leaves	Decoction	Oral
17	<i>Annona squamosa</i> L.	Anón	Leaves	Decoction	Oral
	<b>APIACEAE</b>				
18	<i>Apium graveolens</i> L.	Apio	Leaves	Decoction	Oral
19	<i>Coriandrum sativum</i> L.	Cilantro	Fruits	Decoction	Oral
		Culantro	Whole	Decoction,	

20	<i>Eryngium foetidum</i> L.	cimarrón	plant	infusion	Oral
21	<i>Foeniculum vulgare</i> Mill.	Hinojo	Whole plant	Decoction	Oral
22	<i>Petroselinum crispum</i> (Mill.) Fuss	Perejil	Leaves & branches	Decoction	Oral
23	<i>Pimpinella anisum</i> L.	Anís	Leaves	Decoction	Oral
	<b>APOCYNACEAE</b>				
24	<i>Asclepias curassavica</i> L.	Platanillo	Latex	Others	Nasal route
25	<i>Cascabela thevetia</i> (L.) Lippold	Cabalonga	Leaves, flowers & seeds	Infusion, amulet	Oral and others
26	<i>Catharanthus roseus</i> (L.) G. Don	Vicaria blanca, vicaria morada	Flowers	Decoction y/o infusion	Topical
27	<i>Nerium oleander</i> L.	Adelfa	Leaves	Decoction	Topical
	<b>ARECACEAE</b>				
28	<i>Cocos nucifera</i> L.	Coco	Roots, fruit, peel of fruit,	Decoction, infusion, juice	Oral
29	<i>Roystonea regia</i> (Kunth) O.F. Cook	Palma real	Roots	Decoction	Oral
	<b>ASTERACEAE</b>				
30	<i>Artemisia absinthium</i> L.	Ajenjo	Leaves, flowers	Decoction, infusion	Oral
31	<i>Artemisia vulgaris</i> L.	Altamisa	Whole plant, leaves, flowers	Decoction	Topical, oral
32	<i>Bidens alba</i> var. <i>radiata</i> (Sch.Bip.) R.E. Ballard	Romerillo	Whole plant, leaves, stems	Decoction, infusion	Oral, topical
33	<i>Calendula officinalis</i> L.	Caléndula	Leaves & flowers	Decoction, poultice	Oral, topical
34	<i>Chromolaena odorata</i> (L.) R. M. King & H. Rob.	Rompezaragüey	Whole plant, flower, leaves	Decoction	Oral
35	<i>Critonia aromatisans</i> (DC.) R.M. King & H. Rob.	Trévol	Leaves	Decoction	Oral
36	<i>Helianthus annuus</i> L.	Girasol	Flowers & bark	Decoction	Oral
37	<i>Koanophyllon villosum</i> subsp. <i>villosum</i>	Tribulillo	Leaves	Decoction	Oral
		Manzanilla alemana, Manzanilla dulce,	Whole plant, leaves,	Decoction,	

38	<i>Matricaria chamomilla</i> L.	Camomila	flowers	infusion	Oral, topical
39	<i>Melanthera nivea</i> (L.) Small	Cabecita de muerto	Leaves & flowers	Decoction	Oral
40	<i>Mikania</i> sp.	Bejuco de guaco	Aerial part	Decoction, amulet	Oral, others
41	<i>Parthenium hysterophorus</i> L.	Escoba amarga	Whole plant,	Decoction	Topical
42	<i>Pluchea carolinensis</i> (Jacq.) D. Don	Salvia	Leaves	Decoction, infusion, maceration	Oral, topical
43	<i>Taraxacum officinale</i> (L.) Weber ex F.H. Wigg.	Diente de león	Rhizome	Decoction	Oral, topical
44	<i>Xanthium strumarium</i> L.	Guisazo de baracoa	Root	Decoction	Oral
	<b>BIGNONIACEAE</b>				
45	<i>Crescentia cujete</i> L.	Güira	Fruits, leaves	Decoction, poultice, honey of fruit, expression (juice)	Oral
	<b>BIXACEAE</b>				
46	<i>Bixa orellana</i> L.	Bija	Seeds	Raw	Oral
	<b>BORAGINACEAE</b>				
47	<i>Cordia collococca</i> L.	Ateje	Whole plant	Decoction	Oral
48	<i>Heliotropium indicum</i> L.	Tapón	Whole plant	Decoction	Oral
49	<i>Tournefortia hirsutissima</i> L.	Cayaya	Roots, leaves	Decoction	Oral
50	<i>Varronia bullata</i> subsp. <i>humilis</i> (Jacq.) Feuillet	Poleo	Whole plant	Decoction	Oral
	<b>BRASSICACEAE</b>				
51	<i>Lepidium virginicum</i> L.	Mastuerzo	Whole plant	Decoction, maceration	Oral
52	<i>Nasturtium officinale</i> R. Br.	Berro	Leaves, whole plant	Decoction	Oral
53	<i>Raphanus sativus</i> L.	Rábano	Rhizome	Juice	Oral
	<b>BROMELIACEAE</b>				
54	<i>Bromelia pinguin</i> L.	Piña ratón o maya	Pencas (Leaves), fruits	Decoction, others	Oral, topical
	<b>BURSERACEAE</b>				
55	<i>Bursera graveolens</i> (Kunth) Triana & Planch.	Sasafrás	Leaves	Decoction	Oral
56	<i>Bursera simaruba</i> (L.) Sarg.	Almácigo	Leaves, bark	Decoction	Oral

57	<i>Protium cubense</i> (Rose) Urb.	Copal	Resin, peel	Poultice, infusion, decoction	Topical, oral
	<b>CACTACEAE</b>				
58	<i>Opuntia ficus-indica</i> (L.) Mill.	Tuna	Leaves	Decoction	Topical
	<b>CANNACEAE</b>				
59	<i>Canna coccinea</i> Mill.	Platanillo	Whole plant, seeds	Decoction, others	Oral
	<b>CARICACEAE</b>				
60	<i>Carica papaya</i> L.	Fruta bomba	Roots, male flowers, fruits, roots	Infusion, decoction, raw	Oral
	<b>CELASTRACEAE</b>				
61	<i>Hippocratea volubilis</i> L.	Bejuco de vieja	Aerial part	Decoction	Oral
	<b>CLUSIACEAE</b>				
62	<i>Garcinia aristata</i> (Griseb.) Borhidi	Manajú	Leaves, whole plant, resin	Decoction, others	Oral
	<b>COMBRETACEAE</b>				
63	<i>Terminalia catappa</i> L.	Almendra	Leaves	Decoction	Oral
	<b>COMMELINACEAE</b>				
64	<i>Tradescantia spathacea</i> Sw.	Cordobán	Whole plant, flowers, leaves	Decoction, infusion	Oral
	<b>CONVOLVULACEAE</b>				
65	<i>Ipomoea batatas</i> (L.) Lam.	Boniato	Aerial part	Decoction	Oral
66	<i>Turbina corymbosa</i> (L.) Raf.	Campanilla	Flowers	Infusion	Oral
	<b>COSTACEAE</b>				
67	<i>Cheilocostus speciosus</i> (J.Koenig) C.D.Specht	Caña mexicana	Leaves, roots, stems, rhizome	Decoction, infusion	Oral
	<b>CRASSULACEAE</b>				
68	<i>Kalanchoe pinnata</i> (Lam.) Pers.	Flor de oído	Flowers	Expression (Juice)	Topical
	<b>CUCURBITACEAE</b>				
			Flowers, seeds,	Expression (juice), raw, decoction,	



69	<i>Cucurbita moschata</i> Duchesne	Calabaza	peak fruit	others	Topical, oral
70	<i>Momordica charantia</i> L.	Cundeamor, pimpinillo	Aerial part, leaves	Decoction, infusion	Oral, topical
	<b>CYPERACEAE</b>				
71	<i>Scleria lithosperma</i> L. Sw.	Basarillo	Whole plant	Decoction	Oral
	<b>ERYTHROXYLACEAE</b>				
72	<i>Erythroxylum havanense</i> Jacq. var. <i>havanense</i>	Jibá	Roots	Decoction	Oral
	<b>EUPHORBIACEAE</b>				
73	<i>Cnidoscopus aconitifolius</i> subsp. <i>aconitifolius</i>	Chaya	Leaves	Infusion	Oral
74	<i>Euphorbia tithymaloides</i> subsp. <i>tithymaloides</i>	Itamo real	Leaves	Decoction	Oral, topical
75	<i>Jatropha curcas</i> L.	Piñón botija	Leaves, stems	Decoction, sap	Oral, topical
76	<i>Jatropha gossypifolia</i> L.	Tuatúa	Leaves	Infusion, decoction	Oral
77	<i>Jatropha multifida</i> L.	Árnica o coral	Leaves	Infusion	Oral
78	<i>Platygyne hexandra</i> (Jacq.) Müll. Arg.	Pringamosa	Roots	Decoction	Oral
79	<i>Ricinus communis</i> L.	Higuereta	Leaves	Poultice	Topical
	<b>FABACEAE</b>				
80	<i>Arachis hypogaea</i> L.	Maní	Fruits	Others	Oral
81	<i>Bauhinia divaricata</i> L. var. <i>divaricata</i>	Pata de vaca	Flowers	Infusion	Oral
82	<i>Caesalpinia echinata</i> Lam.	Palo de Brasil	Stems	Decoction	Oral
83	<i>Cajanus cajan</i> (L.) Huth	Frijol guandul	Whole plant	Decoction	Oral
84	<i>Cassia acutifolia</i> Delile	Sen	Leaves	Decoction	Oral
85	<i>Cassia fistula</i> L.	Caña fítula	Fruits	Raw	Oral
86	<i>Cassia grandis</i> L. f.	Cañandong	Leaves, fruits	Expression (juice)	Topical, oral
87	<i>Desmodium incanum</i> DC.	Amor seco	Whole plant	Decoction	Oral
88	<i>Dichrostachys cinerea</i> subsp. <i>africana</i> Brenan & Brummitt	Marabú	Bark	Decoction	Oral
89	<i>Gliricidia sepium</i> (Jacq.) Walp.	Júpito	Leaves	Decoction	Oral
90	<i>Indigofera suffruticosa</i> Mill	Añil cimarrón	Leaves & stems	Decoction	Topical
91	<i>Mimosa pudica</i> var. <i>pudica</i>	Moriviví	Roots, leaves	Maceration, Infusion	Topical, oral
92	<i>Mucuna urens</i> (L.) Medik.	Ojo de buey	Seeds	Others	Topical
93	<i>Phaseolus lunatus</i> L.	Frijol caballero	Leaves	Decoction	Oral
94	<i>Pithecellobium unguis-cati</i> (L.) Benth.	Uña de gato	Roots	Decoction	Oral

