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Comparison of medicinal plant knowledge between rural and urban people living in the Biosphere Reserve "Bioma Pampa-Quebradas del Norte", Uruguay: an opportunity for biocultural conservation

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ABSTRACT

The Biosphere Reserve, UNESCO, "Bioma Pampa-Quebradas del Norte", Rivera Department is an important reservoir of biocultural diversity of Uruguay. With the objective of contributing to its recognition and valuation, we describe the diversity of medicinal plants used by local communities in rural or urban settlements at the Reserve, from a quali-quantitative ethnobotanical approach. We estimated and compared species richness of alien and native medicinal plants mentioned by the 13 urban and 31 rural people in semi-structured interviews selected by snowball sampling. We found that the diversity of medicinal plants comparing urban and rural areas did not present significant differences. However, rural areas report more native species as consequence of a higher environmental offer of medicinal plants and the prevalence of cultural elements of native peoples; in contrast, the construction of homegardens within a pluricultural context in urban areas promotes the incorporation of alien species in the local herbalist. Finally, we emphasize the possibility of integrating the official medicinal system with the traditional medicinal systems based in plants, contributing to the programs of conservation of biocultural heritage and primary health care as posed by the World Health Organization in its Traditional Medicine Strategy 2014-2023.

Keywords: Ethnobotany; Medicinal Plants; Traditional Knowledge; Alien Species; Rarefaction Curves; Protected Areas.

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INTRODUCTION

The biocultural diversity is defined by Maffi (2007) as "the diversity of life in all its manifestations: biological, cultural, and linguistic — which are interrelated (and possibly coevolved) within a complex socio-ecological adaptive system". The conservation of biocultural heritage ensures an increase in the resilience of these systems (Ferreira Júnior et al. 2015; Folke et al. 2010; Gavin et al. 2015; Maffi and Woodley 2010). A relevant dimension of biocultural diversity is expressed in the botanical knowledge of communities (Hurrell 2014; Hurrell and Pochettino 2014; Lozada et al. 2006; Reyes-Garcia et al. 2009; Santoro et al. 2015).

Uruguay presents an interesting governance configuration for the development of ethnobotany applied to biocultural diversity conservation and in particular if the focus is on botanical medicinal systems (Maffi and Woodley 2010). In this sense, one important fact is the implementation of the National System of Protected Areas (SNAP-for its initials in Spanish, law nº 17.234 of the constitution of Uruguay). One particularity of the SNAP is its insertion on private immovable property that is occupied by productive activities (e.g. farming, cattle raising, afforestation). Therefore, to conciliate productive and conservation interests, it uses a governance model made up of local and state actors. This allows an integral management of the diverse objectives present in the territory. The other fact is the recently initiated health reform under an integral perspective (Fuentes 2010; Sollazzo and Berterretche 2011), based on the principles of Alma Ata, and in a renewed Primary Health Care (WHO 2013). The principles of Alma-Ata agreed in the International Conference on Primary Health Care in 1978, “expressing the need for urgent action by all governments, all health and development workers, and the world community to protect and promote the health of all the people of the world”. “Primary health care is essential health care based on practical, scientifically sound and socially acceptable methods and technology made universally accessible to individual and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of selfreliance and self-determination” (Declaration of Alama-Ata, 1978) (WHO 2013). The health reform aims to address biopsychosocial, community and environmental particularities, recognizing further that the physician is not the "only knowledge". In this sense, the reform includes the formation of community health teams made up of doctors, nurses, social workers, psychologists and community referrals (Sollazzo and Berterretche 2011, WHO 2013).

While in the majority of the territory of Uruguay there is broad coverage of biomedical health care and access to industrialized medicines (Cardona et al. 2013), it has been reported, as at other localities in the region (e.g. Hilgert 2009), that people resort to mixed systems incorporating the biomedical and the one based on medicinal plants for the health care (Alonso Paz et al. 2008). This knowledge is framed in a pluricultural context of the area, which is enabled by diverse migratory flows of native Amerindian, Africans and Europeans (Bonilla et al. 2004; Curbelo 2003; González and Rodríguez Varese 1990; Pellegrino 2013), along with an environmental offer of native and alien species that varies between urban and rural environments (Abreu et al. 2015; Janni and

Bastien 2004; Martínez and Pochettino 1992; Rossato et al. 1999).

Understanding how people choose and integrate certain botanical resources into the health care system is a central theme in ethnobotanical studies (Albuquerque et al. 2013). In this regard, several authors try to understand how interacts people with plant diversity and if the environment can influence the incorporation of particular botanical medicinal resources. In this line has been reported a strong representativeness of alien plants in local pharmacopoeias in different areas of the globe (e.g. Alencar et al. 2010; Begossi et al. 2002; Bennett and Prance 2000; Medeiros 2013; Medeiros et al. 2012). It is suggested that the incorporation of exotic plants may comes from a set of intrinsic characteristics of the species, such as: colonization capacity (Begossi et al. 2002) and utilitarian versatility (Alencar et al. 2010), as well as cultural factors related to the environment (e.g. rural, urban) where various processes affect, among them: immigration, modernization (e.g. Leonti 2011; Leonti et al. 2010), acculturation (the loss of native or ancestral knowledge, Eyssartier et al. 2008; Ramirez 2007; Vandebroek and Balick 2012), appearance of new ailments (e.g. Vandebroek and Balick 2012) and generation of innovative therapeutic knowledge (e.g. diversification hypothesis, see Albuquerque 2006). In this sense, this work contributes to the theoretical reflection and to the strategic objectives of the World Health Organization 2014-2023 (WHO 2013), to health reform (Fuentes 2010; Sollazzo and Berterretche 2011) and the SNAP (www.mvotma.gub.uy/snap).

This work describes the diversity of medicinal plants (species richness) used by local communities in the Biosphere Reserve “Bioma Pampa-Quebradas del Norte”, Rivera Departament, Uruguay. From a quantitative approach, it is described, estimated and compared the knowledge about alien and native medicinal plants, in terms of species richness, mentioned by the urban and rural communities of the Reserve. The finding of a pharmacopoeia composed of greater presence of alien plants in urban environments and native in rural one, it is discussed in relation to pluricultural and environmental contexts. Finally, emphasis is placed on the possibility of integrating official and traditional medicine systems with medicinal plants, contributing to the programs of conservation of biocultural heritage and primary health care.

