

Persistence of the Use of Medicinal Plants in Rural Communities of the Western Arid Chaco [Córdoba, Argentina]

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Abstract: Rural communities have complex strategies for health conservation: the use of local pharmacopoeia, visits to “curanderos” [traditional healers] and the use of the scientific official system of medicine. Through 129 semi-structured surveys in 6 villages of the Arid Chaco forest of western Córdoba Province 151 plants species (117 natives and 34 exotics) were registered for diverse uses: digestive, external frictions, respiratory, diuretic, circulatory, sedative, magic, feminine, etc. Besides, differential use by men and women was registered associated to particular cultural roles. 90% of the species were previously registered for the region by several botanists, folklorists and geographers. Thus, a historical continuum in the knowledge of medicinal plants can be pointed out. This knowledge on medicinal plants seems to be part of the culture of the “criollos”, inhabitants of the rural areas of Argentina traditionally dedicated to stockbreeding. Although same socio-cultural changes occurred in the last 100 years, still persist an ethno-medic system related to a comprehensive treatment of patients, which try the disorders simultaneously in physical, emotional, mental, spiritual and environmental levels.

Keywords: Argentinean chaco forest, knowledge persistence, medicinal plants, ethno botany.

INTRODUCTION

Human communities, and particularly rural ones, possess environmental knowledge and beliefs that allow their survival through a particular management of natural resources and these facilitate their integration to natural surroundings. This knowledge, defined as Traditional Ecological Knowledge [1], is preserved and transmitted through generations and it includes the consumption of medicinal plants. Health care and maintenance are two of the main concerns for the people, independently of the particularities of the different cultures [2]. Regarding this, in rural communities surrounding vegetation is the main source of resources, including medicinal products [e.g. 3-6].

In Argentina, as in other parts of the world, many of the rural communities have some complex strategies for health care and maintenance. For example, rural people make use of the local pharmacopoeia (i.e., plant recipes, reputed persons of the community with curative powers) concurrently with visits to medical doctors [e.g., 5-7]. Usually, Hippocratic concepts on health and illness persist in Argentine rural communities [e.g., 8-10]. In Córdoba province, these ethno medical systems have been reported for some little towns [e.g., 11-13], mainly describing the use of medicinal plants, as well as some infrequent magic-symbolic elements. However, these studies have been carried out in communities of the East and the North of the province, where the economy and the communications are comparatively privi-

leged respecting to those of the West Arid region. Considering that people of the West communities uses traditional technologies to develop their daily activities, and they live in a comparatively isolated environment from large urban centres, it is reasonable to expect that they possess traditional information for plant uses and the maintenance of their health. In relation to this [14] pointed out that isolated communities know more medicinal plants than communities with primary health care service, and [15] pointed out that communities with lower level of modernization have a larger spectrum of information than communities with higher degree of modernization.

The province of Córdoba presents diversity of environments which can be related to particular strategies of production of goods and services. In the western Arid Chaco, secondary forests are frequently found near rural communities which show a scarce socioeconomic and technological development. People usually sustain extensive cattle farm and waterless crops by ancient traditional techniques. These characteristics, originated long time ago, allow people to persist in these arid environments with a stressful, unpredictable climate [16], far from urban areas and with deficient medical attention and transportation [17].

On the other hand, this rural communities are exposed to fast social changes, in many cases associated with the fast lost of natural resources of which they depend on to survive. According this, [18] point out that biodiversity and cultural diversity are closely related because rural people depend on local resources to their survival. Thus, forest fragmentation and land uses determine actual ecosystem fragility and the consequent cultural erosion. So, it is urgent and necessary to carry out actions to protect cultural resources as the register and conservation of ethnobiological knowledge. According

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Fig. (1). Location of Argentina, Cordoba Province and Departments of studied communities.

that, this paper pretends [i] to produce a inventory of the medicinal species from Western rural communities of Córdoba; [ii] to analyse how the knowledge of medicinal plants [i.e., plants used, recipe preparation, treated diseases] is distributed within the population [i.e., sex and age classes], and [iii] to compare the current contemporary knowledge of medicinal plants with historical data gathered during the last 100 years.

MATERIALS AND METHODS

Study Area

The present study was carried out in the communities of Chancaní (Pocho Department), San Vicente and San Martín (San Alberto Department), Guasapampa, La Playa and Totorá Huasi (Minas Department). These communities are located between S 31° and W 65° 22', and they are between 540 to 750 msnm (Fig. 1). The annual mean temperature is 18 °C (maximum and minimum of 25° and 11°, respectively), and annual precipitations oscillate between 400-500 mm with a wet season during the summer [19]. Most precipitation falls from October to March. After the wet season, there is an extended dry season with few precipitation events, which coincides with the period of low temperatures [20]. This region is considered a semiarid environment because of the high potential of evapo-transpiration which determines a water deficit during 11 months of the year [i.e., 69 and 97mm of water deficit during the wet and dry seasons, respectively; 20]. In addition, the beginning of the rainy season is unpredictable (i.e., it can occur since September to January).