95	<i>Sena alata</i> (L.) Roxb.	Palo santo	Leaves	Decoction	Oral
96	<i>Senna obtusifolia</i> (L.) H. S. Irwin & Barneby	Guanina	Roots	Infusion	Oral
97	<i>Tamarindus indica</i> L.	Tamarido	Leaves, fruits, root	Decoction, raw	Oral
	<b>HAEMODORACEAE</b>				
98	<i>Xiphidium caeruleum</i> Aubl.	Mano ponderosa	Leaves	Decoction	Oral
	<b>LAMIACEAE</b>				
99	<i>Hyptis pectinata</i> (L.) Poit.	Sandobal	Leaves	Decoction	Oral
100	<i>Mentha spicata</i> L.	Yerba Buena	Leaves	Decoction	Oral
101	<i>Mentha x piperita</i> var. <i>citrata</i> (Ehrh) Briq.	Toronjil	Leaves	Infusion	Oral
102	<i>Ocimum basilicum</i> L.	Albahaca blanca	Leaves & flowers	Decoction, infusion	Oral
103	<i>Ocimum tenuiflorum</i> L.	Albahaca morada	Leaves & flowers	Decoction	Oral, topical
104	<i>Origanum majorana</i> L.	Mejorana	Leaves & stems	Decoction	Oral
105	<i>Origanum vulgare</i> L.	Orégano	Leaves	Decoction	Oral
106	<i>Plectranthus amboinicus</i> (Lour.) Spreng	Orégano	Leaves, stems & flowers	Decoction and maceration	Oral
107	<i>Plectranthus hadiensis</i> (Forssk.) Schweinf. ex Sprenger	Meprobamato/ Menta	Leaves & stems	Decoction	Oral
108	<i>Rosmarinus officinalis</i> L.	Romero	Leaves & flowers	Maceration	Topical
109	<i>Salvia officinalis</i> L.	Salvia del país	Leaves	Decoction, poultice	Oral, topical
110	<i>Teucrium cubense</i> Jacq.	Agrimonia	Leaves	Infusion	Oral
111	<i>Vitex agnus-castus</i> L.	Vencedor	Leaves & flowers	Infusion	Oral
	<b>LAURACEAE</b>				
112	<i>Cinnamomum verum</i> J. Presl	Canela	Bark	Infusion	Oral
113	<i>Persea americana</i> Mill	Aguacate	Leaves	Decoction, infusion	Oral
	<b>LILIACEAE</b>				
114	<i>Lilium candidum</i> L.	Azuzena	Flowers	Expression (juice)	Topical
	<b>LYTHRACEAE</b>				
115	<i>Lagerstroemia indica</i> L.	Júpite	Leaves	Decoction, infusion	Oral
116	<i>Lawsonia inermis</i> L.	Resedá	Leaves	Decoction	Oral
117	<i>Punica granatum</i> L.	Granada	Bark of root	Decoction or infusion	Oral
	<b>MALVACEAE</b>				

118	<i>Abelmoschus esculentus</i> (L) Moench	Quimbombó	Fruit	Decoction	Oral
119	<i>Gossypium barbadense</i> var. <i>barbadense</i>	Algodón	Leaves	Decoction	Oral
120	<i>Guazuma ulmifolia</i> Lam	Guásima	Bark of fruit, bark	Decoction	Oral, topical
121	<i>Hibiscus elatus</i> Sw.	Majagua	Flowers	Decoction, expression (juice)	Oral
122	<i>Hibiscus rosa-sinensis</i> L.	Mar pacífico	Flowers	Infusion	Oral
	<b>MELIACEAE</b>				
123	<i>Azadirachta indica</i> A. Juss.	Nin	Leaves	Infusion, others	Oral
124	<i>Guarea guidonia</i> (L.) Sleumer	Yamagua	Leaves	Maceration	Topical
125	<i>Melia azedarach</i> L.	Pulciana	Leaves	Decoction	Topical
126	<i>Melia</i> sp.	Lila	Leaves	Decoction	Topical
	<b>MORACEAE</b>				
127	<i>Artocarpus altilis</i> (Parkinson ex F.A.Zorn) Fosberg	Guapén	Leaves	Infusion	Oral
128	<i>Ficus religiosa</i> L.	Álamo	Leaves and stems	Decoction	Topical
	<b>MORINGACEAE</b>				
129	<i>Moringa oleifera</i> Lam	Moringa	Leaves, flowers	Decoction, expression (juice)	Oral, topical
	<b>MUSACEAE</b>				
130	<i>Musa x paradisiaca</i> L.	Plátano	Stems, fruits	Sap, others	Oral
	<b>MYRICACEAE</b>				
131	<i>Myrica cerifera</i> L.	Arraigán	Leaves	Maceration	Topical
	<b>MYRISTICACEAE</b>				
132	<i>Myristica fragrans</i> Houtt.	Nuez moscada	Fruits	Decoction	Oral
	<b>MYRTACEAE</b>				
133	<i>Corymbia citriodora</i> (Hook.)K.D. Hill & L.A.S. Johnson	Eucalipto	Leaves, resin	Decoction, raw	Inhalation, topical, oral
134	<i>Psidium guajava</i> L.	Guayaba	Leaves	Decoction, powder	Oral, topical
	<b>NYCTAGINACEAE</b>				
135	<i>Boerhavia scandens</i> L.	Tostón	Whole plant	Decoction	Oral
136	<i>Boldoa purpurascens</i> Cav. ex Lag.	Nitro	Leaves	Decoction	Oral
137	<i>Mirabilis jalapa</i> L.	Maravilla	Leaves, flowers, roots	Decoction, infusion	Oral, topical
	<b>PAPAVERACEAE</b>				
			Whole plant,	Infusion,	

138	<i>Argemone mexicana</i> L.	Cardosanto	roots, seeds	decoction, others	Oral, topical
	<b>PASSIFLORACEAE</b>				
139	<i>Passiflora edulis</i> Sims	Maracullá	Flowers	Infusion	Oral
140	<i>Passiflora rubra</i> L.	Pasionaria de cerca	Leaves	Tincture	Oral
141	<i>Turnera ulmifolia</i> L.	Marilope	Whole plant	Decoction	Oral
	<b>PHYLLANTHACEAE</b>				
142	<i>Phyllanthus amarus</i> Schumach. & Thonn.	Huevo de toro, lo tengo abajo	Whole plant	Decoction	Oral
	<b>PHYTOLACCACEAE</b>				
143	<i>Petiveria alliacea</i> L.	Anamú	Leaves and stems	Decoction	Oral
	<b>PIPERACEAE</b>				
144	<i>Peperomia pellucida</i> (L.) Kunth	Corazón de hombre	Whole Plant	Decoction o infusion	Oral
145	<i>Piper amalago</i> L.	Mataguao	Leaves and stems	Decoction	Oral
146	<i>Piper auritum</i> Kunth	Anisón	Leaves	Decoction, infusion	Oral
	<b>PLANTAGINACEAE</b>				
147	<i>Plantago major</i> L.	Llantén	Whole Plant	Decoction, infusion	Oral, topical
	<b>POACEAE</b>				
148	<i>Bambusa vulgaris</i> Schrad.	Cañambú	Roots	Decoction	Oral
149	<i>Cymbopogon citratus</i> (DC.) Stapf	Caña santa	Leaves	Decoction, infusion	Oral
150	<i>Eleusine indica</i> (L.) Gaertn.	Pata de Gallina	Whole plant	Decoction	Oral
151	<i>Eragrostis unioides</i> (Retz.) Nees ex Steud.	Lloviznita	Whole plant	Decoction, infusion	Oral
152	<i>Urochloa mutica</i> (Forssk.) T.Q. Nguyen	Paraná	Leaves and roots	Decoction	Oral
153	<i>Paspalum conjugatum</i> P.J. Bergius	Cañamaso	Roots	Infusion	Oral
154	<i>Zea mays</i> L.	Maíz	Fruits	Decoction	Oral
	<b>POLYGONACEAE</b>				
155	<i>Coccoloba uvifera</i> (L.) L.	Uva caleta	Bark	Decoction	Topical
	<b>POLYPODIACEAE</b>				
156	<i>Polypodium polypodioides</i> var. <i>polypodioides</i>	Doradilla	Whole plant, leaves	Infusion, decoction	Oral
	<b>PORTULACACEAE</b>				
157	<i>Portulaca oleracea</i> L.	Verdolaga	Whole Plant	Decoction	Oral
158	<i>Talinum fruticosum</i> (L.) Juss.	Espinaca	Leaves	Others	Oral