MATERIAL AND METHODS

Study area

In the year 2011, 110.882 hectares of Rivera Department, Uruguay, is declared: “UNESCO Reserve Biosphere”, under the name “Bioma Pampa-Quebradas del Norte” (Fig. S1, supplementary material). The Biosphere Reserve, UNESCO, “Bioma Pampa-Quebradas del Norte”, which contains the protected area “Valle del Lunarejo”-SNAP, is located in the Rivera Department and is one of the most important reservoirs of biodiversity of Uruguay (Brussa and Grela 2007; Soutullo et al. 2013). The area extends over the northwest of the department, from the departmental boundary of Tacuarembó to the border with Brazil. The Reserve presents an important number of springs of a fluvial network associated to the set of blades and ravines. On the margins of these watercourses riparian mounts of high diversity are developed, similar to that of Atlantic subtropical forests, with an herbaceous stratum of high plant richness of families Poaceae, Fabaceae, Orchidaceae y

Asteraceae (Brussa and Grela 2007). Given the richness of plants that makes up the area, this area has been recognized as of interest for conservation (DINAMA 1998; Gautreau and Lezama 2009; Grela and Romero Suárez 1996; Sayagues et al. 2000; Soutullo et al. 2013). In addition to the biodiversity conservation aspects, the objectives of the reserve include reinforcing the cultural traditions associated with the particularity of the inhabitants of rural areas (DINAMA 1998, 1999; MVOTMA 2017). The climate is warm temperate or subtropical, and corresponds to category Cfa according to the classification of Köppen-Geiger (Kottek et al. 2006; Rubel and Kottek 2010).

Population characteristics

A synthesis of the settlement of the current Uruguayan territory must show an extensive temporal sequence initiated at least 9000 BC years ago, under a dynamic of establishment, change and replacement of successive waves of different groups of native people. This includes nomadic groups of hunter-gatherers belonging to a possible macroethnic group "charrúa", higher technical development groups related to cultural groups of Patagonian and Paraná connection (Pi Hugarte 2014). These indigenous populations suffered profound alterations with the arrival of Europeans in the Rio de la Plata. These groups were mostly converted and assimilated by the missionaries. It is important to emphasize the importance of the Guarani missionary natives in the development of this process, which led to the disappearance of most ethnic groups, with the exception of some groups that they resisted and later were exterminated, the great part of the descendants of the original peoples were incorporated into the "Creole" society (i.e. direct descendants of Europeans born in Uruguay) (Pi Hugarte 2014).

Subsequently, in the eighteenth and nineteenth centuries the actual Uruguayan territory was characterized by the populating of the rural land mainly by families of Spanish immigrants coming from Montevideo (Barrios Pintos 1963, 1990; Pi Hugarte and Vidart 1969). The population would later become an amalgam of diverse Amerindian, European and African cultures (Bonilla et al. 2004), composed of descendants of native peoples (mainly Guaraní natives), Spaniards, Basques, French, Germans, and West Africans (Curbelo 2003; González and Rodríguez Varese 1990), configuring a pluricultural context (*sensu* Martínez et al. 2006). The Rivera Department has a population of approximately 100,000 inhabitants (INE 2011). More than a quarter of the people living in the semi-urban area of the city of Rivera carry out agricultural activities on family farms with less than 40 hectares, where they develop their activities with a low investment capacity. The production units market their products directly in the nearest populated centers. The item requires investment in infrastructure, technical knowledge and access to the market, so the activity is conceived as self-consumption and sale of surplus, without capitalization achievements (Nolla and de Vargas 2010; Rodriguez Miranda 2010).

Election of interlocutors and interview development

The prospecting work began in 2012 in the city of Rivera, with the aim of identifying the community referents of medicinal botanical knowledge. The following year tasks began with the identification and the interviews of the 44 interlocutors, which was

a *posteriori* divided into two categories: a) sellers of medicinal plants characterized by knowledge about medicinal plants and associated treatments y b) people recognized in the local community for their medicinal plant knowledge but are not engaged in the marketing of resources or knowledge. This last group was divided into: people living in urban and rural environments (*sensu* Cardeillac et al. 2016). A "snowball sampling" was performed starting with a seller of medicinal plants, to which a semi-structured interview was carried out and subsequently invited to appoint another member of the target population, this method allowed the generation of a growing sample (Albuquerque et al. 2014; Cunningham 2001; Newman 2010; Noy 2008).

We developed five field trips with medicinal plants sellers to natural harvesting sites, "Valle del Lunarejo" and "Great Britain Park" (PGB), using the participant observation technique/strategy (Albuquerque et al. 2014), and we performed participant observation at courtyards and gardens (*sensu* Albuquerque et al. 2014). In this way, it was possible to record the vernacular names with the botanical taxonomy of the species. All the interviews were recorded generating audio files along with annotations in field notebooks. The interviews were decoded and a careful interpretation of interlocutors’ perception about the diseases, treatments and plants used (*emic* categories) was carried out. This led to the creation of a categorization (*etic* categorization) in order to carry out the analyzes (Albuquerque et al. 2014). It should be noted that the methodological approach is in accordance with the ethic principles of the *International Society of Ethnobiology* (ISE 2014). In this work, we have discussed with each of the interlocutors the "inalienable character" of the information offered by the local population, including the use of recordings and images for exclusive purposes of this work.

Ethnobotanical reference materials were obtained by asking the interlocutors for a sample of each specimen. When medicinal plants were stored, they were determined and subsequently collected at the field sites mentioned by the interlocutors. The botanical reference material collected at its original site was geo-referenced, identified by botanical keys, reference literature and expert consultations (Brussa and Grela 2007; IMM 2000; Lombardo 1973; 1979). Scientific names were corroborated and updated by consulting the following databases: Tropicos (http://www.tropicos.org), Plants Database (USDA, www.plants.usda.gov), Reflora (www.floradobrasil.jbrj.gov.br), Catalog of Vascular Plants of Southern Cone Flora-Darwinion Botanical Institute (IBODA, www.darwin.edu.ar). Subsequently, reference specimens were deposited in the Herbarium of the National Museum of Natural History of Montevideo (MNHN) (vouchers numbers: MVM 23201 to 23345) (see Bennett and Balick 2014).

Return activities were carried out for the participating population and residents of the GBP area, consisting in talks on the dissemination of results and the construction of an ethnobotanical herbarium which allows people to appreciate the relationship between biological diversity and medicinal botanical knowledge. Samples of medicinal plants, including the herbarium, remained during the months of September to December of 2014 at the "Environmental Interpretation Center" of the GBP as a return to the community (ISE 2003).

Statistical analysis

An incidence matrix was constructed (1=presence, 0=absence) with the interlocutors in the columns (n_i=44) and the species in the rows (n_{spp}=159). From this matrix the plant species richness was estimated for the entire study area through the Chao2 index (Colwell et al. 2012; Gotelli and Colwell 2010). Rarefaction curves were performed based on samples (in this case the interlocutors) and allowed to compare communities with different numbers of interlocutors (Colwell et al. 2012; Gotelli and Colwell 2001, 2010; Peroni et al. 2014). Rarefaction curves discriminated the sample by residence of the interlocutors according to whether it corresponded to an urban or rural environment ($n_{i\ urban}$ = 10, $n_{i\ rural}$ = 34) and according to the origin of the plant species in native and alien ($n_{spp\ native}$ =87, $n_{spp\ alien}$=72). Chao2 indexes were estimated using the "ChaoSpecies" function and the rarefaction curves through the functions *iNEXT* and *ggiNEXT* using the R package “iNEXT” (Hsieh et al. 2016). All analyzes were performed using the R version 3.03 (R Core Team 2017).