The towns are placed inside the phytogeographic region of Chaco Seco [21]. The flora of this region is characterized through some tree species as *Aspidosperma quebracho-blanco*, *Schinopsis marginata*, *Lithrea molleoides*, *Prosopis flexuosa*, *Acacia aroma*, *Flourensia oolepis*, *Ruprechtia apetala*, *Celtis ehrenbergiana*, *Acacia furcatispina*, etc. Most of this region has been disturbed by logging, cattle farming, fires, etc., mainly during the last 30 years. Secondary forests are characterized by few trees and many shrubs [22].

Inhabitants of these rural areas are denominated *Criollos*. *Criollos* are auto-characterized as small stockbreeders (not farmers). They are related to forest areas where they obtain medicinal plants, forage and fire wood. They are catholic, Spanish speakers and devoted to their own traditions. The ethno-medicinal system of *criollos* is dominated by the use of medicinal plants, with environmental, cognitive and symbolic dimensions [23]. The use of medicinal plants is complemented with visits to medical doctors and prayers to Catholic and vernacular images.

Socioeconomic data from the area shows low population densities, critical social indicators (Total Fertility Rates – TFR-, illiteracy rates) and poverty (Unsatisfied Basic Needs –NBI, acronym in Spanish) [17]. The socio-economic characterization is summarized in Table 1.

Methodology

Data were collected through semi-structured interviews [24, 25] to one person per family. Information obtained is related to socio-economic and geographic conditions, knowledge of plant resources, their use, and preparation, as well as knowledge transference about their use. Interviews

Table 1. Demographics and Socio-Economic Data of the Communities Studied, According 2001 National Population Census [48]

Department	Pocho	San Alberto			Minas	
Number of residents	5.057	25.104			4.888	
N° pers/km ²	1.6	7.5			1.3	
Total Fertility Rate	3,78ch/w	3,39ch/w			3,77ch/w	
Illiteracy Rate	5,53%	4%			9,39%	
Town	Chancaní	San Martín	San Vicente	Guasapampa	La Playa	Totora Huasi
Number of residents	196	61	193	163	193	24
NBI	50	21,3	28,5	26,5	37,3	...

Population density, fertility and illiteracy rates are only available from Departments. NBI is available from each town. Number of residents is available from department as town.

also had a structured section [25] designed to gather data on knowledge and effective use of the wild plant resources by applying the free list method.

The interviews were carried out from 2001 to 2006 to adult residents in each community, totalling 129 *interviews* (one person per family). Considering the small size of each town and our interest in same statistical comparisons, a census was the selected criterion. Thus, interviews were carried out on 80-100% of permanent residents' houses of each community. First we have explained to each family the aims of the interview, and then each family designated the person to be interviewed. The total number of interviews for each community were 9 in Totora Huasi, 51 in La Playa, 17 in Guasapampa, 32 in Chancaní, 28 in San Vicente and 13 in San Martín town. In addition, participant observation –walks and talks with residents who had a wide knowledge on medicinal plants- were used to generate a voucher in order to recognize and identify the plants. Plant material was identified at the laboratory and the scientific name was corroborated according to "Catálogo de Plantas Vasculares de la República Argentina" of Darwinion Institute, using the on-line version [available on www.darwin.edu.ar, February 2009]. Voucher was deposited at the Botany Museum of National University of Córdoba [CORD].

An ANOVA was ran to evaluate differences within populations. The analysis evaluates such variables with respect to gender (male/female) and age groups (15-39 vs. ≥40). The selection of age groups was made looking for statistical balance among groups of data and differences in the knowledge among persons. All the assumptions were checked and met. Also, graphics of frequencies were made. Finally, it was contrasted information about medicinal plants obtained in this work with similar information for the area published along the 20th century.

RESULTS AND DISCUSSION

Botanical Analysis

A total of 151 plant species (Table 2) was registered. Used medicinal plants include 117 indigenous and 34 exotic or introduced species. In general, native plants grow in the forests surrounding communities while exotic are cultivated in orchards and gardens or obtained from disturbed places [by the tracks or farmings, etc.] near the houses. Most of the

introduced species cited in this report were incorporated to the local folklore as European plants brought by the Spaniards [26, 27] and then incorporated by the Criollos to their pharmacopeias. With native as much as exotic plants, a fluid exchange exists among relatives and neighboring, added to the occasional trade of some species.

Registered medicinal plants belong to a variety of botanical families [44] but Asteraceae, Lamiaceae, Fabaceae and Solanaceae can be highlighted because they showed many representatives (25, 12, 12 and 8 species respectively; Table 2). It is not surprising because these families are well represented in Córdoba flora and some of the species are very common plants [e.g., 28, 29]. In addition, [30] (and references therein) has postulated that as more common a plant is, it has a higher probability to be used. However, during the field work were observed several abundant medicinal species that were not cited as used. Subsequent studies should be conducted about this question.

Socio-Cultural Analysis

Rural population of Córdoba present a complex ethno-medicinal system [23] dominated by the use of medicinal plants and complemented with the use of the scientific-official health system. These systems are not in competition because residents of rural regions use both [31] according to their needs.