	<b>RHAMNACEAE</b>				
159	<i>Colubrina elliptica</i> (Sw.) Brizicky & W.L.Stern	Bijagua	Leaves	Decoction	Oral
	<b>RHIZOPHORACEAE</b>				
160	<i>Rhizophora mangle</i> L.	Mangle rojo	Leaves and stems	Decoction	Oral
	<b>RUBIACEAE</b>				
161	<i>Chiococca alba</i> (L.) Hitchc.	Bejuco de verraco	Aerial parts	Decoction	Oral
162	<i>Coffea arabica</i> L.	Café	Leaves	Infusion	Topical
163	<i>Morinda citrifolia</i> L.	Noni	Fruits	Juice	Oral
	<b>RUTACEAE</b>				
164	<i>Citrus aurantiifolia</i> (Christm.) Swingle	Limón	Fruits	Expression (juice)	Oral, topical
165	<i>Citrus reticulata</i> Blanco	Mandarina	Bark of fruit	Decoction	Oral
166	<i>Citrus sinensis</i> (L.) Osbeck	Naranja dulce	Fruits	Juice	Oral
167	<i>Citrus x aurantium</i> L.	Naranja agria	Fruits	Juice, decoction others	Oral, topical
168	<i>Citrus x paradisi</i> Macfad.	Toronja	Fruits	Juice	Oral
169	<i>Plethadenia cubensis</i> Urb.	Ruda	Leaves	Infusion, decoction	Oral, topical
170	<i>Zanthoxylum martinicense</i> (Lam.) DC.	Ayúa	Espinas	Others	Topical
	<b>SAPINDACEAE</b>				
171	<i>Allophylus cominia</i> (L.) Sw. var. <i>cominia</i>	Palo de caja	Stems	Decoction	Oral
172	<i>Melicoccus bijugatus</i> Jacq.	Anoncillo	Leaves	Decoction	Oral
	<b>SAPOTACEAE</b>				
173	<i>Pouteria sapota</i> (Jacq.) H.E. Moore & Stearn	Mamey	Seeds	Others	Topical
174	<i>Manilkara zapota</i> (L.) P. Royen	Níspero	Fruits	Raw	Oral
	<b>SCROPHULARIACEAE</b>				
175	<i>Capraria biflora</i> L.	Magüiro	Whole plant	Decoction	Oral
	<b>SOLANACEAE</b>				
176	<i>Capsicum annuum</i> L.	Pimiento	Fruits	Infusion	Oral
177	<i>Capsicum annuum</i> var. <i>frutescens</i> (L.) Kuntze	Ají guaguao	Fruits	Raw fruit	Oral
178	<i>Physalis angulata</i> L.	Huevo de gato	Whole plant	Decoction	Oral
179	<i>Solanum americanum</i> Mill.	Yerba mora	Whole plant, leaves	Decoction, infusion, maceration	Oral, topical
180	<i>Solanum lycopersicum</i> L.	Tomate	Whole plant,	Decoction, vegetable	Oral, topical

			fruits		
181	<i>Solanum melongena</i> L	Berenjena	Fruits	Maceration	Oral
182	<i>Solanum torvum</i> Sw.	Pendejera blanca	Leaves, roots	Decoction, infusion, expression (juice)	Oral, topical
	<b>URTICACEAE</b>				
183	<i>Cecropia schreberiana</i> subsp. <i>antillarum</i> (Snethl.) C.C.Berg & P.Franco	Yagruma	Roots, leaves	Decoction	Oral, topical
	<b>VERBENACEAE</b>				
184	<i>Lantana trifolia</i> L	Doña nica	Leaves	Decoction	Oral
185	<i>Lippia alba</i> (Mill.) N.E. Br. ex Britton & P. Wilson	Menta	Leaves	Decoction, infusion	Oral
186	<i>Phyla nodiflora</i> (L.) Greene	Sanguinaria	Leaves	Decoction	Oral
187	<i>Phyla scaberrima</i> (Juss. ex Pers.) Moldenke	Oruzuz	Whole plant	Decoction	Oral
188	<i>Phyla strigulosa</i> (M. Martens & Galeotti) Moldenke	Yerba de sapo	Whole plant	Decoction	Oral, topical
189	<i>Stachytarpheta jamaicensis</i> (L.) Vahl	Verbena	Whole plant	Decoction	Oral, topical
190	<i>Verbena officinalis</i> L.	Verbena	Whole plant	Decoction	Oral, topical
	<b>VITACEAE</b>				
191	<i>Cissus verticillata</i> subsp. <i>verticillata</i>	Bejuco ubí	Aerial parts	Decoction	Oral
192	<i>Vitis vinifera</i> L.	Uva	Fruit	Decoction, juice	Topical
	<b>XANTHORRHOEACEAE</b>				
193	<i>Aloe vera</i> (L.) Burm. f.	Sábila	Leaves	Others	Oral, topical, rectal
	<b>ZINGIBERACEAE</b>				
194	<i>Zingiber officinale</i> Roscoe	Jengibre	Rhizomes	Maceration, decoction	Topical, oral
	<b>ZYGOPHYLLACEAE</b>				
195	<i>Guaiacum officinale</i> L.	Guayacán	Leaves	Decoction	Oral

Table N° 1B

Nº	Family/scientific name	Cuban local name	Uses (citations)	Total citations	VU
	<b>ACANTHACEAE</b>				
1	<i>Justicia adhatoda</i> L.	Justicia	Cough (9)	9	0.014
2	<i>Justicia pectoralis</i> Jacq.	Tilo	Nerves (74)	74	0.111
3	<i>Ruellia tuberosa</i> L.	Siqui traqui	Kidney infection (29), kidney stones (12)	41	0.062
	<b>ADOXACEAE</b>				

4	<i>Sambucus nigra</i> subsp. <i>canadensis</i> (L.) Bolli	Saúco blanco	Depurative (19), tumors (11), diabetes (2), flu (6), inflammation (4)	42	0.063
	<b>AIZOACEAE</b>				
5	<i>Sesuvium</i> sp.	Miaito	Kidney infection (4)	4	0.006
	<b>AMARANTHACEAE</b>				
6	<i>Achyranthes aspera</i> var. <i>aspera</i>	Rabo de mono	Kidney infection (1), Skin disease (1)	2	0.003
7	<i>Beta vulgaris</i> var. <i>vulgaris</i>	Remolacha	Anemia (1)	1	0.002
8	<i>Chenopodium ambrosioides</i> L.	Apazote	Dysentery (29)	29	0.044
	<b>AMARYLLIDACEAE</b>				
9	<i>Allium cepa</i> L.	Cebolla	Asthma (3)	3	0.005
10	<i>Allium sativum</i> L.	Ajo	Blood circulation (1), sciatica (2), flu (6), anti-atheromatous (2), blood pressure (9), dysentery (1), cholesterol (1), digestive disorders (1), rheum (2).	25	0.038
11	<i>Zephyranthes atamasco</i> (L.) Herb.	Brujita	Earache (1)	1	0.002
	<b>ANACARDIACEAE</b>				
12	<i>Anacardium occidentale</i> L.	Marañón	Diarrhea (7)	7	0.011
13	<i>Mangifera indica</i> L.	Mango	Antioxidant (2), inflammation (3), toothache (7), menstrual pain (8), asthma (2), flu (4), cough (32), expectorant (3).	61	0.092
14	<i>Spondias purpurea</i> L.	Ciruela	Skin rash (2), varicella (2)	4	0.006
	<b>ANNONACEAE</b>				
15	<i>Annona muricata</i> L.	Guanábana	Cancer (21), prostate (2), blood pressure (29), inflammation (5), flu (24), rheum (5), arthritis (11), asthma (3), cough (1), antioxidant (3), diabetes (10), diarrhea (1), digestive disorders (5), lung disorders (9)	129	0.194
16	<i>Annona reticulata</i> L.	Anón manteca	stomachache (2)	2	0.003
17	<i>Annona squamosa</i> L.	Anón	Flu (2), digestive disorders (30), dysentery (1), diarrhea (30)	63	0.095
	<b>APIACEAE</b>				
18	<i>Apium graveolens</i> L.	Apio	Blood pressure (10), bronchial disorders (8)	18	0.027

19	<i>Coriandrum sativum</i> L.	Cilantro	Dysentery (5), digestive disorders (5)	10	0.015
20	<i>Eryngium foetidum</i> L.	Culantro cimarrón	Laxative (1), digestive disorders (3)	4	0.006
21	<i>Foeniculum vulgare</i> Mill.	Hinojo	Digestive disorders (1), carminative (4), stomachache (1)	6	0.009
22	<i>Petroselinum crispum</i> (Mill.) Fuss	Perejil	Healing (1), Blood circulation (2)	3	0.005
23	<i>Pimpinella anisum</i> L.	Anís	Digestive disorders (9), carminative (11)	20	0.030
	<b>APOCYNACEAE</b>				
24	<i>Asclepias curassavica</i> L.	Platanillo	Flu (11)	11	0.017
25	<i>Cascabela thevetia</i> (L.) Lippold	Cabalonga	Blood pleasure (10), increase breast milk (2)	12	0.018
26	<i>Catharanthus roseus</i> (L.) G. Don	Vicaria blanca, vicaria morada	Conjunctivitis (14), antibacterial (2), allergies (1), menstrual pain (4)	21	0.032
27	<i>Nerium oleander</i> L.	Adelfa	Fungus (1)	1	0.002
	<b>ARECACEAE</b>				
28	<i>Cocos nucifera</i> L.	Coco	Diuretic (6), ovarian cysts (2), kidney stones (6), menstrual pain (6), Kidney infection (5), dysentery (6)	31	0.047
29	<i>Roystonea regia</i> (Kunth) O.F. Cook	Palma real	Kidney infection (4), menstrual pain (2), cysts (3), diuretic (7)	16	0.024
	<b>ASTERACEAE</b>				
30	<i>Artemisia absinthium</i> L.	Ajenjo	Scabies (1), healing (3), stomachache (3)	7	0.011
31	<i>Artemisia vulgaris</i> L.	Altamisa	Flu (31), kidney infection (3), asthma (16) liver ailments (1), choleric (1), antibacterial (5), increase immune system (2), inflammation (1), expectorant (2), gastritis (1)	63	0.095
32	<i>Bidens alba</i> var. <i>radiata</i> (Sch.Bip.) R.E. Ballard	Romerillo	Diabetes (10), sore throat (4), inflammation (21), flu (1) bruises (2), tumors (26), blood pleasure (1), fever (1)	66	0.099
			Carminative (4), hoarseness (1), gastritis		