RESULTS

General characterization of the interlocutors interviewed

Sellers of medicinal plants correspond to a group of men and women who have a wide knowledge on medicinal plants and associated treatments. They are low income people (MTSS 2017), born and raised in rural areas. Although when young they moved to the city to develop commercial activity, they learnt about medicinal plants since childhood as they collaborated with their families identifying and collecting therapeutic resources. Nowadays they perform the collection and trade of medicinal plants like an exclusive activity and of subsistence, they offer their products in the streets and main avenues of the city of Rivera, some of them moving with their baskets and others having fixed places of sale.

Women, in general, are dedicated to the sale as an economic complement to improve their income. They cover various items, such as: selling handicrafts and cosmetics, washing clothes, domestic work and the care of the elderly. They own small homegardens where they grow and harvest the plants that they later dry, fraction and sell. Commercialization is carried out in the homes, consisting of mainly the neighbors as the main buyers, also they offer their products at neighborhood fairs (ex street markets of "Cuaró" in "Rivera Chico" the one of greater dimension and assistance of neighbors). According to the analysis of speech, we infer that when they do not have a medicinal resource demanded in the market, they turn to the male sellers of medicinal plants and make product exchanges.

From the discourse of the interlocutors it has been inferred that they carry out plants and knowledge exchanges with other members of the community. Regarding to this, interlocutors are holders of medicinal botanical knowledge, be or not engaged in the sale of medicinal plants. Those who live in the urban and/or periurban environment, mostly have an education level ranging from complete school to basic high school. They are adult men and women who have been raised in rural areas and young people that have moved to cities (e.g. Rivera and Tranqueras). They have vast knowledge about medicinal plants and associated uses. They usually mention that this knowledge

was acquired following the teachings of the grandmothers and then supplemented with personal experience and multiple sources of information to which they have access. They usually have an extensive bibliography of consultation on the botanical medicine theme and they search the Internet on natural therapies. These people have in their homes, garden and courtyard crops of some of the medicinal plants that they use and interchange (Fig. 1).

Among the interlocutors that make up the rural group we can distinguish two subgroups. The first corresponds to the rural family, which develops farming and small-scale cow and sheep farming. Their houses are made of bricks, they have electric power and potable water, near the houses there are small subsistence homegardens and in some cases they develop bigger crops of watermelon (*Citrullus vulgaris*), sweet potato (*Ipomoea batatas*), tabacco (*Nicotiana tabacum*), lettuce (*Lactuca sativa*) and chard (*Beta vulgaris* var. *cicla*). Around their dwellings and in the homegardens they cultivate other plants that are used for medicinal purposes.

Figure 1: Example of homegardens where people grow some of the medicinal plants they use and exchange.

The second group corresponds to families dedicated to rural tourism, mainly those families that live inside the Biosphere Reserve. The members of this group generally have a higher education and socioeconomic level. They develop the cattle industry as a complementary activity. Their homes are comfortable, with electricity and drinking water, have Internet connectivity and are prepared to accommodate small groups of tourists. They have extensive material on popular flora and fauna, and show a particular interest in knowing and spreading the medicinal plants that are in their environment.

Sales posts and street sellers

At the Rivera city we observed fixed stalls and street vendors of medicinal plants, this characteristic is not observed in the rest of the cities of the department (Tranqueras, Corrales Minas, Masoller). Sellers display their products, offer and advise clients on treatments and medicinal properties similar to those performed by pharmacies. There have been no reports of ritual procedures or symbolic actions. The delivery of the product is done in packages of journal paper or white paper; the use of plastic bags was registered in a single opportunity. The approximate size of the branches with leaves and flowers is 15 cm, this allows an easy identification of the product, the approximate weight per package is 50 grams. No particulate material has been observed. The most visible plants at the sales posts and street vending baskets were: *Achyrocline satureioides, Ginkgo biloba, Jodina rhombifolia, Malva sylvestris, Matricaria recutita, Mikania periplocifolia, Scutia buxifolia* and S*tenachaenium campestre* (Table 1).

Courtyards and homegardens

At the courtyards and homegardens daily activities are performed, both of recreation and work related to the preparation and management of the soil, obtaining seedlings and cuttings, seed germination, irrigation, insect management and control, pruning and harvesting (Fig. 1). Specific crops are reported that constitute a mosaic of ornamental, medicinal, aromatic varieties, vegetables, fruit shrubs and plants related to magical aspects. The most reported medicinal plants in these systems were: *Aloe* spp., *Aloysia citrodora, Cestrum euanthes, various species of Citrus* spp., *Lantana montevidensis, Lippia alba, Malva sylvestris, Lavandula latifolia, Mentha* spp., *Mikania* spp., *Plantago tomentosa, Rosmarinus officinalis, Ruta chalepensis*. Less frequent were incorporated: *Achillea millefolium, Allium sativum, Allium cepa, Artemisia absinthium, Casearia decandra, Casearia sylvestris, Phyllanthus niruri, Tanacetum vulgare, Thymus vulgaris* (Table 1).

Harvest sites: "walking and participant observation"

In the rural area the daily activity of the fieldwork, carried out by men and women is considered by the interlocutors as an opportunity to obtain the medicinal plants. The following species are the most frequently reported in these events: *Acanthospermum australe, Arctium lappa, Baccharis articulata, Baccharis trimera, Matricaria chamomilla, Myrceugenia euosma, Usnea* sp., *Xanthium spinosum* (Table 1). On the other hand, the harvest of plants from the riverine forests is performed as a planned activity, usually carried out by men (Fig. 2). In these events it is common the harvest of: *Aloysia gratissima, Allophylus*

Table 1. Herbalist at the Biosphere Reserve, UNESCO, “Bioma Pampa-Quebradas del Norte”, Rivera Department, Uruguay. List of species of medicinal plants mentioned and collected (deposited in the Herbarium of the National Museum of Natural History of Montevideo —MNHN) during interviews with 44 key interlocutors. Species, scientific name to which ethnospecies belong; Guaranitic and spanish vernacular names, name used by the interlocutors when referring to ethnospecies; Habit, growth habit; Origin, whether native or alien species; Uses, uses assigned to medicinal plants; Ab, abortive; Al, alcoholism; An, antiseptic; Bo, bone; Can, cancer; Car, cardiovascular; De, dermatological; Ea, ear-nose-throat; G, gastrointestinal; Hae, haematological; Hai, hair; Im, immunological-allergic; Inf, infections; Li, liver; Ma, magical; Mem, memory; Met, metabolic; Mo, mouth; Ne, nervous; Nu, nutritional; Pai, pains; Par, parasites; Ren, Renal; Rep, reproductive; Res, respiratory; Sl, slimming; The, thermoregulator; Ve, vesicle; Vi, vipers; Wo, wounds; MVM, acronym corresponding to the collection catalog of the MNHN herbarium, under which the reference materials have been deposited.