In the studied communities medicinal plants are used for the treatment of several diseases or disorders. Nine categories can be highlighted by their frequency of appearance: digestives, for back aches, for the circulatory systems, for the respiratory systems, faith or magic plants (placed at the entrance of the house to avoid "bad intentions"), for feminine disorders, for external use (knocks, burns, skin diseases, etc.), and others (this category includes different affections with lower occurrence, such as plants for ophthalmic use, sedatives, for the memory, antipyretics, etc.). Table 3 shows the number of citations registered for each category of use of medicinal plants, by gender and Fig. (2) shows the distribution of the affections considering the number of species for each one. Of these categories, used plant for digestive disorders have received most mentions (774 references). This category comprehends plants facilitating digestion, lowering stomach acidity, aromatic plants added to the "mate" [traditional Argentinean no-

Table 2. Plant Species Mentioned by People of the Studied Populations at the Western Arid Chaco of Córdoba, Argentina. Signed Numbers of each Species Indicate if a Plant was Previously Mentioned in a Reference: 1:Río y Achával (1904), 2:Di Lullo (1946), 3: Barboza *et al.* (2006); (F): Exclusively Mentioned Plants by Women, (M): Exclusively Mentioned Plants by Men; * Exotic or Introduced Plants

Family	Scientific Name	Vernacular Name	Used Part	Properties	1	2	3
Alliaceae	(F) <i>Allium sativum</i> L.	Ajo *	Head	To cold			
Amaranthaceae	<i>Alternanthera pungens</i> Kunth	Yerba del pollo	All plant	Digestive disorders, diuretic, diarrhea	X	X	X
Anacardiaceae	<i>Lithraea molleoides</i> (Vell.) Engl.	Molle	Leaves	Tooth pain, sedative, digestive		X	
	<i>Schinopsis marginata</i> Engl.	Orco quebracho	Leaves	Digestive		X	
	<i>Schinus areira</i> L.	Aguaribay	Leaves	Digestive disorders, abortive, head ache, anti-inflammatory	X	X	X
Apocynaceae	<i>Aspidosperma quebracho-blanco</i> Schldl.	Quebracho blanco	Leaves	Disinfectant, digestive disorders, contraceptive		X	
	<i>Morrenia odorata</i> (Hook. & Arn.) Lindl.	Tasi	Fruits	To induce the production of milk, skin disorders		X	X
	(F) <i>Vallesia glabra</i> (Cav.) Link	Ancoche	Leaves	To remove skin boils	X	X	
Aristolochiaceae	<i>Aristolochia argentina</i> Griseb.	Charrúa	Roots	To haemorrhoids, diuretic, diarrhea	X	X	X
Asteraceae	<i>Achyrocline satureoides</i> (Lam.) DC.	Vira vira	Branches	Digestive, respiratory disorders	X	X	X
	(F) <i>Achyrocline</i> sp.	Lavanda	Branches	Digestive			
	<i>Ambrosia tenuifolia</i> Spreng.	Altamisa	Leaves	Digestive	X	X	X
	(F) <i>Artemisia absinthium</i> L.	Ajenjo *	Leaves	Digestive			X
	<i>Artemisia douglasiana</i> Besser	Matico* – Hepatálgina	Branches	Digestive, hepatic disease			X
	<i>Baccharis articulata</i> (Lam.) Pers.	Carqueja	Branches	Digestive	X	X	X
	(F) <i>Baccharis salicifolia</i> (Ruiz & Pav.) Pers.	Chilca amarga	Branches	To the “aire”	X	X	X
	(F) <i>Bidens subalternans</i> DC.	Manzanilla silvestre	Flowers	Digestive			X
	<i>Cyclolepis genistoides</i> D. Don	Palo azul	Branches	Diuretic		X	X
	<i>Flaveria bidentis</i> (L.) Kuntze	Figue o Balda	Branches	Back aches	X	X	X
	(M) <i>Flourenacia oolepis</i> S.F. Blacke	Chilca	Flowers	Back aches			
	<i>Gaillardia megapotamica</i> (Spreng.) Baker	Topasaire	Leaves	To the “aire”	X	X	X
	<i>Jungia polita</i> Griseb.	Zarzaparrilla	Leaves	Diuretic, circulation, to fall the blood pressure		X	X
	(F) <i>Matricaria recutita</i> L.	Manzanilla*	Flowers	Digestive, sedative, to inflammations		X	X
	(F) <i>Pluchea sagittalis</i> (Lam.) Cabrera	Lucera	Branches	Digestive			X
	(F) <i>Porophyllum obscurum</i> (Spreng.)DC.	Yerba del venado	Leaf	Digestive, anti-inflammatory	X		X
	<i>Schkhria pinnata</i> (Lam.) Kuntze ex Thell.	Mata pulgas	Branches	External anti-parasitic	X		X
	(F) <i>Tagetes minuta</i> L.	Suico	Leaf	Diarrhea, digestive for children	X		X
	(F) <i>Taraxacum officinale</i> G. Weber ex F.H. Wigg.	Diente de león*	Leaf	Digestive	X		X
	(F) <i>Tessaria dodoneifolia</i> (Hook. et Arn.) Cabrera	Chilca dulce	Branches	Digestive			X
<i>Thymophylla pentachaeta</i> (DC.) Small	Guillermite	All plant	Digestive			X	
<i>Trixis divaricata</i> (Kunth) Spreng.	Contrayerba	Roots	Back aches, to cold	X	X	X	
(F) <i>Verbesina encelioides</i> (Cav.) Benth. & Hook. f.ex A. Gray	Mirasol	Leaf	Ophthalmic use	X		X	
<i>Xanthium cavanillesii</i> Schouw	Abrojo	Leaf	Diuretic			X	
<i>Xanthium spinosum</i> L.	Cepacaballo	Leaf	Back ache, to “slim” the blood		X	X	
Boraginaceae	<i>Borago officinalis</i> L.	Borraja *	Leaf	Cough suppressant		X	
	<i>Heliotropium amplexicaule</i> Vahl	Yerba meona	Branches	Diuretic	X	X	X
	<i>Nama undulatum</i> Kunth	Matagusano	Leaf	Digestive	X	X	X
Brassicaceae	(F) <i>Brassica</i> sp.	Mostaza *	Seeds	Protective			
Bromeliaceae	(F) <i>Tillandsia duratii</i> Vis.	Flor del aire	Flowers	Heart diseases	X		
Buddlejaceae	<i>Buddleja cordobensis</i> Griseb.	Pulmonaria - Sanalotodo	Branches	Respiratory disorders	X		X
Cactaceae	(F) <i>Opuntia ficus-indica</i> L. (Mill.)	Tuna	Branch	To hemorrhoids			X
Capparaceae	<i>Capparis atamisquea</i> Kuntze	Atamisqui	Leaves	To cold, disinfectant, to the “pasma”	X	X	X
Cecropiaceae	(F) <i>Cecropia pachystachya</i> Trécul	Ambay	Leaf	Cough suppressant			