33	<i>Calendula officinalis</i> L.	Caléndula	(4)	9	0.014
34	<i>Chromolaena odorata</i> (L.) R. M. King & H. Rob.	Rompezaragüey	Inflammation (7)	7	0.011
35	<i>Critonia aromatisans</i> (DC.) R.M. King & H. Rob.	Trévol	Fever (1)	1	0.002
36	<i>Helianthus annuus</i> L.	Girasol	Diarrhea (3)	3	0.005
37	<i>Koanophyllon villosum</i> subsp. <i>villosum</i>	Tribulillo	Fungus (3), antiseptic (1), healing (5), anti-dandruff (1), blood purifier (1), spots skin (1), digestive disorders (27), diarrhea (2), nerves (2), vaginal infections (2)	45	0.068
38	<i>Matricaria chamomilla</i> L.	Manzanilla alemana, Manzanilla dulce, Camomila	Scabies (1), healing (3), stomachache (3)	7	0.011
39	<i>Melanthera nivea</i> (L.) Small	Cabecita de muerto	Toothache (3)	3	0.005
40	<i>Mikania</i> sp.	Bejuco de guaco	Flu (4), tumors (5), waist pain (1)	10	0.015
41	<i>Parthenium hysterophorus</i> L.	Escoba amarga	Skin disease (1)	1	0.002
42	<i>Pluchea carolinensis</i> (Jacq.) D. Don	Salvia	Flu (3), muscle contractions (1), carminative (8), headache (2), cough (3), cholesterol (2), diarrhea (3), healing (1)	23	0.035
43	<i>Taraxacum officinale</i> (L.) Weber ex F.H. Wigg.	Diente de león	Liver inflammation (1), mouth ulcer (1), kidney inflammation (1)	3	0.005
44	<i>Xanthium strumarium</i> L.	Guisazo de baracoa	Kidney stones (18), flu (20), kidney infection (7)	45	0.068
	<b>BIGNONIACEAE</b>				
45	<i>Crescentia cujete</i> L.	Güira	Flu (8), abortive (6), fertility (7), earache (9), bumps (4), inflammation (7) anti-dandruff (7) asthma (4), healing (1)	53	0.080
	<b>BIXACEAE</b>				
46	<i>Bixa orellana</i> L.	Bija	Diabetes (1)	1	0.002
	<b>BORAGINACEAE</b>				
47	<i>Cordia collococca</i> L.	Ateje	Blood pressure (3)	3	0.005
48	<i>Heliotropium indicum</i> L.	Tapón	Diarrhea (9)	9	0.014
			Kidney infection (6),		

49	<i>Tournefortia hirsutissima</i> L.	Cayaya	diarrhea (7)	13	0.020
50	<i>Varronia bullata</i> subsp. <i>humilis</i> (Jacq.) Feuillet	Poleo	Flu (1)	1	0.002
	<b>BRASSICACEAE</b>				
51	<i>Lepidium virginicum</i> L.	Mastuerzo	Kidney infection (9), muscle contractions (1), carminative (38), muscle fiber relaxing (1), dysentery (1), digestive disorders (10), inflammation (3)	63	0.095
52	<i>Nasturtium officinale</i> R. Br.	Berro	Flu (5), anemia (2), skin disease (4), kidney infection (3).	14	0.021
53	<i>Raphanus sativus</i> L.	Rábano	Lung disorders (4)	4	0.006
	<b>BROMELIACEAE</b>				
54	<i>Bromelia pinguin</i> L.	Piña ratón o maya	Sore throat (2), dysentery (1), kidney stones (6)	9	0.014
	<b>BURSERACEAE</b>				
55	<i>Bursera graveolens</i> (Kunth) Triana & Planch.	Sasafrás	Rheum (1), inflammation (3), flu (12), digestive disorders (18), Diarrhea (4)	38	0.057
56	<i>Bursera simaruba</i> (L.) Sarg.	Almácigo	Flu (6), asthma (4), diarrhea (7), lung disorders (2), bronchial disorders (2)	20	0.030
57	<i>Protium cubense</i> (Rose) Urb.	Copal	Remove spines (2), flu (56), expectorant (1), digestive disorders (12)	71	0.107
	<b>CACTACEAE</b>				
58	<i>Opuntia ficus-indica</i> (L.) Mill.	Tuna	Hemorrhoids (1)	1	0.002
	<b>CANNACEAE</b>				
59	<i>Canna coccinea</i> Mill.	Platanillo	Kidney infection (2), carminative (11)	13	0.020
	<b>CARICACEAE</b>				
60	<i>Carica papaya</i> L.	Fruta bomba	Kidney infection (24), sciatica (1), spots skin (22), asthma (8), inflammation (12), digestive disorders (1), antioxidant (11), blood pleasure (6)	85	0.128
	<b>CELASTRACEAE</b>				
61	<i>Hippocratea volubilis</i> L.	Bejuco de vieja	Kidney infection (2)	2	0.003
	<b>CLUSIACEAE</b>				

62	<i>Garcinia aristata</i> (Griseb.) Borhidi	Manajú	Asthma (2), kidney stones (1), bronchial disorders (17), healing (11), flu (8), cancer (2), remove spines (3)	44	0.066
	<b>COMBRETACEAE</b>				
63	<i>Terminalia catappa</i> L.	Almendra	Blood pleasure (9), hemorrhoids (10), blood circulation (5), diabetes (1)	25	0.038
	<b>COMMELINACEAE</b>				
64	<i>Tradescantia spathacea</i> Sw.	Cordobán	Kidney infection (3), menstrual pain (5), blood circulation (3), menstrual disorders(14), throat infections (1), flu (5), inflammation (1)	32	0.048
	<b>CONVOLVULACEAE</b>				
65	<i>Ipomoea batatas</i> (L.) Lam.	Boniato	Increase breast milk (2)	2	0.003
66	<i>Turbina corymbosa</i> (L.) Raf.	Campanilla	Vaginal parasites (1)	1	0.002
	<b>COSTACEAE</b>				
67	<i>Cheilocostus speciosus</i> (J.Koenig) C.D.Specht	Caña mexicana	Kidney infection (14), kidney stones (4), digestive disorders (2).	20	0.030
	<b>CRASSULACEAE</b>				
68	<i>Kalanchoe pinnata</i> (Lam.) Pers.	Flor de oído	Otitis (6)	6	0.009
	<b>CUCURBITACEAE</b>				
69	<i>Cucurbita moschata</i> Duchesne	Calabaza	Earache (14) blood pleasure (2), dysentery (21), urinary incontinence (1), kidney infection (1)	39	0.059
70	<i>Momordica charantia</i> L.	Cundeamor, pimpinillo	Abortive (3), dysentery (15), parasites in liver and vesicle (1), vesicle disorders (1), blood pleasure (1), digestive disorders (2), flu (3)	26	0.039
	<b>CYPERACEAE</b>				
71	<i>Scleria lithosperma</i> L. Sw.	Basarillo	Healing (8), digestive disorders (4), kidney infection (7)	19	0.029
	<b>ERYTHROXYLACEAE</b>				
72	<i>Erythroxylum havanense</i> Jacq.var. <i>havanense</i>	Jibá	Kidney infection (1)	1	0.002
	<b>EUPHORBIACEAE</b>				
			Prostate inflammation		

73	<i>Cnidoscolus aconitifolius</i> subsp. <i>aconitifolius</i>	Chaya	(10), prostate ailments (4) diabetes (3), dysentery (1), diarrhea (2), kidney infection (3)	23	0.035
74	<i>Euphorbia tithymaloides</i> subsp. <i>tithymaloides</i>	Itamo real	Abortive (6), throat infection (1)	7	0.011
75	<i>Jatropha curcas</i> L.	Piñón botija	Dyspeptic upsets (1), skin disease (1), flu (1), inflammation (4)	7	0.011
76	<i>Jatropha gossypifolia</i> L.	Tuatúa	Kidney infection (1), depurative (1), antioxidant (4), inflammation (3), blood circulation (2), constipation (5), flu (6)	22	0.033
77	<i>Jatropha multifida</i> L.	Árnica o coral	Inflammation (9), arthrosis (6), kidney infection (6), kidney stones(1), diarrhea (3), bone pain (25)	27	0.041
78	<i>Platygyne hexandra</i> (Jacq.) Müll. Arg.	Pringamosa	Kidney stones (10)	10	0.015
79	<i>Ricinus communis</i> L.	Higuereta	Inflammation (1), tumors (1) toothache (1), cough (1)	4	0.006
	<b>FABACEAE</b>				
80	<i>Arachis hypogaea</i> L.	Maní	Anemia (4), antioxidant (4)	8	0.012
81	<i>Bauhinia divaricata</i> L. var. <i>divaricata</i>	Pata de vaca	Diabetes (1)	1	0.002
82	<i>Caesalpinia echinata</i> Lam.	Palo de Brasil	Kidney infection (44)	44	0.066
83	<i>Cajanus cajan</i> (L.) Huth	Frijol guandul	Dysentery (1)	1	0.002
84	<i>Cassia acutifolia</i> Delile	Sen	Inflammation (2), abortive (9)	11	0.017
85	<i>Cassia fistula</i> L.	Caña fítula	Anemia (7)	7	0.011
86	<i>Cassia grandis</i> L. f.	Cañandonga	Skin disease (3), anemia (5)	8	0.012
87	<i>Desmodium incanum</i> DC.	Amor seco	Inflammation (9)	9	0.014
88	<i>Dichrostachys cinerea</i> subsp. <i>africana</i> Brenan & Brummitt	Marabú	Diabetes (3)	3	0.005
89	<i>Gliricidia sepium</i> (Jacq.) Walp.	Júpito	Kidney infection (8)	8	0.012
90	<i>Indigofera suffruticosa</i> Mill	Añil cimarrón	Pediculicidal (3), scabies (2)	5	0.008
91	<i>Mimosa pudica</i> var. <i>pudica</i>	Moriviví	Toothache (1), nerves (4)	5	0.008
92	<i>Mucuna urens</i> (L.) Medik.	Ojo de buey	Hemorrhoids (5)	5	0.008
		Frijol			