Species	Guaranitic or spanish vernacular names	Habit	Origin	Uses	MVM
Adoxaceae					
Sambucus australis Cham. & Schltdl.	Sauco	Evergreen shrub	native	Ea,Res	23261
Alismataceae					
Echinodorus grandiflorus (Cham. & Schltdl.) Micheli	Sombrero de cuero	Evergreen herb	native	De,Bo,Inf,Met,Nu,Ren,Res	23284
Amaranthaceae					
Guilleminea densa (Willd. ex Roem. & Schult.) Moq.	Yerba del pollo	Evergreen herb	native	G,Ea,Res	23270

Amaryllidaceae				
Allium cepa L.	Cebolla	Evergreen herb	alien	Ea,Res
Allium sativum L.	Ajo	Evergreen herb	alien	Car,Inf,Met,Nu,Par,Res,Vi
Anacardiaceae				
Schinus molle L. var. molle	Anacahuita	Evergreen tree	native	Im,Ea,Res
Annonaceae				
Annona muricata L.	Graviola	Tree	alien	Can,Car,G,Ne
Apiaceae				
Pimpinella anisum L.	Anis	Annual herb	alien	G,Inf,The
Apium graveolens Cham.	Apio	Bi-annual herb	alien	An,Mo,Car
Eryngium pandanifolium Cham. & Schltdl.	Calaguala	Evergreen herb	native	Li,Ren
Eryngium sp.	Calaguala	Evergreen herb	native	G,Ne,The
Foeniculum vulgare Mill.	Hinojo	Evergreen herb	alien	G,Ne,Rep
Aquifoliaceae				
Ilex paraguariensis A. St.-Hil. var. Paraguariensis	Yerba mate	Shrub, Evergreen tree	native	Met
Araliaceae				
Panax ginseng C. A. Mayer	Ginseng	Evergreen herb	alien	Im,Met,Nu,Rep

Aspleniaceae					
Asplenium ceterach L.	Doradilla	Fern	alien	Car,G,Rep	23263
Asteraceae					
Acanthospermum australe (Loefl.) Kuntze	Yerba de la oveja	Annual herb	native	Li,Rep	23222
Achillea millefolium L.	Milenrama	Evergreen herb	alien	G	23217
Achyrocline satureioides (Lam.) DC.	Marcela	Evergreen shrub	native	An,Car,G,Li,Im,Ma,Met,Nu,Ea,Ren,Res	23223
Acmella decumbens (Sm.) R.K. Jansen var. *decumbens*	Barba de indio	Evergreen herb	native	G,Ren	23271
Arctium lappa L.	Bardana	Bi-annual herb	alien	An,G,Her	23312
Arnica montana L.	Arnica	Herb	alien	Ab,De,Pai,Hae,Bo,Im,Nu,Rep	
Artemisia absinthium L.	Ajenjo-Losna	Evergreen shrub	alien	G,Li,Ea,Par,Rep,Res	23214
Baccharis articulata (Lam.) Pers.	Carqueja blanca	Evergreen shrub	native	Sl,Car,G,Hae,Li,Met,Nu,Ren	23206
Baccharis trimera (Less.) DC.	Carqueja	Evergreen shrub	native	Sl,An,Car,G,Li,Met,Rep,Ve	23272
Conyza bonariensis (L.)	Carnicera	Annual herb	native	G,Wo,Li,Ren	
Cynara scolymus L.	Alcachofa	Herb	alien	G,Li,Ren	
Echinacea angustifolia DC.	Echinacea	Annual herb	alien	Inm	23335
Lactuca sp.	Lechuga	Annual herb	alien	Ne	
Matricaria chamomilla L.	Manzanilla	Annual herb	alien	Rep	23207
Matricaria recutita L.	Manzanilla	Annual herb	alien	Hai,Car,De,G,Ne,Rep	23203

Mikania glomerata Spreng.	Guaco	Evergreen creeper	native	Oi	23273
Mikania periplocifolia Hook. ARN.	Guaco	Evergreen creeper	native	Ea,Res	23294
Moquiniastrum polymorphum (Less.)	Cambará	Evergreen tree	native	Res	23308
Pluchea sagittalis (Lam.) Cabrera	Yerba lucera	Evergreen herb	native	G,Hig	23334
Stenachaenium campestre Baker	Arnica	Evergreen herb	native	Ab,An,Mo,Can,De,Pai,G,Hae,Wo,Bo,Inf,Im, Ea,Ren,Rep,Res	23264
Stevia rebaudiana (Bertoni) Bertoni	Stevia	Evergreen shrub	alien	Nu	23336
Tanacetum vulgare L.	Palma Imperial	Evergreen herb	alien	G,Wo,Li,Par,Ve	23216
Taraxacum officinale G. Weber ex F.H. Wigg.	Diente de León	Evergreen herb	alien	Sl,An,Li,Bo,Inf,Met,Nu,Ren,Ve	23309
Xanthium spinosum L. var. *spinosum*	Cepa caballo	Annual herb	native	Li,Res	23321
Boraginaceae					
Borago officinalis L.	Borraja	Annual herb	alien	The	23313
Lithospermum sp.	Siete sangrias	Annual herb	alien	Car,Hae,Met,Nu	23234
Symphytum officinale L.	Confrei	Annual herb	alien	An,Can,G,Her	23311
Brassicaceae					
Nasturtium officinale W.T. Aiton	Berro	Herb	alien	Ne	

Bromeliaceae					
Bromelia balansae Mez	Bananinha do mato	Bromeliad	native	Li,Res	
Tillandsia recurvata (L.) L.	Epilobio	Bromeliad	native	Rep	23337
Cactaceae					
Opuntia brasiliensis (Willd.) Haw.	Yurunibeba	Cactus	native	Pai,G,Ve	23333
Caricaceae					
Carica papaya L.	Papaya, mamón	Evergreen tree	native	Inf	
Celastraceae					
Maytenus ilicifolia Mart. ex Reissek	Congorosa	Shrub	native	Al,Car,G,Hem	23265
Cervantesiaceae					
Jodina rhombifolia (Hook. & Arn.) Reissek	Sombra de toro	Shrub, Evergreen tree	native	Al,Car,G,Hae,Wo,Li,Im,Met,Nu,Ren,Rep	23268
Chenopodiaceae					
Dysphania ambrosioides (L.) Mosyakin & Clemants	Paico	Annual herb	native	G,Hig	23205
Convolvulaceae					
Ipomoea batatas (L.) Lam	Boniato	Evergreen herb	alien	Met	
Cucurbitaceae					

Cucurbita pepo L.	Zapallo	Annual creeper	alien	G	
Dryopteridaceae					
Rumohra adiantiformis (G. Forst.) Ching	Calaguala	Fern	native	Pai,Li,Bo,Ren	23274
Ebenaceae					
Diospyros inconstans Jacq.	Caki	Evergreen tree	native	G	
Ephedraceae					
Ephedra tweediana Fisch. & C.A. Mey. emend. J.H. Hunz.	Cola de caballo	Evergreen shrub	native	An,Li,Inf,Im,Met,Nu,Ren,Ve	23303
Equisetaceae					
Equisetum giganteum L.	Cola de lagarto	Evergreen herb	native	Ren,Rep	23209
Euphorbiaceae					
Euphorbia serpens Kunth var. *serpens*	Yerba meona	Evergreen herb	native	Ren	23275
Manihot esculenta Crantz	Mandioca	Evergreen shrub	alien	Car,Pai,G	
Fabaceae					
Bauhinia forficata Link ssp. *pruinosa* (Vogel) Fortunato & Wunderlin	Pata de vaca	Evergreen tree	native	Car,Met,Nu,Ren,Rep	23283
Caesalpinia echinata Lam.	Palo Brasil	Shrub, Evergreen tree	native	De	23314
Cassia angustifolia Vahl	Sene	Shrub, Evergreen	alien	G	23320