(Table 2) Contd.....

Family	Scientific Name	Vernacular Name	Used Part	Properties	1	2	3
Celtidaceae	<i>Celtis ehrenbergiana</i> (Klotzsch) Liebm.	Tala	Leaves	Digestive for baby and children	X	X	X
Chenopodiaceae	<i>Atriplex undulata</i> (Moq.) D. Dietr.	Cachiyuyo	Branches	Bone pains		X	X
	(F) <i>Chenopodium album</i> L.	Yerba de la perdiz	Leaves	Sedative	X	X	
	<i>Chenopodium ambrosioides</i> L.	Paico	Leaf	Digestive disorders	X	X	
Commelinaceae	<i>Commelina erecta</i> L.	Santa Lucía	Flowers	Ophthalmic use		X	X
Cucurbitaceae	(F) <i>Cayaponia citrullifolia</i> (Griseb.) Cogn.ex Griseb.	Sandía de la vibora	Leaf	To blood circulation			X
	(F) <i>Cucurbita maxima</i> Duchesne	Zapallo	Seed	To the "aire"			X
Ephedraceae	<i>Ephedra triandra</i> Tul.emend .J.H.Hunz.	Tramontana	Branches	To knocks, back aches		X	X
Equisetaceae	<i>Equisetum giganteum</i> L.	Cola de caballo	All the plant	Diuretic	X	X	X
Euphorbiaceae	(F) <i>Euphorbia serpens</i> Kunth	Yerba meona	All plant	Diuretic	X	X	X
	(F) <i>Croton lachnostachyus</i> Baill.	Bálsamo	Leaf	To sore throat	X		X
Fabaceae	<i>Acacia aroma</i> Gillies ex Hook. ex Arn.	Tusca	Leaf	External disinfectant		X	X
	<i>Acacia caven</i> (Molina) Molina	Espinillo	Leaf	External disinfectant		X	X
	(F) <i>Acacia praecox</i> Griseb.	Garabato	Flowers	To tooth pain			X
	<i>Bauhinia forficata</i> Link	Pezuña de vaca	Leaf	Diabetes			X
	(F) <i>Caesalpinia gilesii</i> (Wall.ex Hook.) D.Dietr.	Lagaña de perro	Leaf	Disinfectant			X
	(M) <i>Cercidium praecox</i> (Ruiz & Pav. Ex Hook.) Harms	Brea	-	-		X	X
	(F) <i>Erihtrina crista-galli</i> L.	Ceibo	Leaf	To inflammations		X	
	<i>Geoffraea decorticans</i> (Gillies ex Hook. & Arn.) Burkart	Chañar	Fruits	Respiratory disorders		X	X
	(M) <i>Mymozyanthus carinatus</i> (Griseb.) Burkart	Lata	Leaf	To stomach acidity.			
	<i>Prosopis chilensis</i> (Molina) Stuntz emend. Burkart	Algarrobo blanco	Leaf	To stomach acidity	X		X
	(F) <i>Prosopis torquata</i> (Cav. ex Lag.) DC. (F) <i>Senna corymbosa</i> (Lam.) H.S. Irwin & Barneby	Tintitaco Sen o Cafeto	Leaf	Digestive Purgative		X	X
Gentianaceae	(M) <i>Gentianella multicaulis</i> (Gillies ex Griseb.) Fabris	Nencia	No reference	No reference			X
Hydnoraceae	<i>Prosopanche americana</i> (R.Br.) Baill.	Guaicurú - Flor de tierra	All the plants	To cold.			X
Hypericaceae	(M) <i>Hypericum connatum</i> Lam.	Cabo torilo	N	Heart disease			X
Lamiaceae	<i>Hedeoma multiflora</i> Benth.	Tomillo *	Leaf	Digestive, disinfectant, alcoholism	X	X	X
	(F) <i>Lavandula officinalis</i> L.	Lavanda *	Leaves	Less the "aire"	X		
	<i>Marrubium vulgare</i> L.	Yerba del sapo *	Leaf	Hepatic disease	X		X
	<i>Melissa officinalis</i> L.	Toronjil *	Leaf	Heart disease		X	X
	<i>Mentha spicata</i> L.	Yerba buena*	Leaf	Digestive	X	X	X
	<i>Mentha</i> sp.	Veramota *	Leaf	Digestive	X	X	X
	<i>Mentha</i> sp.	Menta *	Leaf	Digestive	X	X	
	<i>Minthostachys mollis</i> (Kunth) Griseb	Peperina	Leaf	Digestive		X	X
	<i>Ocimum selloi</i> Benth.	Albahaca *	Leaf	Digestive		X	
	<i>Origanum vulgare</i> L.	Orégano *	Leaf	Digestive		X	
	<i>Salvia officinalis</i> L.	Salvia *	Leaf	Digestive		X	
	<i>Rosmarinus officinalis</i> L.	Romero *	Leaf	Digestive		X	
Lomariopsidaceae	(F) <i>Elaphoglossum gayanum</i> (Feè) T. Moore	Calaguala		Femenine cicle		X	X
Lauraceae	<i>Laurus nobilis</i> L.	Laurel *	Leaf	Digestive, to cold	X		
Liliaceae	<i>Aloe</i> sp.	Aloe *	All the plant	To skin diseases			
Loranthaceae	<i>Ligaria cuneifolia</i> (Ruiz et Pav.) Tiegh.	Liga	Branches	To fall blood pressure	X	X	X