93	<i>Phaseolus lunatus</i> L.	caballero	Face pain (1)	1	0.002
94	<i>Pithecellobium unguis-cati</i> (L.) Benth.	Uña de gato	Inflammation (7), prostate (7), kidney infection (12), antioxidant (7), antitumoral (7)	40	0.060
95	<i>Sena alata</i> (L.) Roxb.	Palo santo	Healing (2)	2	0.003
96	<i>Senna obtusifolia</i> (L.) H. S. Irwin & Barneby	Guanina	Appetite stimulant (1)	1	0.002
97	<i>Tamarindus indica</i> L.	Tamarido	Flu (1), urinary sepsis (1), asthma (9), liver ailments (5), laxative (1), hepatitis (9), dysentery (13), fatty liver (1)	40	0.060
	<b>HAEMODORACEAE</b>				
98	<i>Xiphidium caeruleum</i> Aubl.	Mano ponderosa	Kidney infection (22)	22	0.033
	<b>LAMIACEAE</b>				
99	<i>Hyptis pectinata</i> (L.) Poit.	Sandobal	Headache (2)	2	0.003
100	<i>Mentha spicata</i> L.	Yerba Buena	Digestive disorders (23), dysentery (4), nerves (4)	31	0.047
101	<i>Mentha x piperita</i> var. <i>citrata</i> (Ehrh) Briq.	Toronjil	Heart (14)	14	0.021
102	<i>Ocimum basilicum</i> L.	Albahaca blanca	Diabetes (10), nerves (2), gastritis (5), digestive disorders (32), blood pleasure (14), diarrhea (2), cough (2), inflammation (2)	69	0.104
103	<i>Ocimum tenuiflorum</i> L.	Albahaca morada	Diabetes (2), blood pleasure (9), carminative (9), nerves (9), conjunctivitis (7)	38	0.057
104	<i>Origanum majorana</i> L.	Mejorana	Flu (7), digestive disorders (6)	13	0.020
105	<i>Origanum vulgare</i> L.	Orégano	Flu (2), nerves (1)	3	0.005
106	<i>Plectranthus amboinicus</i> (Lour.) Spreng	Orégano	Flu (11), asthma (9), cough (33), expectorant (2)	74	0.111
107	<i>Plectranthus hadiensis</i> (Forssk.) Schweinf. ex Sprenger	Meprobamat o/Menta	Nerves (12), blood pleasure (2)	14	0.021
108	<i>Rosmarinus officinalis</i> L.	Romero	Hair loss (4)	4	0.006
109	<i>Salvia officinalis</i> L.	Salvia del país	Flu (3), throat infection (3), inflammation (3), cough (4), prostate ailments (3), expectorant (6), headache (16), hoarseness (13)	51	0.077

110	<i>Teucrium cubense</i> Jacq.	Agrimonia	Giardia (1), dysentery (2), digestive disorders (7)	10	0.015
111	<i>Vitex agnus-castus</i> L.	Vencedor	Cough (21), flu (9), lung disorders (6), digestive disorders (1), earache (3)	40	0.060
	<b>LAURACEAE</b>				
112	<i>Cinnamomum verum</i> J. Presl	Canela	Blood circulation (3)	3	0.005
113	<i>Persea americana</i> Mill	Aguacate	Blood circulation (3), inflammation (2) rheum (1) dysentery (5), arterial hypertension (16)	27	0.041
	<b>LILIACEAE</b>				
114	<i>Lilium candidum</i> L.	Azuzena	Earache (4)	4	0.006
	<b>LYTHRACEAE</b>				
115	<i>Lagerstroemia indica</i> L.	Júpite	Blood circulation (1), cough (5)	6	0.009
116	<i>Lawsonia inermis</i> L.	Resedá	Nerves (18), inflammation (8)	26	0.039
117	<i>Punica granatum</i> L.	Granada	Diarrhea (5), digestive disorders (2)	7	0.011
	<b>MALVACEAE</b>				
118	<i>Abelmoschus esculentus</i> (L) Moench	Quimbombó	Atherosclerosis (4)	4	0.006
119	<i>Gossypium barbadense</i> var. <i>barbadense</i>	Algodón	Flu (18), bronchial disorders (8), asthma (4)	30	0.045
120	<i>Guazuma ulmifolia</i> Lam	Guásima	Flu (3), hair loss (5), diarrhea (1), inflammation (3), throat infection (1), skin eruptions (1)	14	0.021
121	<i>Hibiscus elatus</i> Sw.	Majagua	Flu (1), hair loss (2), earache (1), asthma (3), antiseptic (1)	8	0.012
122	<i>Hibiscus rosa-sinensis</i> L.	Mar pacífico	Flu (7), diabetes (1), Cough (13)	21	0.032
	<b>MELIACEAE</b>				
123	<i>Azadirachta indica</i> A. Juss.	Nin	Kidney infection (1), halitosis (1), skin disease (1)	3	0.005
124	<i>Guarea guidonia</i> (L.) Sleumer	Yamagua	Hemorrhages (6)	6	0.009
125	<i>Melia azedarach</i> L.	Pulciana	Scabies (3), pediculicidal (7)	10	0.015
126	<i>Melia</i> sp.	Lila	Allergies (6)	6	0.009
	<b>MORACEAE</b>				
127	<i>Artocarpus altilis</i> (Parkinson ex F.A.Zorn) Fosberg	Guapén	Blood pressure (10)	10	0.015
128	<i>Ficus religiosa</i> L.	Álamo	Spiritual baths (1)	1	0.002

	<b>MORINGACEAE</b>				
129	<i>Moringa oleifera</i> Lam	Moringa	Prostate (1), blood pleasure (4), diabetes (22), nerves (3), weight loss (1), increase immune system (12), Otitis (4), cholesterol (2), dysentery (1), arthrosis (1)	51	0.077
	<b>MUSACEAE</b>				
130	<i>Musa x paradisiaca</i> L.	Plátano	Bronchial disorders (17), asthma (6), anemia (22), cancer (4), astringent (1), antioxidant (11)	61	0.092
	<b>MYRICACEAE</b>				
131	<i>Myrica cerifera</i> L.	Arraigán	Feet cracks (1)	1	0.002
	<b>MYRISTICACEAE</b>				
132	<i>Myristica fragrans</i> Houtt.	Nuez moscada	Dyspeptic upsets (1)	1	0.002
	<b>MYRTACEAE</b>				
133	<i>Corymbia citriodora</i> (Hook.)K.D. Hill & L.A.S. Johnson	Eucalipto	Expectorant (2), inflammation (1), antiseptic (1), asthma (3), flu (3)	10	0.015
134	<i>Psidium guajava</i> L.	Guayaba	Diarrhea (12), fungus (2), diabetes (1)	15	0.023
	<b>NYCTAGINACEAE</b>				
135	<i>Boerhavia scandens</i> L.	Tostón	Kidney infection (2)	2	0.003
136	<i>Boldoa purpurascens</i> Cav. ex Lag.	Nitro	Kidney stones(15)	15	0.023
137	<i>Mirabilis jalapa</i> L.	Maravilla	Vasodilators (2), monilias (1), inflammation (3), conjunctivitis (8) antibacterial (3), fungus (1), kidney stones (2), prostate (4)	24	0.036
	<b>PAPAVERACEAE</b>				
138	<i>Argemone mexicana</i> L.	Cardosanto	Anemia (4), kidney infection (4), varicella (2), weight loss (2)	12	0.018
	<b>PASSIFLORACEAE</b>				
139	<i>Passiflora edulis</i> Sims	Maracullá	Flu (2)	2	0.003
140	<i>Passiflora rubra</i> L.	Pasionaria de cerca	Nerves (3)	3	0.005
141	<i>Turnera ulmifolia</i> L.	Marilope	Nerves (9), kidney infection (8), dyspeptic upsets (2), menstrual pain (1), diarrhea (4)	24	0.036
	<b>PHYLLANTHACEAE</b>				

142	<i>Phyllanthus amarus</i> Schumach. & Thonn.	Huevo de toro, lo tengo abajo	Diabetes (8), diuretic (5), stonebreaker (6)	19	0.029
	<b>PHYTOLACCACEAE</b>				
143	<i>Petiveria alliacea</i> L.	Anamú	Inflammation (15), fever (19), cancer (5), syphilis (2), hepatic cirrhosis (1), cervicitis (5), kidney infection (3), arthrosis (2), cysts (3)	55	0.083
	<b>PIPERACEAE</b>				
144	<i>Peperomia pellucida</i> (L.) Kunth	Corazón de hombre	Kidney infection (12), heart (4)	16	0.024
145	<i>Piper amalago</i> L.	Mataguao	Allergies (13)	13	0.020
146	<i>Piper auritum</i> Kunth	Anisón	Kidney infection (2), carminative (6), increase breast milk (5), inflammation (2), digestive disorders (4)	19	0.029
	<b>PLANTAGINACEAE</b>				
147	<i>Plantago major</i> L.	Llantén	Cough (4), sore throat (10), throat infections (91), inflammation (20), skin eruptions (1)	126	0.189
	<b>POACEAE</b>				
148	<i>Bambusa vulgaris</i> Schrad.	Cañambú	Kidney infection (5), stone delivery (5)	10	0.015
149	<i>Cymbopogon citratus</i> (DC.) Stapf	Caña santa	Blood pleasure (9), carminative (2), antibacterial (9), fever (53), diuretic (3), kidney stones (5), flu (6), inflammation (1), nerves (3)	91	0.137
150	<i>Eleusine indica</i> (L.) Gaertn.	Pata de Gallina	Kidney infection (1)	1	0.002
151	<i>Eragrostis uniolooides</i> (Retz.) Nees ex Steud.	Lloviznita	Kidney infection (2), sore throat (12)	14	0.021
152	<i>Urochloa mutica</i> (Forssk.) T.Q. Nguyen	Paraná	Dysentery (16)	16	0.024
153	<i>Paspalum conjugatum</i> P.J. Bergius	Cañamaso	Kidney infection (1)	1	0.002
154	<i>Zea mays</i> L.	Maíz	Diuretic (7)	7	0.011
	<b>POLYGONACEAE</b>				
155	<i>Coccoloba uvifera</i> (L.) L.	Uva caleta	Hair loss (1)	1	0.002
	<b>POLYPODIACEAE</b>				
			Liver ailments (12),		