		tree			
Erythrina crista-galli L. var. *leucochloa* Lombardo	Ceibo	Evergreen tree	native	Wo,Res	23304
Otholobium glandulosum (L.) J.W. Grimes	Culé	Shrub, Evergreen tree	alien	G	23322
Ginkgoaceae					
Ginkgo biloba L.	Ginkgo	Deciduous tree	alien	Car,Hae,Me	
Hypericaceae					
Hypericum connatum Lam.	Yerba del toro	Evergreen herb	native	Ne	23302
Hypericum perforatum L.	Hiperico	Evergreen herb	native	G,Ne	
Iridaceae					
Sisyrinchium vaginatum Spreng. ssp. *vaginatum*	Cambaracito	Evergreen herb	native	Met,Ea,Ren,Res	23293
Juglandaceae					
Carya illinoinensis (Wangenh.) C. Koch	Nuez de Pecan	Evergreen tree	alien	Met,Nu	
Labiatae					
Origanum vulgare L	Oregano	Evergreen herb	alien	G,Met,Rep	
Lamiaceae					
Hyptis radicans (Pohl) Harley & J.F.B. Pastore	Ortelan	Evergreen herb	native	De,G,Pa	23331
Lavandula angustifolia Mill.	Lavanda	Shrub	alien	Pai,Ne	

Marrubium vulgare L.	Marrubio	Shrub	alien	Sl,G,Li,Met,Nu,Rep,Res	23319
Melissa officinalis L.	Melisa	Evergreen herb	alien	Pai,Ne	
Mentha aquatica L.	Menta/levante	Evergreen herb	alien	G,Im,Ma,Met,Ne,Ea,Rep,Res	23208
Mentha spicata L.	Menta	Evergreen herb	alien	G,Ma,Ne	23212
Mentha x piperita L.	Menta	Evergreen herb	alien	Oi	23314
Rosmarinus officinalis L	Romero	Evergreen shrub	alien	Car,Pai,G,Ma,Met,Nu,Rep,Res	23330
Thymus vulgaris L.	Tomillo	SubEvergreen shrub	alien	Res	
Cinnamomum amoenum (Nees) Kosterm.	Garuvá	Evergreen tree	native	G	23276
Cinnamomum sp.	Canela	Evergreen tree	alien	G,Met,Ne,Nu,Rep,Res	
Laurus sp.	Laurel	Evergreen tree	alien	Ne,Nu,Res	
Persea americana Mill.	Palta	Evergreen tree	alien	G,Ren	
Loranthaceae					
Tripodanthus acutifolius (Ruiz & Pav.) Tiegh.	Yerba del pajarito	Evergreen parasit shrub	native	G,Hae,Wo,Inm	23277
Lythraceae					
Cuphea carthagenensis (Jacq.) J.F. Macbr.	Escobilla	Annual herb	alien	Car,Hem	23329
Cuphea fruticosa Spreng.	Siete sangrias	Evergreen herb	native	Car,Hae,Wo,Met,Nu,Ren	23215
Punica granatum L.	Granada	Evergreen shrub	alien	G	
Malvaceae					

Malva sylvestris L.	Malva	Annual herb	alien	An,Mo,De,G,Wo,Inf,Im,Ea,Ren,Rep	23301
Modiola caroliniana (L.) G. Don	Mercurio	Evergreen herb	native	De,Her	23279
Meliaceae					
Melia azedarach L.	Paraiso	Evergreen tree	alien	De	
Menispermaceae					
Cissampelos pareira L.	Oreja de tigre	Evergreen liana	native	Li,Ren	23298
Monimiaceae					
Peumus boldus Molina	Boldo	Evergreen shrub	alien	G,Li,Ve	
Moraceae					
Dorstenia brasiliensis Lam.	Higuerilla	Evergreen herb	native	Wo,Res	23292
Morus alba L.	Mora	Evergreen tree	alien	Met,Ne,Ren,Rep,Res	23338
Myrtaceae					
Blepharocalyx salicifolius (Kunth) O. Berg	Arrayan	Shrub, Evergreen tree	native	Car,Pai,G,Hae,Li,Nu,Ren,Res,Ve	23201
Campomanesia xanthocarpa O. Berg var. *littoralis* (D. Legrand) Landrum	Guabiroba	Shrub, Evergreen tree	native	Met,Nu,Ren	23343
Eucalyptus globulosus St.-Lag.	Eucalypto	Evergreen tree	alien	Res,The	
Eugenia uniflora L.	Pitanga	Shrub, Evergreen tree	native	Pai,G,Nu,Oi	23297
Eugenia uruguayensis Cambess.	Guayabo blanco	Shrub, Evergreen tree	native	Wo,Pa	23344

Myrceugenia euosma (O. Berg) D. Legrand	Murta	Shrub, Evergreen tree	native	G,Li,Res	23315
Myrrhinium atropurpureum Schott var. *octandrum* Benth.	Palo de fierro	Shrub, Evergreen tree	native	Im,Met,Nu	23305
Psidium cattleianum Sabine	Azará	Evergreen shrub	native	G,Wo,Met,Ren,Ve	23291
Oleaceae					
Fraxinus excelsior L.	Fresno	Evergreen tree	alien	Hem	
Olea europaea L.	Olivo	Evergreen tree	alien	Car	
Onagraceae					
Epilobium parviflorum Schreb.	Epilobio	Annual herb	alien	Rep	23328
Parmeliaceae					
Usnea sp.	Yerba de la piedra	Lichen	native	An,Mo,Ren	23278
Passiflora caerulea L.	Burucuya	Evergreen liana	native	Ne,Nu	23218
Passiflora edulis Sims	Maracuya	Evergreen liana	alien	Ne	
Turnera diffusa Willd.	Damiana	Evergreen shrub	alien	Met	23316
Phyllanthaceae					
Phyllanthus niruri L.	Quebra pedra	Annual herb	native	Ren,Rep,Ve	23280
Phyllanthus sellowianus (Klotzsch) Müll. Arg.	Sarandi blanco	Shrub, Evergreen tree	native	Hae,Met,Nu	23300
Phytolacca dioica L.	Ombú	Evergreen tree	native	G	
Piperaceae					

Piper mikanianum (Kunth) Steud. var. *mikanianum*	Pariparoba	Evergreen shrub	native	Ab,G,Hem	23322
Plantaginaceae					
Plantago tomentosa Lam. ssp. *tomentosa*	Llantén	Evergreen herb	native	An,Mo,Can,G,Wo,Li,Inf,Im,Nu,Ea,Ren,Ve	23282
Plumbaginaceae					
Limonium brasiliense (Boiss.) Kuntze	Baicuru	Evergreen herb	native	G	23339
Poaceae					
Cymbopogon citratus (DC.) Stapf	Pasto limón	Evergreen herb	alien	Ne	23317
Sorghastrum pellitum (Hack.) Parodi	Cola de zorro	Evergreen herb	native	Ren	23306
Zea mays L.	Barba de choclo	Annual herb	alien	Inf,Ren	
Polygonaceae					
Polygonum punctatum Elliott	Yerba del bicho	Annual herb	native	De,G,Inm	23290
Polypodiaceae					
Microgramma vacciniifolia (Langsd. & Fisch.) Copel.	Suelda-consuelda	Fern	native	Bo,Met,Nu	23296
Pontederiaceae					
Pontederia cordata L. var. Cordata	Sombrero de cuero	Evergreen herb	native	Pai,Hu	23318