(Table 2) Contd.....

Family	Scientific Name	Vernacular Name	Used Part	Properties	1	2	3
Lycopodiaceae	(F) <i>Huperzia saururus</i> (Lam.) Trevis.	Cola de quirquincho	All the plants	Contraceptive, aphrodisiac	X	X	X
Lythraceae	<i>Heimia salicifolia</i> (Kunth.) Link	Queiebrarado	Branches	Digestive, back aches		X	
Malvaceae	<i>Sphaeralcea cordobensis</i> Krapov.	Malva	Leaf	To inflammations, to heal up, to hemorrhoids	X	X	X
Monimiaceae	(F) <i>Peumus boldus</i> Molina	Boldo *	Flowers	Digestive			
Moraceae	(M) <i>Ficus carica</i>	Higuera *			X		
Myristicaceae	(F) <i>Myristica fragans</i> Houtt.	Nuez moscada *	Seeds	Protective			
Myrtaceae	<i>Eucaliptus</i> sp	Eucaliptus *	Leaf	To cold, antitusive.			
Papaveraceae	<i>Argemone subfusiformis</i> G.B. Ownbey	Cardo santo	Roots	Diuretic, digestive, to cold.		X	X
Parmeliaceae	<i>Usnea amblyoclada</i> (Müll. Arg.) Zahlbr	Barba de piedra	All the thallus	Sore throat	X	X	
Passifloraceae	<i>Pasiflora caerulea</i> L.	Pasionaria	Leaves	Sedative	X		X
Plantaginaceae	<i>Plantago tomentosa</i> Lam.	Llantén *	Leaf	Digestive, disinfectant	X	X	X
Poaceae	(F) <i>Oryza sativa</i> L. <i>Triticum</i> sp. - <i>Paspalum</i> sp.	Arroz * Gramilla	Seeds All the plant	Diarrhea Back aches, contraceptive	X X		X
Polygonaceae	(M) <i>Rumex</i> sp <i>Ruprechtia apetala</i> Wedd . (M) <i>Polygonum</i> sp.	Romasa Juda o manzano del campo Sanguinaria	Leaf Leaf	Depurative Diuretic Blood circulation	X X	X X	X X
Pteridaceae	(F) <i>Argyroschisma nivea</i> (Poir.) Windham	Culandrillo	All the plant	Contraceptive	X	X	X
Punicaceae	(F) <i>Punica granatum</i>	Granada *	Bark	Diarrhea		X	
Rhamnaceae	<i>Condalia mycophylla</i> Cav. <i>Ziziphus mistol</i> Griseb.	Piquillín Mistol		To hemorrhage Respiratory disorders		X X	X X
Rosaceae	(F) <i>Cydonia oblonga</i> <i>Eriobotrya japonica</i> (Thunb.)Lindl <i>Prunus persica</i> (L.) Batsch.	Menbrillo * Nispero * Durazno *	Fruit Leaf Leaf	Diarrhea Cough suppressant Digestive			
Rutaceae	<i>Citrus limon</i> (L.) Burm.f. <i>Citrus sinensis</i> (L.) Osbeck <i>Ruta chalepensis</i> L.	Limón * Naranja * Ruda *	Leaf Leaf Lef	Digestive Sedative Digestive disorders, home protector, blood circulation, sedative	X	X	X
Salicaceae	(M) <i>Salix</i> sp.	Sauce		Analgesic		X	X
Santalaceae	<i>Jodinia rhombifolia</i> (Hook. & Arn.) Reissek	Peje - Quebracho flojo	Leaf	Digestive disorders, respiratory disorders, diarrhea, abortive.	X		X
Sapindaceae	(F) <i>Cardiospermum halicacabum</i> L.	Globito -Pedorra	Fruit	Blood circulation	X		X
Schizaeaceae	<i>Aneimia tomentosa</i> (Savign.y)Sw.	Doradilla	All the plant	Antitusive, cough suppressant	X	X	X
Solanaceae	<i>Cestrum parqui</i> L'Hér. (F) <i>Lycium ciliatum</i> Schtdl. <i>Lycium elongatum</i> Miers <i>Nicotiana glauca</i> Graham <i>Nierembergia linariifolia</i> Graham (F) <i>Nicotiana tabacum</i> L. (F) <i>Nicotiana</i> sp. (F) <i>Solanum tuberosum</i> L.	Duraznillo negro Piquillín víbora Gualeguay Palán palán Chuscho Tabaco Flor de sapo Papa	Leaf Leaf Leaf Leaf Branches Leaf - Disk of tuber	Skin inflammations Digestive and stomach inflammations. Digestive Skin diseases, injuries Abortive To the "aire" - Skin burns	X X X X	X X X	X X X
Tiliaceae	(F) <i>Tilia</i> sp	Tilo *	Flowers	Sedative			
Urticaceae	(F) <i>Urtica urens</i> L.	Ortiga	Leaf	Blood circulation, back aches, cough suppressant, hair loss	X	X	X
Verbenaceae	<i>Aloysia citriodora</i> Palau <i>Aloysia gratissima</i> (Gillies & Hook. ex Hook.)Tronc. <i>Aloysia polystachya</i> (Griseb.) Moldenke <i>Lippia integrifolia</i> (Griseb.) Hieron. <i>Lippia turbinata</i> Griseb.	Cedrón Palo amarillo Te de burro Incauyuyo Poleo	Leaf Leaf Leaf Leaf Leaf	Cardiotonic, digestive Digestive Digestive Digestive, diuretic Digestive	X X X X X	X X X X	X X X X