156	<i>Polypodium polypodioides</i> var. <i>polypodioides</i>	Doradilla	gastrointestinal disorders (11), dysentery (7)	30	0.045
	<b>PORTULACACEAE</b>				
157	<i>Portulaca oleracea</i> L.	Verdolaga	Kidney infection (3), antioxidant (5), inflammation (2), digestive disorders (1)	11	0.017
158	<i>Talinum fruticosum</i> (L.) Juss.	Espinaca	Anemia (9)	9	0.014
	<b>RHAMNACEAE</b>				
159	<i>Colubrina elliptica</i> (Sw.) Brizicky & W.L.Stern	Bijagua	Allergies (4)	4	0.006
	<b>RHIZOPHORACEAE</b>				
160	<i>Rhizophora mangle</i> L.	Mangle rojo	Anti-acid (1), ulcers (1), cancer (7), kidney infection (6)	15	0.023
	<b>RUBIACEAE</b>				
161	<i>Chiococca alba</i> (L.) Hitchc.	Bejuco de verraco	Kidney infection (2), prostate (3)	5	0.008
162	<i>Coffea arabica</i> L.	Café	Hair loss (2)	2	0.003
163	<i>Morinda citrifolia</i> L.	Noni	Kidney infection (6), blood pleasure (5)	11	0.017
	<b>RUTACEAE</b>				
164	<i>Citrus aurantiifolia</i> (Christm.) Swingle	Limón	Flu (6), throat affections (9), fungus (2), stimulant and energetic (2), blood pleasure (30), kidney infection (2), nerves (5)	56	0.084
165	<i>Citrus reticulata</i> Blanco	Mandarina	Flu (4), cough (7)	11	0.017
166	<i>Citrus sinensis</i> (L.) Osbeck	Naranja dulce	Dysentery (1)	1	0.002
167	<i>Citrus x aurantium</i> L.	Naranja agria	Blood circulation (2), hair loss (2), calcaneal spur (1), flu (3), anti-dandruff (2), blood pleasure (4), nerves (38)	52	0.078
168	<i>Citrus x paradisi</i> Macfad.	Toronja	Blood pleasure (4)	4	0.006
169	<i>Plethadenia cubensis</i> Urb.	Ruda	Steric (2), Staphylococcus in the ears (2), dysentery (3), nerves (1), blood circulation (3), abortive (5), ulcers (5), digestive disorders (16)	37	0.056
170	<i>Zanthoxylum martinicense</i> (Lam.) DC.	Ayúa	Dentition (1)	1	0.002
	<b>SAPINDACEAE</b>				
171	<i>Allophylus cominia</i> (L.) Sw. var. <i>cominia</i>	Palo de caja	Kidney infection (1)	1	0.002

172	<i>Melicoccus bijugatus</i> Jacq.	Anoncillo	Diarrhea (6)	6	0.003
	<b>SAPOTACEAE</b>				
173	<i>Pouteria sapota</i> (Jacq.) H.E. Moore & Stearn	Mamey	Scabies (2)	2	0.003
174	<i>Manilkara zapota</i> (L.) P. Royen	Níspero	Inflammation (4)	4	0.006
	<b>SCROPHULARIACEAE</b>				
175	<i>Capraria biflora</i> L.	Magüiro	Gynecological disorders (11)	11	0.017
	<b>SOLANACEAE</b>				
176	<i>Capsicum annuum</i> L.	Pimiento	Kidney infection (1)	1	0.002
177	<i>Capsicum annuum</i> var. <i>frutescens</i> (L.) Kuntze	Ají guagüao	Hemorrhoids (10)	10	0.015
178	<i>Physalis angulata</i> L.	Huevo de gato	Kidney infection (1)	1	0.002
179	<i>Solanum americanum</i> Mill.	Yerba mora	Inflammation (25), sore throat (1), ulcers (18), tumors (11), conjunctivitis (1), healing (19), diabetes (3), digestive disorders (12), blood pressure (2), gastritis (26)	118	0.177
180	<i>Solanum lycopersicum</i> L.	Tomate	Flu (1), asthma (5), antioxidant (2), inflammation (1)	9	0.014
181	<i>Solanum melongena</i> L.	Berenjena	Cholesterol (3), weight loss (1), fatty liver (1)	5	0.008
182	<i>Solanum torvum</i> Sw.	Pendejera blanca	Flu (1), inflammation (5), allergies (2), spots skin (1), asthma (15), fever (2)	26	0.039
	<b>URTICACEAE</b>				
183	<i>Cecropia schreberiana</i> subsp. <i>antillarum</i> (Snehl.) C.C.Berg & P.Franco	Yagruma	Expectorant (1), kidney infection (6), asthma (5), throat infection (3)	15	0.023
	<b>VERBENACEAE</b>				
184	<i>Lantana trifolia</i> L.	Doña nica	Menstrual pain (3)	3	0.005
185	<i>Lippia alba</i> (Mill.) N.E. Br. ex Britton & P. Wilson	Menta	Dyspeptic upsets (27), stomachache (8), carminative (4), digestive disorders (115), diarrhea (3)	157	0.236
186	<i>Phyla nodiflora</i> (L.) Greene	Sanguinaria	Allergies (5)	5	0.008
187	<i>Phyla scaberrima</i> (Juss. ex Pers.) Moldenke	Oruzuz	Flu (1)	1	0.002
188	<i>Phyla strigulosa</i> (M. Martens & Galeotti) Moldenke	Yerba de sapo	Kidney infection (7), tumors (1), healing (7), diarrhea (7)	22	0.033

189	<i>Stachytarpheta jamaicensis</i> (L.) Vahl	Verbena	Hepatitis (5), kidney infection (4), depurative (1), blood circulation (1), skin rash (6)	17	0.026
190	<i>Verbena officinalis</i> L.	Verbena	Inflammation (2), kidney infection (3), diabetes (1), digestive disorders (1), blood circulation (1), skin disease (16), scabies (1), cough (11), liver fatty (2), acne (1), flu (5)	44	0.066
	<b>VITACEAE</b>		VITACEAE		
191	<i>Cissus verticillata</i> subsp. <i>verticillata</i>	Bejuco ubí	Flu (25)	25	0.038
192	<i>Vitis vinifera</i> L.	Uva	Hair loss(2), healing (2)	4	0.006
	<b>XANTHORRHOACEAE</b>				
193	<i>Aloe vera</i> (L.) Burm. f.	Sábila	Acne (2), hemorrhoids (25) bronchial disorders (4), liver ailments (3), Kidney infection (1), inflammation (7), Culebrina's pain (1), gastritis (26), digestive disorders (3), giardia (4), healing (12), dysentery (1)	89	0.134
	<b>ZINGIBERACEAE</b>				
194	<i>Zingiber officinale</i> Roscoe	Jengibre	Bone pain (2), fungus (2), rheum (3), prostate (1), anemia (1), arthritis (2)	11	0.017
	<b>ZYGOPHYLLACEAE</b>		ZYGOPHYLLACEAE		
195	<i>Guaiacum officinale</i> L.	Guayacán	Rheum (1)	1	0.002

## RESULT AND DISCUSSION

### Demographic data

A total of 223 men (33%) and 443 women (67%) were interviewed through face-to-face interviews. The informants were divided into three age groups (1) < 30, (2) 31–60 and (3) > 61 years old. Most of the informants belonged to age between 30 and 60 years with 278 informants.

### Use of medicinal plants

In the study, 195 medicinal plants species belonging to 70 families and distributed in 166 genera were documented. Those medicinal plants were used in the treatment of 152 ailments grouped into 17 categories.

That information as well as the family, scientific and local name, the used parts, the ailment to treat, the method of preparation, the mode of administration and the use value of those medical plants are summarized in Table N° 1A & 1B. *Fabaceae* was the family with the greatest number (18) of medicinal plants, followed by *Asteraceae* (15) and *Lamiaceae* (13). These results are in general agreement with previous investigations in Camagüey and Holguín regions (Beyra et al., 2004; Riverón et al., 2015). In addition, the families *Asteraceae*, *Poaceae*, and *Fabaceae* are also represented by more genera within the Cuban flora (Acevedo, 1991). *Euphorbiaceae*, *Rutaceae* and *Verbenaceae* were represented each

one by seven species. The principal diseases that are treated using the plants include gastro-intestinal and liver problems with 967 citations, respiratory systems diseases with 845 citations and pathologies of the urinary system with 470 citations.

### Used parts

The part of the plant used with most frequently (Figure N° 2) were leaves (1632 citations) followed by aerial part (807 citations), fruits (337 citations), whole plant (293 citations) root (261 citations) and flower (215 citations).

Figure N° 2 Plant parts used for medicinal preparations in the communities of Holguín, Cuba (January to June 2016).

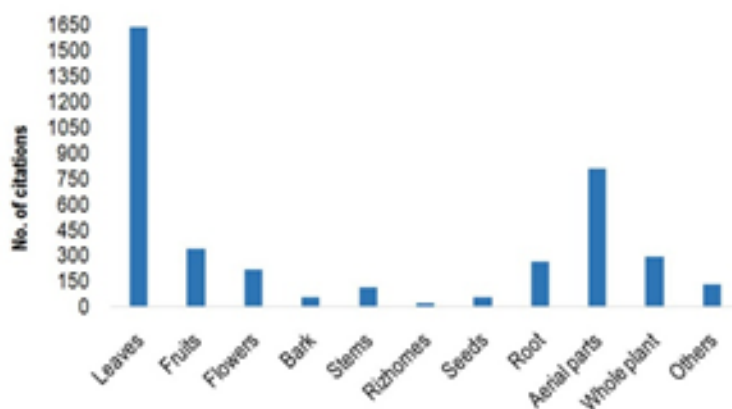
In the study area there are no previous reports, however in others regions of Cuba, the leaves are the part of the plant used with higher frequency (Barreras, 1989; Ochoa, 2002; Beyra *et al.*, 2004; Pérez *et al.*, 2009; Pérez *et al.*, 2011). These results are in accordance with those found in studies conducted in other parts of the world (Pérez, 2002; Gil *et al.*, 2003; Gómez, 2011; Lastre *et al.*, 2015; Vijayakumar *et al.*, 2016; Palheta *et al.*, 2017). The high use rates of leaves to make herbal medicine preparations could be attributed to the easy in which they can be obtained from the plant, allowing to being collected in larger quantities when compared with other plant parts. Leaves are the main photosynthetic organ, as a result, various biogenetic pathways take place to produce secondary metabolites which contribute toward its medicinal value (Ghorbani, 2005). Besides, collection and the

mode of preparation of medicine from leaves is much easier than other parts of the plant (Giday *et al.*, 2009).

### Mode of Preparations and Application

Plant parts were grouped into six categories for preparation and utilization. The most common preparations (Figure N° 3) were decoction (56.37%) and infusion (22.65%).

The results of this study, compared to the findings of other studies carried out in other regions of Cuba show that both modes of preparations are the most commonly used by population (Beyra *et al.*, 2004; Pérez *et al.*, 2009; Pérez *et al.*, 2011). Decoction and infusion as preparation methods for herbal medicines are very simple, economic, and quickly. Boiling is effective in extracting plant materials and at the same time preserves the herbal remedies for a longer period compared to cold extraction. The most frequently used mode of remedy administration is oral ingestion (85.05%), followed by topical (13.65%), rectal (0.64%), inhalation (0.33%) and others (0.33%) (Figure N° 4). Today, most of the medicines are given orally, being in agreement with other studies. The oral route is the most comfortable for the administration and the most widely used by the population. On the other hand, topical route is still an important way of remedy administration to treat diseases like skin disorders, wounds, poison bites, rheumatism, body pain and burns (Morvin-Yabesh *et al.*, 2014).