Ranunculaceae					
Clematis bonariensis Juss. ex DC.	Barba de viejo	Evergreen liana	native	De,Wo,Vi	23327
Rhamnaceae					
Discaria americana Gillies & Hook.	Quina del campo	Evergreen shrub	native	Sl,Hai,G,Ren,The	23221
Scutia buxifolia Reiss.	Coronilla	Tree	native	Car,Hae,Met,Nu,Ren	23281
Rosaceae					
Eriobotrya japonica (Thunb.) Lindl.	Nispero	Evergreen shrub	alien	Res	
Prunus subcoriacea (Chodat & Hassl.) Koehne	Duraznero	Tree	native	G,Pa	23323
Rubiaceae					
Uncaria tomentosa (Willd. ex Roem. & Schult.) DC.	Uña de gato peruana	Liana	alien	An,Bo,Inm	
Rutaceae					
Citrus aurantium L.	Limera	Evergreen tree	alien	Car,G,Ne	
Citrus limon (L.) Osbeck	Limón	Evergreen tree	alien	Car,Pai,G,Hae,Met,Ne,Nu,Ea,Ren,Res	
Citrus sp.	Lima	Evergreen tree	alien	De,Pai,G,Wo,Inf,Ne,Ea,Res	
Ruta chalepensis L.	Ruda	Evergreen shrub	alien	Ab,Car,Pai,Ma,Par,Ren,Rep,Vi	23340
Salicaceae					
Banara tomentosa Clos	Guazatunga	Shrub, Evergreen	native	De,Pai,Vi	23286

		tree			
Casearia decandra Jacq	Guazatunga	Shrub, Evergreen tree	native	An,De,Vi	23220
Casearia sylvestris Sw. var. *sylvestris*	Guazatunga	Shrub, Evergreen tree	native	An,De,Pai,Wo,Bo,Inf,Vi	23219
Salix humboldtiana Willd.	Sauce	Evergreen tree	native	Do	23289
Sapindaceae					
Aesculus hippocastanum L.	Castaño de la India	Tree	alien	Car	
Allophylus edulis (A. St.-Hil., A. Juss. & Cambess.) Hieron. ex Niederl.	Chal chal	Evergreen tree	native	Hig	23267
Paullinia cupana Kunth	Guarana	Evergreen shrub	alien	Mem,Met,Nu	
Schisandraceae					
Illicium verum Hook. f.	Anis estrellado	Evergreen tree	alien	G,Ne	
Simarubaceae					
Quassia amara L.	Cedro santo	Shrub, Tree	native	Met,Nu,Pa	23324
Smilacaceae					
Smilax campestris Griseb.	Zarzaparrilla	Evergreen liana	native	An,Hae,Wo,Inf,Im,Met,Nu	23341
Solanaceae					
Atropa belladonna L.	Bella dona	Shrub	alien	G	23345
Cestrum euanthes Schltdl.	Guazatunga	Shrub, Evergreen	native	De,Vi	23285

		tree			
Datura arborea L.	Floripon	Annual herb	alien	Res	23344
Nicotiana glauca Graham	Palán-palán	Shrub, Evergreen tree	native	Her	23287
Solanum paniculatum L.	Yurubeba	Evergreen shrub	native	G	23299
Solanum tuberosum L.	Papa	Evergreen herb	alien	Do	
Tiliaceae					
Luchea divaricata Mart.	Francisco Álvarez	Evergreen tree	native	Hem	23295
Tilia cordata Mill.	Tilo	Tree	alien	Car,Ne,Ea,Res	23326
Tropaeolaceae					
Tropaeolum majus L.	Taco de reina	Evergreen herb	alien	Met,Nu	23307
Urticaceae					
Urtica dioica L.	Ortiga	Shrub	alien	Hai,Res,The	23288
Verbenaceae					
Aloysia citrodora Palau	Cedron	Shrub, Evergreen tree	native	An,Mo,G,Ne,Res,The	23211
Aloysia gratissima (Gillies & Hook. ex Hook.) Tronc. var. *gratissima*	Cedron del monte	Shrub, Evergreen tree	native	G,Ne,Ea,Res	23325
Lantana montevidensis (Spreng.) Briq.	Salvia	Evergreen creeper	native	An,Mo,Inf,Ea,Ren,Res	23232
Lippia alba (Mill.) N.E. Br. ex	Salvia	Evergreen shrub	native	G,Oi	23213

Britton & P. Wilson var. *Alba*					
Salvia officinalis L.	Salvia	Evergreen shrub	alien	G,Inf,Ea,Par,Ren,Res	23266
Violaceae					
Anchietea pyrifolia (Mart.) G. Don	Cipó suma	Shrub, Evergreen tree	native	Bo,Vi	23327
Vitaceae					
Cissus verticillata (L.) Nicolson & C.E. Jarvis	Insulina vegetal	Evergreen liana	native	Met,Nu	23342
Zingiberaceae					
Zingiber officinale Roscoe	Gengibre	Evergreen herb	alien	Res	

Figure 2: Walking and participant observation in medicinal plants harvesting near Lunarejo stream.

edulis, Ephedra tweediana, Jodina rhombifolia, Uncaria tomentosa, Scutia buxifolia (Table 1). It is important to highlight the harvest of *Achyrocline satureioides*. This medicinal plant is harvested on the "Palm Sunday" in Uruguay, which is located between the last week of March and the first weeks of April. On this religious date, people go to the sites where wild populations are found and collect a bouquet that will remain in the house throughout the year, being replaced next year, with the next harvest. It is highlighted that people consider that the species collected on this date has greater effectiveness (Fig. 3).

Medicinal plants diversity

We report a total of 159 species belonging to 75 botanical families used for medicinal purposes (Table 1). The richness estimated by the Chao 2 index was 195.6 species ($IC95\%_{sup}$=177; $IC95\%_{inf}$=236). The diversity of botanical families were: Asteraceae with 24 species (40.0%), followed by Lamiaceae and Myrtaceae with 8 species (12.0%). The habit of growth is distributed in 79 species of trees, shrubs and sub-bushes (49.7%), 61 of herbs (38.4%), seven of lianas (4.4%), four of creepers (2.5%), three of ferns (1.9%), two bromeliads (1.3%), a lichen (0.6%), one succulent (0.6%) and one cactus (0.6%) (Table 1). Of the total recorded species, 87 are native and 72 are alien. Regarding the comparison of the diversity of species used between urban and rural environments, it is found that when interpolating both curves to ten samples, the differences between the two groups are not significant (Fig. 4a). Regarding the geographic origin of the species, the native medicinal plants did not report a greater

Figure 3: Harvesting of *Achyrocline satureioides* on the last Sunday of "Holy Week" in the vicinity of Rivera city, Rivera, Uruguay.

diversity than the alien ones for the whole sample (Fig. 4b). However, in discriminating the rural environments of the urban, the former reported a greater number of native medicinal plants (Fig. 4c) and the latter reported a greater number of alien medicinal plants (Fig. 4d).