(Table 2) Contd.....

Family	Scientific Name	Vernacular Name	Used Part	Properties	1	2	3
Zygophyllaceae	<i>Larrea divaricata</i> Cav.	Jarilla	Branches and leaf	To back aches, febrifuge	X	X	X
	(F) <i>Porlieria microphylla</i> (Baill.) Descole, O'Donnell & Lourteig	Cucharero	Flowers	Digestive		X	X
		(F) Alcanfor	Leaves				
		(F) Azafrán del monte					
		(F) Buscapina	Leaves	Digestive			
		(F) Piedra de sapo					
		(F) Sertal	Leaves	Digestive			

alcoholic and hot drink, prepared whit *Ilex paraguariensis* A. St.-Hil., for deeper description see [32] as preventive of digestive disorders, for liver disorders, antispasmodic, among others. An explanation of the prevalence of digestive uses of plants can be searched in the high consumption of fat and alcohol, typical of this population as was revealed by rural people of western Chaco of Formosa, Argentina [10]. Indeed, there are some plants used mainly by men specifically for the treatment of alcoholism such as *Jodinia rhombifolia*, "sombra de toro"; *Artemisa douglasiana*, "matico"; and *Hedeoma multiflora*, "tomillo". These species are, including some other species for liver disorders.

Table 3. Number of Citations Registries for 129 Surveys for 6 Villages of Western of Córdoba [Argentina] for each Categories the Medicinal Use, for Women and Men

Uso de usotionsegre	Women	Men
Digestive	580	204
Circulatory	112	34
Diuretic	95	39
Respiratory	163	65
External friction	171	55
Femenine	27	9
Sedative	18	8
Magic	4	1
Others	34	4

It is interesting to know that people of the studied communities classified some species as "cold" or "hot" (Table 4). This classification is related to the Hippocratic medicine and its "principle of opposition" [33], which proposed that body had four "humours" equal in proportion: blood, black bile, yellow bile and phlegm and all illness is the product of the imbalance of them. Thus, Hippocratic therapy was directed towards restoring this balance. In this aspect, studied people classified as hot "jarilla" (*Larrea divaricata*) used to make frictions and "molle" (*Lithraea molleoides*) and "mint" (*Mentha* spp.) for the toothache, because when people drink same tea or use same ointment prepared whit them perspires.