**Figure N° 2**  
Plant parts used for medicinal preparations.

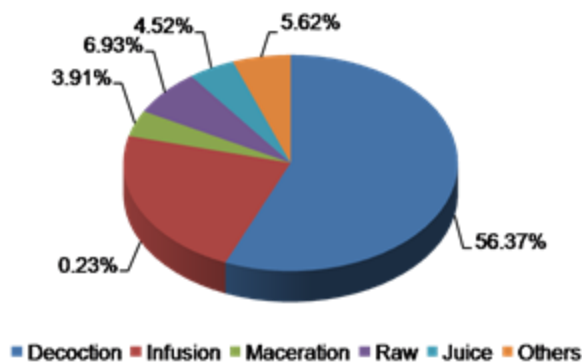


Figure N° 3

Preparation mode of medicinal preparations plants informed by the people in the communities of Holguín, Cuba (January to June 2016)

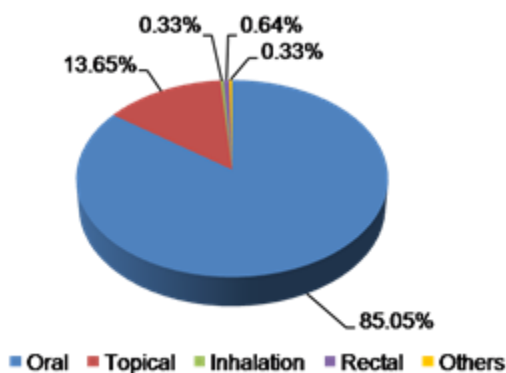


Figure N° 4

Routes of administration of medicinal preparations plants informed by the people in the communities of Holguín, Cuba (January to June 2016)

### Quantitative Analysis

#### Use value

The most commonly used species was *Lippia alba* (Mill.) N.E. Br. ex Britton & P. Wilson with 157 use reports by 666 informants, giving the highest use value of 0.236. It was followed by *Annona muricata* L. (0.194) with 129 use reports, *Plantago major* L. (0.189) with 126, *Solanum americanum* Mill. (0.177) with 118 and *Cymbopogon citratus* (DC.) Stapf (0.137) with 91 (Table N° 1A & 1B). High use value of *Lippia alba* (Mill.) N.E. Br. ex Britton & P. Wilson can be attributed to its frequent use in the treatment of various digestive disorders with high use reports and number of informants showing that it is well accustomed by Cuban people as an ethno-

digestive medicinal plant. Studies by Beyra *et al.* (2004) reported the use of this specie for the treatment of stomachache and other digestive ailments in five communities in Camagüey Region. In addition, this specie has common folk uses in tropical and middle America and in the Caribbean. Numerous reports support the use of *L. alba* (Mill.) N.E. Br. ex Britton & P. Wilson against digestive ailments. In Itacaré, Brazil, it is used against stomachache and digestive troubles with high concordance between informants (76.50%) (Pinto *et al.*, 2006). In San Isidro, in the municipality of San José de Pare-Boyacá, Colombia, *L. alba* (Mill.) N.E. Br. ex Britton & P. Wilson is used as a painkiller, against digestive troubles, diarrhea, stomach pain, flu and cough. It is one of the ten species with the

highest level of significant use (Toscano-González, 2006). In the Afro-Caribbean community of Livingston (Guatemala), the leaves of *Lippia alba* are used in various forms against flatulence (infusion as a beverage), nausea and vomiting (the plant is smoked). In a Mixe community, in Mexico, the leaves of *L. alba* (Mill.) N.E. Br. ex Britton & P. Wilson were frequently cited by traditional healers as active against gastrointestinal troubles (Hennebelle et al., 2008). Other important plant with high use value was *Annona muricata* L. (0.194) with high concordance between informants for the treatment of cancer (21 citations), arterial hypertension (29 citations) and flu (24 citations). Cano & Volpato (2004), reported the use of this species as hypotensive and to alleviate the flu in Santiago de Cuba and Guantánamo (Eastern Cuba). On the other hand, in South America and tropical Africa, including Nigeria, leaves of *A. muricata* L. are deployed as an ethnomedicine against tumors and cancer. In addition, smooth muscle relaxant, hypotensive and antispasmodic effects are also attributed to the leaves, barks and roots of *A. muricata* L. (Moghadamtousi et al., 2015).

*Plantago major* L. is frequently used for throat infections (91) with a fidelity level of 72.22%. In Cuba, Roig reports the use of the leaves decoction for catarrhal anginas (Roig, 1974) while Beyra et al. reports the blend of leaves juice with honey for the tonsils inflammation (Beyra et al., 2004). Ethnopharmacological studies show that *P. major* L. is worldwide used in the treatment of skin diseases, infectious diseases, digestive and respiratory disorders, as well as the healing of tumors, pain and fever. (Samuelsen, 2000).

A total of 27 plants were reported by only one informant with a UV of 0.002: *Nerium oleander* L., *Ficus religiosa* L., *Myrica cerifera* L., *Zanthoxylum martinicense* (Lam.) DC., *Bixa orellana* L., *Zephyranthes atamasco* (L.), *Turbina corymbosa* (L.) Raf., *Paspalum conjugatum* P.J. Bergius, *Parthenium hysterophorus* L., *Phaseolus lunatus* L., *Cajanus cajan* (L.) Huth, *Helianthus annuus* L., *Senna*

*obtusifolia* (L.) H. S. Irwin & Barneby, *Guaiacum officinale* L., *Physalis angulata* L., *Erythroxylum havanense* Jacq. var. *havanense*, *Citrus sinensis* (L.) Osbeck, *Myristica fragrans* Houtt., *Phyla scaberrima* (Juss. ex Pers.) Moldenke, *Eleusine indica* (L.) Gaertn., *Bauhinia divaricata* L. var. *divaricata*, *Allophylus cominia* (L.) Sw. var. *cominia*, *Capsicum annum* L., *Varronia bullata* subsp. *humilis* (Jacq.) Feuillet. *Beta vulgaris* var. *vulgaris*, *Opuntia ficus-indica* (L.) Mill. and *Coccoloba uvifera* (L.) L. These species are not usually used by Cuban people for the treatment of different ailments and they are not deep-rooted in ethnobotanical knowledge of the region.

The endemism of vascular medicinal plants in Cuba reaches 97 species (7.8%) which are grouped into 71 genera from 40 families. Only one percent of medicinal plants cited (195) is endemic, which shows that most of the endemic species have a restricted distribution, sometimes punctual with very low popular knowledge. *Protium cubense* (Rose) (71 citations) and *Plethadenia cubensis* Urb. (37 citations) were the endemic medicinal species most cited by the population of the communities under study. The species *Protium cubense* (Rose) has been widely cited for cold and as an expectorant (Beyra et al., 2004; Cano & Volpato, 2004; Riverón et al., 2015). However, this study constitutes its first report for digestive problems. *Plethadenia cubensis* Urb. was mainly reported for digestive disorders, ulcers, abortive, circulatory problems and dysentery; constituting the first reports for the treatment of these affections in the Eastern region of Cuba. These results are of great value for the genus *Plethadenia* since this is a rare species that is distributed only in the provinces of Santiago de Cuba, Guantánamo and Holguín. (Beurton, 2000; Acevedo & Strong, 2012).

#### **Fidelity level**

From the available information fidelity level of each of the species was calculated for each category. The categories with the major agreements were analyzed to highlight the most important plants (Table N° 2).

Table N° 2

Fidelity level (FL) values for common medicinal plants used by local traditional healers by ailment category, Holguín, Cuba (January to June 2016)

Ailment categories	Most preferred species with specific ailment	FL (%)
Circulatory system/cardiovascular diseases	<i>Artocarpus altilis</i> (Parkinson ex F.A.Zorn) Fosberg (Arterial hypertension)	100
	<i>Mentha x piperita</i> var. <i>citrata</i> (Ehrh) Briq. (Heart strength)	100
	<i>Protium cubense</i> (Rose) Urb. (Flu)	78.87
Respiratory systems disease	<i>Plantago major</i> L. (Throat infections)	72.22
	<i>Origanum vulgare</i> L. (Cough)	56.76
	<i>Lippia alba</i> (Mill.) N.E. Br. ex Britton & P. Wilson (Digestive problems)	73.25
Gastro-intestinal ailments and liver problem	<i>Lepidium virginicum</i> L.(Carminative)	61.70
	<i>Chenopodium ambrosioides</i> L. (Worms)	60.32
Pathologies of the urinary system	<i>Caesalpinia echinata</i> Lam. (Kidney infection).	100
Dermatologica infections/diseases	<i>Piper amalago</i> L. (Allergies)	100
Gynecological disorders	<i>Euphorbia tithymaloides</i> subsp. <i>tithymaloides</i> (Abortive)	85.71
Neurological disorders	<i>Justicia pectoralis</i> Jacq. (Nervous disorders)	100
Skeleton-muscular system disorders	<i>Jatropha multifida</i> L. (Bone pain)	50
Endocrinal disorders	<i>Moringa oleifera</i> Lam. (Diabetes)	46.81
Cancer and tumors	<i>Calendula officinalis</i> L. (Tumors)	39.39
Microbial infections	<i>Kalanchoe pinnata</i> (Lam.) Pers. (Otitis)	100
Blood problems	<i>Talinum fruticosum</i> (L.) Juss.(Anemia)	100
Immune system	<i>Melia</i> sp. (Allergies)	100
Dental care	<i>Zanthoxylum martinicense</i> (Lam.) DC. (Dentition)	100
Pain	<i>Salvia officinalis</i> L. (Headache)	31.37
General health	<i>Cymbopogon citratus</i> (DC.) Stapf (Fever)	58.24
Others	<i>Senna obtusifolia</i> (L.) H. S. Irwin & Barneby (Appetite stimulant)	100

For this analysis the plants with less than ten use reports were not considered. Of the reported plants, 19 species had highest fidelity levels of 100 percent, most of which were used in single ailment category for multiple informants. The plants with highest FL of 100 percent were: *Capsicum annum* var. *frutescens* (L.) Kuntze, *Cissus verticillata* subsp.