DISCUSSION

This work represents the first contribution in which the herbalist of an area of relevance for the biocultural conservation in Uruguay is described. Considering the population density and the size of the Uruguayan territory, the diversity of medicinal plants included in the therapeutics of the studied community is surprising, but it is a reflection of vast herbalist knowledge in the context of the Neotropical region (see Arenas 2009; Begossi et al. 2002; Gazzaneo et al. 2005). Asteraceae family has been the most conspicuous of the studied pharmacopoeia. This is expected since it corresponds to one of the families with the greatest diversity of genera and species within the Angiosperms (Funk et al. 2009), and also coincides with the surveys of diversity for the area (Brussa and Grela 2007). In addition, other works of the region describe this family as the most cited for medicinal uses (Baptista et al. 2013; Begossi et al. 2002). Species of Asteraceae family are pioneers and develop in open environments (Funk et al. 2009). Both traits could contribute to people finding, recognizing and harvesting them in places modified by anthropic activities, such as those corresponding to sites near houses, gardens and areas for agriculture and livestock. This finding reinforces what was observed by other authors regarding the importance of disturbed or modified

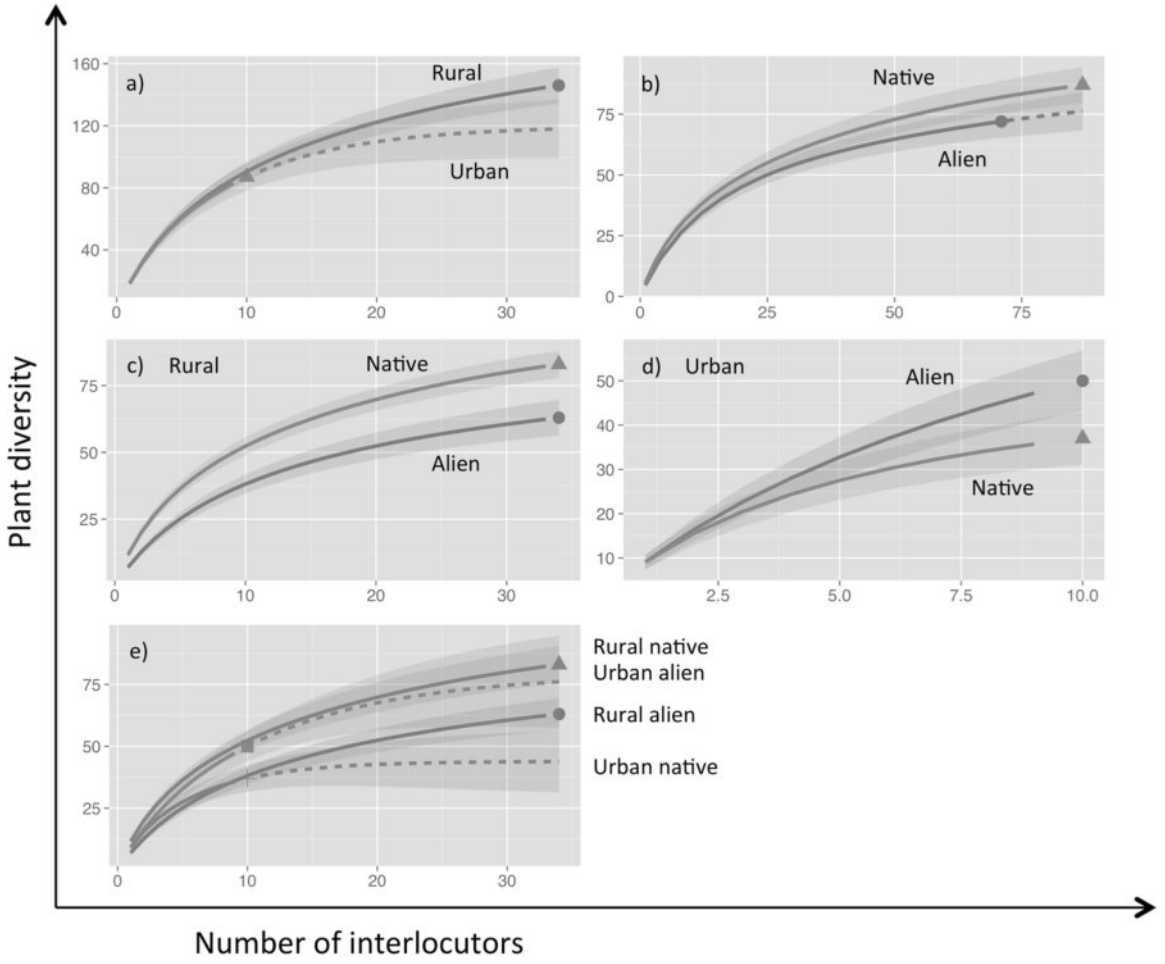

Figure 4: Rarefaction curves comparing the diversity of species reported for the interlocutors. a) Comparison for rural and urban environments; b) comparison according to provenance of the species in native and alien; c) Comparison of discriminated according to provenance of native and alien species reported exclusively in rural environment; d) discriminated comparison according to native and alien species reported exclusively in urban environment; e) comparison of diversity of species discriminated according to origin and environments.

environments and the role they play in the supply of medicinal resources (Begossi et al. 2002).

It is considered that the greater representativeness of Asteraceae, Lamiaceae and Myrtaceae is due in part to its organoleptic properties. These families are characterized by the presence of essential oils and strong flavor (Alonso Paz et al. 2008; Hurrell et al. 2011), which would prove to be a characteristic valued as a mnemonic resource for the identification, experimentation and use in treatments of various ailments (Casagrande 2000; Johns 1999). Thus these traits can influence the representativeness of these families as therapeutic options (Casagrande 2000; Pieroni and Torry 2007). A similar pattern has been reported in other works in Rio Grande do Sul and in the Atlantic Coastal Forest of South East Brazil (Bagatini et al. 2009; Begossi et al. 2002).

Under deterministic or positivist theoretical frameworks that propose to the environment as a determinant and limiting factor, respectively, of the behaviors of resources choice and therapeutic options (Sutton and Anderson 2014), we could assume that in rural environments there is a greater knowledge and use of species richness than in urban ones, since in the latter the environment presents a lower species richness (Albuquerque 2013). This hypothesis was not supported by our data since no significant differences were observed when comparing the number of medicinal species mentioned by the interlocutors of rural or urban settlements. Some of the assumptions would not be observed at our study area: differences in environmental species richness and/or people knowledge on medicinal plants between rural and urban areas. In this sense, the environmental construction could change species availability (e.g. courtyards and homegardens), seeds interchange, purchase, and harvest and storage (e.g. harvest and storage of *Achyrocline satureioides* associated to religious calendar) (Kendal et al. 2011). The phenomenon should be considered together, including the various belief systems, knowledge and behavior, where people choose, use, share and actively manage a specific set of plants for the treatment of diseases and maintenance of health (Pochettino et al. 2012; Toledo 2002; Toledo and Alarcon-Chaires 2012).