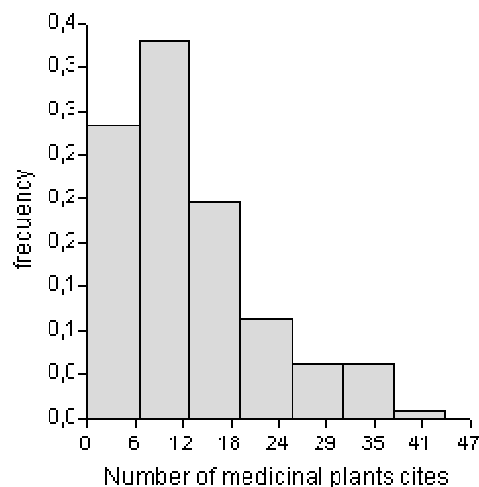


Fig. (2). Distribution of frequency of mentioned medicinal plants for inhabitant.

According to the Hippocratic Theory, these "hot" plants are used to treat "cold" illness and like this restoring the body balance. The characterization as "cold" or "hot" of the illnesses and remedies depending on the causes that produce them or their symptoms or effects [34]. Thus, a plant as the mentioned, which produce perspiration, is classified as

Table 4. Classification of Medicinal Plants for Hippocratic Criterius in "Cold" and "Hot"

"Cold"	"Hot"
Duraznillo <i>Cestrum parqui</i> Coquillo <i>Vallesia glabra</i> Palo azul <i>Cyclolepis genistoides</i>	Poleo <i>Lippia turbinata</i> Doradilla <i>Anemia tomentosa</i> Jarilla <i>Larrea divaricata</i> Contrayerba <i>Trixis divaricata</i> Atamisqui <i>Capparis atamisquea</i> Barba de piedra <i>Usnea</i> sp. Molle <i>Lithraea molleoides</i> Albahaca <i>Ocimum selloi</i> Yerbabuena <i>Mentha</i> sp Aguaribay <i>Schinu areira</i>

“hot”, equally to all the illnesses that produce fever, which must to be fight with a cold remedy. Opposite, cold illnesses are produced by excessively cold air or water and must to be fight with a “hot” remedy. This approach pursues the effect of the re-absorption of the excess by the opposed one [principle of opposition], the fresh thing “sucks”, it “takes out”, the heats, and vice versa. The same conception of illness in popular medicine were registered in Argentinean rural communities from Córdoba [11], Formosa [10] and the NE of Argentina [2].

The most common preparations are infusions [“herbal teas”], decoctions [locally named as “aguapasta”], and the addition of plants into the “mate”. Also, medicinal plants are used during baths or applied with frictions, combined whit animal fat or same minerals.

In other aspect, although the knowledge of medicinal species is widespread within population, its distribution is heterogeneous (range 1 to 42 species mentioned by person; Fig. 3). Even not statistically significant (ANOVA $F=2.904$;

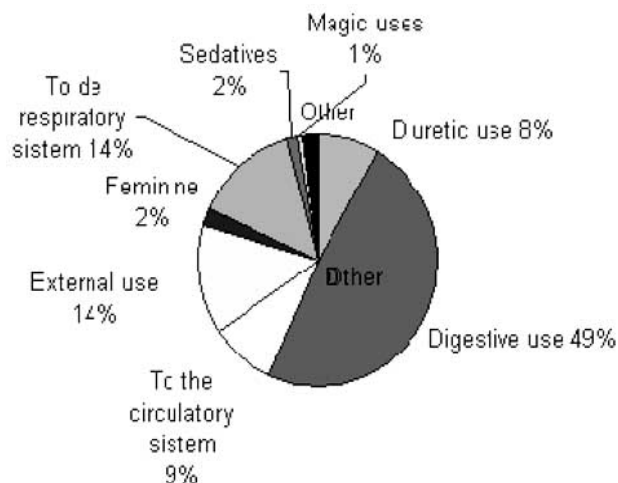


Fig. (3). Distribution of frequency of different uses.

$p=0.90$), the number of plants mentioned by women or men was different ($x=13.24$ $SD=9$ and $x=10.7$ $SD=6.9$ respectively) but, more interesting, is that men and women have distinct knowledge relating to the use of natural environment. It is to say, there are species of feminine interest, such as plants related to the regulation of menstrual cycle, to the stimulation of the production of milk, abortive, contraceptives, or specific for children discomfort, which were mentioned more frequently by women than men. Species with these characteristics are *Anemia tomentosa*, “doradilla”; *Morrenia odorata*, “tasi”; *Celtis ehrenbergiana*, “tala” and *Chenopodium ambrosioides*, “paico”. Nevertheless, women knowledge cover not only the previous plants whit a specific feminine interest but they know useful plants by almost all the locally recognized illness. On the other hand, male knowledge is concentrated around species associated to digestive problems or osteo-muscular pains have mentioned by all. For example, *Artemisa annua*, “ajenjo”; *Artemisa douglasiana*, “matico”; *Aloysia gratissima*, “palo amarillo”; *Lippia turbinata*, “poleo”, for digestive affections, and *Acacia aroma*, “tusca” and *Larrea divaricata*, “jarilla” for back aches.

Most interestingly, not just the total of cited plants by women is higher than the cited by men; also the plants cited exclusively by women are notably more than the exclusive plants of men (Table 2). Thus, 35, 3 % (49 spp.) of the total diversity of plants are exclusively mentioned by women and just 6, 5% (9 spp.) are exclusive of men. However, even in general women mentioned higher quantity of medicinal plants; particular men are recognized by their plant knowledge in the studied populations.