*verticillata*, *Artocarpus altilis* (Parkinson ex F.A.Zorn) Fosberg, *Capraria biflora* L., *Xiphidium caeruleum* Aubl., *Piper amalago* L., *Boldoa purpurascens* Cav. ex Lag., *Caesalpinia echinata* Lam., *Urochloa mutica* (Forssk.) T.Q. Nguyen, *Asclepias curassavica* L., *Platygyne hexandra* (Jacq.) Müll. Arg., *Justicia pectoralis* (Jacq.) and *Mentha x*

*piperita* var. *citrata* (Ehrh) Briq.

High FL levels for *Justicia pectoralis* (Jacq.) and *Caesalpinia echinata* Lam. indicated their outstanding preference for treating neurological disorders and pathologies of the urinary system. For neurological disorders, *Justicia pectoralis* (Jacq.) (74 citations and 100 percent FL) is the plant widely used for the nervous disorders by Cuban population. Studies by Beyra *et al.* (2004) reveal the use of the decoction of leaves and flowers as sedative in Camaguey, Cuba. The phytochemical and pharmacological studies indicate that the central and peripheral depressor effects are probably induced by coumarins (Corrêa & Alcântara, 2012). Regarding to the pathologies of the urinary system, the *Caesalpinia echinata* Lam. (44 citations) was invariably reported for de treatment of kidney infections. In Cuba, there are not pharmacological studies to support the use of this plant in kidney infections. Nevertheless, other studies demonstrated that this species exhibit quite interesting medical properties, in particular antimicrobial, antifungal, anti-inflammatory, antinociceptive and anti-tumor (Barbosa, 2014).

#### Informant consensus factor

The reported ailments were grouped into 17 categories based on the information gathered from the interviews (Table N° 3). The ICF values were ranged from 0.33 to 0.94.

Cancer and tumors had the highest informant consensus value of 0.94, with 67 use reports for 9 plant species. High FIC value (close to 1) shows that the plants, which were used for the treatment of cancer and tumors, are presumed to be the most effective and are used by a proportion of the informants. The high ICF value (0.94) for the cancer and tumors category may be due to the fact that in recent years the pathologies of cancer have increased in Cuban population (MINSAP, 2017) and beside because convencional therapy are very aggressive.

*Petiveria alliacea* L., *Calendula officinalis* L., *Ricinus communis* L., *Crescentia cujete* L., *Roystonea regia* (Kunth) O.F. Cook., *Sambucus nigra* subsp. *canadensis* (L.) Bolli, *Solanum americanum* Mill., *Phyla strigulosa* (M. Martens & Galeotti) Moldenke and *Pithecellobium unguis-cati* (L.) Benth. were reported to be among the plant remedies indicated for this use.

The second highest value was for respiratory systems diseases (ICF: 0.93) with 845 use reports for 58 plant species, followed by gastro-intestinal and liver problem (ICF: 0.93) with 967 use reports for 71 plant species, and neurological disorders (ICF: 0.92) with 188 use reports for 16 plant species. There is no study indicating ICF value in this region so far. Respiratory diseases are very common in Caribbean regions due to tropical climatic conditions. Cuba health ministry report the respiratory diseases as one of the main causes that requires medical care (MINSAP, 2017). This reality associate to the increased bacterial resistance to antibiotics in recent years has motivated the increment of the use of medicinal plants to treat these ailments. In the study area a large number of medicinal plants (58 plants) have been informed to treat various respiratory diseases (Table N° 3). The species with more reports for these disorders were *Protium cubense* (Rose) Urb., *Plantago major* L. and *Plectranthus amboinicus* (Lour.) Spreng. These facts are an evidence of the ethnobotanical knowledge of those inhabitants, giving to plants a high medicinal importance, specifically to treat respiratory diseases.

The lowest ICF value was observed in others category with an ICF of 0.33. In this category were grouped five uses, which are specifics and reports very located. It shows that the plants grouped in this category are chosen randomly: *Plethadenia cubensis* Urb., *Citrus aurantiifolia* (Christm.) Swingle, *Ficus religiosa* L., *Senna obtusifolia* (L.) H. S. Irwin & Barneby and *Musa x paradisiaca* L.

Table N° 3

Informant consensus factor for commonly used medicinal plants in Holguín, Cuba (January to June 2016)

Ailment categories	Informed medicinal use	Use Citation	Number of plants used	ICF	Ailment categories
Cancer and tumors	Cysts, antitumor, tumors	67	9	0.94	<i>Calendula officinalis</i> L., <i>Sambucus nigra</i> subsp. <i>canadensis</i> (L.) Bolli, <i>Pithecellobium unguis-cati</i> (L.) Benth.,



					<i>Solanum americanum</i> Mill.
Respiratory systems diseases	Cough, cold, flu, bronchial disorders, asthma, lung disorders, sore throat, expectorant, throat infections, hoarseness.	845	58	0.93	<i>Protium cubense</i> (Rose) Urb., <i>Plantago major</i> L., <i>Plectranthus amboinicus</i> (Lour.) Spreng.
Gastro-intestinal and liver problem	Digestive disorders, hemorrhoids, carminative, diarrhea, stomachache, constipation, ulcers, intestinal disorders, gastrointestinal disorders, dysentery, worms, giardia, gastritis, laxative, hepatitis, liver inflammation, liver ailments, fatty liver, dyspeptic upsets, hepatic cirrhosis, parasites in liver and vesicle, choleric.	967	71	0.93	<i>Ocimum basilicum</i> L., <i>Lepidium virginicum</i> L., <i>Lippia alba</i> (Mill.) N.E. Br. ex Britton & P. Wilson
Neurological disorders	Nerves disorders.	188	16	0.92	<i>Citrus x aurantium</i> L., <i>Justicia pectoralis</i> Jacq., <i>Lawsonia inermis</i> L.
General health	Antioxidant, conjunctivitis, inflammation, fever, healing.	436	50	0.89	<i>Calendula officinalis</i> L., <i>Solanum americanum</i> Mill., <i>Cymbopogon citratus</i> (DC.) Stapf
Circulatory system/cardiovascular diseases	Blood circulation, arterial hypertension, anti-teratomatous, heart strength, atherosclerosis, vasodilators.	243	33	0.87	<i>Citrus aurantiifolia</i> (Christm.) Swingle, <i>Annona muricata</i> L., <i>Persea americana</i> Mill.
Pathologies of the urinary system	Kidney stones, kidney infection, urinary incontinence, stone delivery, diuretic, stonebreaker, urinary sepsis, kidney inflammation, prostate, prostate ailments, prostate inflammation.	470	62	0.87	<i>Caesalpinia echinata</i> Lam., <i>Ruellia tuberosa</i> L., <i>Carica papaya</i> L.
Gynecological disorders	Cervicitis, fertility, menstrual disorders, menstrual pain, abortive, increase breast milk, uterine fibroids, vaginal parasites, ovarian cysts, gynecological disorders..	112	19	0.84	<i>Cassia acutifolia</i> Delile, <i>Mangifera indica</i> L., <i>Tradescantia spathacea</i> Sw.
Skeleton-muscular	Arthrosis, bone pains, arthritis, muscle	55	10	0.83	<i>Jatropha multifida</i> L., <i>Annona muricata</i> L.

system disorders	contractions, muscle fiber relaxing, calcaneal spur, bumps, sciatica.				
Blood problems	Cholesterol, anemia, blood purifier, depurative, hemorrhages, bruises	91	18	0.81	<i>Sambucus nigra</i> subsp. <i>canadensis</i> (L.) Bolli, <i>Talinum fruticosum</i> (L.) Juss., <i>Musa x paradisiaca</i> L.
Immune system	Increase immune system, allergies.	32	7	0.81	<i>Moringa oleifera</i> Lam., <i>Phyllanthus nodiflora</i> (L.) Greene, <i>Melia</i> sp.
Endocrinal disorders	Diabetes, weight loss.	83	19	0.78	<i>Ocimum basilicum</i> L., <i>Moringa oleifera</i> Lam., <i>Annona muricata</i> L., <i>Phyllanthus amarus</i> Schumach. & Thonn., <i>Calendula officinalis</i> L.
Microbial infections	Earache, syphilis, antibacterial, varicella, antiseptic, otitis, candidiasis, Staphylococcus in the ears.	73	18	0.76	<i>Cucurbita moschata</i> Duchesne, <i>Cymbopogon citratus</i> (DC.) Stapf, <i>Kalanchoe pinnata</i> (Lam.) Pers., <i>Crescentia cujete</i> L.
Pain	Culebrina's pain, headache, waits pain, face pain.	22	5	0.74	<i>Salvia officinalis</i> L., <i>Pluchea carolinensis</i> (Jacq.) D. Don, <i>Hyptis pectinata</i> (L.) Poit.
Dental care	Foulodour, dentition, mouthulcer, toothache	15	7	0.57	<i>Mangifera indica</i> L., <i>Melanthera nivea</i> (L.) Small.
Dermatological infections/diseases	Fungus, skin eruptions, pediculicidal, skin rash, hair loss, acne, anti-dandruff, spots on the skin, skin disease, remove spines from skin, feet cracks, scabies.	141	34	0.76	<i>Piper amalago</i> L., <i>Carica papaya</i> L., <i>Verbena officinalis</i> L.
Others	Spiritual baths, appetite stimulant, increasing energy, astringent, steric.	8	5	0.33	<i>Plethadenia cubensis</i> Urb., <i>Citrus aurantiifolia</i> (Christm.) Swingle

## CONCLUSIONS

Throughout this study we intent to provide a useful documentation which can contribute to preserving the popular knowledge on the use of medicinal plants in this region. A total of 195 medicinal plants grouped in 70 family were reported by the 666 inhabitants interviewed. The plants most frequently used were: *Lippia alba* (Mill.) N.E. Br. ex Britton & P. Wilson, *Annona muricata* L., *Plantago major* L., *Solanum americanum* Mill., *Cymbopogon citratus* (DC.) Stapf and *Jatropha multifida* L. The *Caesalpinia echinata* Lam. was invariably reported for de treatment of kidney infections; having not pharmacological studies to support the use of this plant in Cuba. Further attention is necessary on plant species which are having high fidelity level and/or endemic species

which can be candidates to further studies.

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