When incorporating the origin of plant species that compose the botanical pharmacopoeia at the study area, a repertoire of medicinal plants composed by alien and native species is obtained, a characteristic shared by other works in South America (Abreu et al. 2015; Funk et al. 2009; Janni and Bastien 2004; Martínez and Pochettino 1992; Rossato et al. 1999). This pattern has been partly attributed to migration processes, which can be approached at two scales. On the one hand, a scale, with clear incidence of the Eurasian pharmacopoeia, legacy of the transatlantic migratory flow (Arenas 2009, Pellegrino 2013), which could explain the widespread presence of alien species. On the other hand, the second scale related to the rural population once established in a new urban context, recreates "landscapes of rural origin" in homegardens (Furlan et al. 2016). Following this reasoning it is possible to attribute the high number of mentions of alien to the characteristics of the population, with a strong component of descendants of European immigrants (Bonilla et al. 2004; Pellegrino 2013), while the mention of native plants in rural and urban environments could be related to the strong link between these environments (Medeiros et al. 2012). In this sense, different species of the family Asteraceae, such as *Solidago microglossa* and *Stenachaenium campestre*, in Brazil and Uruguay respectively, are known under the vernacular name of “Arnica”. Possibly this is due to similarities in some of the characteristics of leaves and flowers with the species of European origin *Arnica montana*. Moreover, in the present work therapeutic purposes similar to those attributed to *Arnica montana* (e.g. wounds, muscle aches, bumps, bruises) are reported as Di Stasi and Hiruma-Lima (2002) did for the region of the Atlantic Forest.

In this regard, considering the idiosyncratic nature of the used plants, it was observed that in rural environments, unlike the urban ones, people tend to use a higher proportion of native than alien medicinal species. Greater familiarity with native medicinal plants in rural areas may be related to better access to harvest sites,

obtaining "first-hand" medicinal resources (Pochettino et al. 2010, 2012). On the other hand, people in the urban environment would have difficulties with "first hand" access and would have a varied supply of medicinal plants thanks to third parties and where alien plants would be most represented (Balick and Cox 1996). In addition, in urbanized areas the incidence of modernization phenomena could be greater (e.g. greater access to the media, wide flow of people from diverse cultures), resulting in a more evident and fast incorporation of foreign plants for health care (e.g. Leonti 2011; Leonti et al. 2010). Possible agents influencing the dynamics of popular knowledge transformation in urban areas are: the greater choice of health care options, the difficult access to natural environments where the medicinal plants grow, and the processes of migration, acculturation and modernization (Alencar et al. 2014; Ceuterick et al. 2008; Medeiros et al. 2012; Ramirez 2007; Vandebroek and Balick 2012). The urban areas of the Rivera Department have a wide coverage of biomedical assistance, with availability of industrialized medicines. In rural areas, however, official assistance is not as frequent; nevertheless there is a system of sporadic medical rounds.

CONCLUSIONS

This work shows how community agents have a wealth of knowledge about plant diversity and phytotherapies. In urban and rural environments, the traditional knowledge of the Eurasian and Amerindian pharmacopoeias is reflected in the incorporation of alien and native plants. However, rural environments where the knowledge associated with the original peoples is more preserved, native species are predominant. The complexity of knowledge and behaviors associated with medicinal plants reflects the important role played by community referents in the maintenance and care of the health of the population as a whole. The results shown here can be used as tools to help policymakers to understand and to consider traditional knowledge and plant medicine. This knowledge should be integrated, as the strategic objectives of the World Health Organization (WHO 2013), into the new model of renewed Primary Health Care. It is particularly important in one of the most neglected areas of Uruguay. Development indices always show a relative disadvantage, in relation to the Uruguayan context, being considered as a marginalized society in terms of: poverty, social exclusion, marginality, gender inequality, instability and labor informality, among others indices (INE 2011; Rodriguez Miranda 2010). At the same time, the contribution offers a reflection that shows how environments with high biological diversity in multicultural contexts can constitute an ideal platform to address biocultural conservation efforts (Gavin et al. 2015; Maffi 2007).

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Eletronic supplementary 1 - Study area

In the year 2011, 110.882 hectares of Rivera Department, Uruguay, is declared: “UNESCO Reserve Biosphere”, under the name “Bioma Pampa-Quebradas del Norte” (Fig. S1).

Interview questions

Information of the interlocutor: name, age, place of birth and residence, work activity.

Guiding questions

1. Do you use medicinal plants for the maintenance and care of your health or your family?
2. What plants do you use and for what kind of treatment?
3. What plants cannot miss in your home?
4. Where do you get them?
5. If the interlocutor is the one who harvests, it is inquired about aspects of origin of the medicinal plants (forest, meadow, modified environments, courtyards, gardens).
6. Which type of preparations they perform for the consumption of MP?
7. In the case of sellers of medicinal plants, a modification of the questionnaire was made.
8. What plants cannot be missing in first aid kit and for what treatments?
9. Where do you get them?
10. Aspects related to the management of medicinal resources:
11. Harvest: site, frequency, harvest practice.
12. Preparation of the resource for sale: storage, drying, fragmentation, and packaging.
13. Finally, for both interviews, the origin of the information related to plants and treatments is investigated: source of learning (e.g., parental way, books, internet).

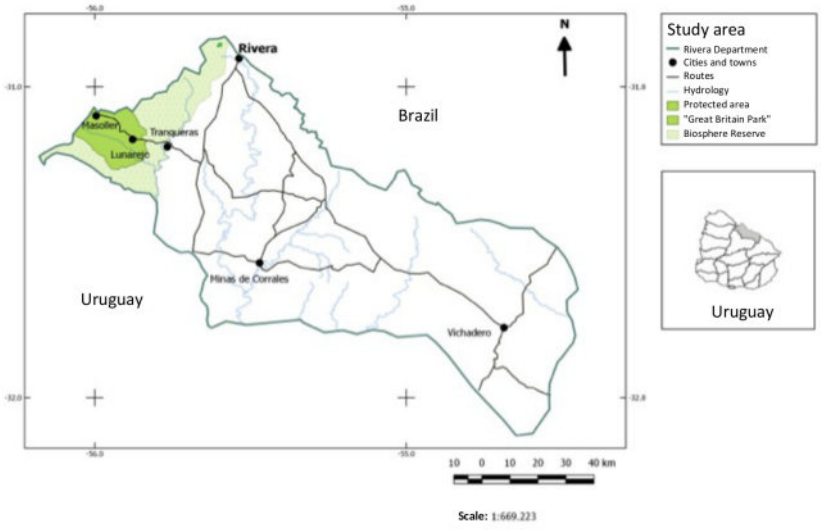

Figure S1: Map of the study area, at Rivera Department, Uruguay, in the national context and referencing the main localities and geographical features.