The difference between women and men about the use of plants is interesting because it can reflect some differences in the daily activities: women take care of the home and family, the maintenance of family health, and the preparation and administration of therapies are feminine responsibilities. Men, in the other hand, work in rural activities, raising cattle o taking care of farms, staying far from home. In agree with this, similar situations were found in mestizo populations of Brazil [4, 35], Colombia [36] and in Bolivian Amazon [37]. In Argentina, [12, 38] reach the same conclusions, which is demonstrative that the differential knowledge of medicinal plants according to the sex would be reflecting cultural diversity.

Other aspect of the cultural diversity may be the age-classes differences. In that aspect, significant differences [ANOVA: $p = 0.002$] between up to 39 and over 40 years persons were evidenced. Average number of know plants by the youngest is 13 and by the oldest is 18. This differences of knowledge by age has been registered in diverse places as Perú [39], Córdoba [23], and the Argentinean Patagonia [40], with the same analytical criteria. The significantly bigger knowledge of older people can be related with their life experience, because all knowledge is an accumulative corpus but also with a loss of the traditional practices between the younger generations. This fact can be explained because of the knowledge is not transmitted by the previous generations, phenomenon mentioned by [10] pointing out that the ethno-medicinal current knowledge of Criollos is in process of being forgotten, its practice is in mostly setback, getting lost so much data on the vegetables of utilitarian nature as an entire vision of nature and the world. Thus, although the use of medicinal plants by young people has not disappeared, its decreasing is a call for attention respecting to the loss of traditional knowledge. That loss is related to changes in employment: while traditional job are related to forest areas [cattle farming, fire wood extraction, etc.], actual activities are principally commercial or related to public services. Thus, the contact with nature is less and less frequent. Also, the knowledge about plant uses is relegated to minority groups, mainly because young people are the most exposed to the socioeconomic changes and to the emigration from rural to urban places [41].

In relation to this present tendency to the lost of knowledge, fortunately the registration and systematization about medicinal plants in Córdoba has been deepened in the last 100 years [42-44]. This previous literature has registered most of the medicinal plant species currently mentioned by the settlers (“criollos”) of the studied populations. Of the total number of plant species mentioned by the residents ($n=153$) only 22 were not registered previously (13 of them are exotic, 4 are native and the remaining five were not identified). Considering the previously registered in the literature

Table 5. Historical Register in Ethnographic Literature

No. of Species	Ríos & Achaval, 1905	Di Lullo, 1945	Barbosa et al. 2006	Present Work
Exclusives	4	10	18	22
Shared	57	61	53	131
Total	117	123	669	153

species with medicinal uses it is interesting to point out the progressive increase of citations of medicinal plants by Criollos that are registered in scientific and folkloric volumes (Table 5), related with the tradition in systematic botany in Córdoba province. Some of the species of the medicinal flora were registered for the last 100 years present among the Córdoba rural residents. This pattern shows that although the knowledge is present and came from old cultural traditions in the population it is now eroding from younger generation.

Thus, in this stage, scientific effort to register and to systematize the useful flora becomes essential as a first step for the development of conservation policies. In that sense, [1] indicates that the traditional knowledge is an essential tool for the management of ecosystem processes and functions. At this time, scientific, social and economic reasons have promoted an increasing interest over the traditional knowledge among the conservation biologists, ecological anthropologists and ethno biologists, as well as political attention [45]. Traditional knowledge may be related to conservation because that knowledge involves techniques that usually can be less aggressive to the environmental in comparison to modern techniques.

Finally, traditional or complementary medicine offer a holistic approach where health disorders are treated considering simultaneously several levels: physical, emotional, mental, spiritual, and environmental [7, 46, 47], with the same vision of health and illness of the rural inhabitants. In the other hand, the official-scientific medicinal system posses some characteristics, also appreciated in these communities, as prevention [e.g. vaccination], diagnosis, and treatment of several.

Thus, the persistence of the complementary medicine in parallel with official medicine offer higher variety of treatments, while share valuations, knowledge an interpretations of users.

CONCLUSIONS

The “criollos” of western Córdoba showed a deep knowledge on medicinal plants. As it was found in this study, they mentioned 151 plant species for diverse uses, highlighting those for digestive uses. Additionally, same medicinal plants and illnesses are classified as “hot” or “cold”, related whit the ancient Hippocratic system. This particular knowledge is part of their culture, and can be transmitted and maintained through generations. Also, the plant knowledge is not homogeneous in the population since there are plants associated to the feminine scope and others to the masculine

one. On the other hand, the existence of a significantly privileged knowledge of medicinal plants among older people than young people clearly reflects an age group heterogeneity. This pattern is a call of attention because the maintenance of this knowledge could be in risk. Young people are exposed to socioeconomic changes and to the emigration from rural to urban sites.

This kind of report is valuable since it carries out the characterization of an ethno-medicinal system with wide and old transmission among the rural populations of Córdoba. Nevertheless, there is a certain risk of knowledge eroding because of the ecological and socio-cultural transformations. On the other hand, it provides tools to support the development of alternative models to protect these populations, including their traditional medicine and the associated cultural rules.

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