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Medicinal plants in the family farms of rural areas in southern Brazil: ecological and ethnobotanical aspects

[Plantas medicinales en las fincas familiares del área rural en el sur de Brasil: aspectos ecológicos y etnobotánicos]

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Abstract: The objective of this study was to find which medicinal plants were used by family farmers from rural areas located in the state of Santa Catarina, southern Brazil, and to characterize the habitat where they are cultivated. This research was conducted in 2011/2012, it included 43 farmers aged from 38 to 92 years of age, and it was grounded on the snowball method. A total of128 species belonging to 60 botanical families were found. Three cultivation areas are discussed, namely, backyard, grass field, and "capão", a small forest fragment. Herbaceous and shrubby species were most commonly found in the backyard and grass field areas, while tree species were found in the "capão". Medicinal plants were mostly located in areas that had been modified by farmers.

Keywords: herb, botanical knowledge, Araucaria forest, Highland fields

Resumen: El objetivo de esta investigación fue identificar las plantas medicinales utilizadas por los agricultores familiares del área rural de Santa Catarina, sur de Brasil, y caracterizar el hábitat donde se cultivan. La evaluación se realizó en 2011/2012 con 43 agricultores de 38 a 92 años siguiendo la metodología de la bola de nieve. Se pudo identificar 128 especies pertenecientes a 60 familias botánicas. Tres ambientes para el cultivo: quintas, pastizales y fragmentos forestales. En las quintas y pastizales predominan las especies herbáceas y arbustivas, mientras que las especies arbóreas se localizaron en los fragmentos del bosque. Las plantas medicinales se encontraban principalmente en hábitats modificados por los agricultores.

Palabras clave: hierbas medicinales, conocimiento botánico, bosque de araucaria, Campos de planalto

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INTRODUCTION

Rural communities that live on family farming, when far from urban areas, use local flora as resource, and this ends up affecting the structure and richness of their surrounding ecosystem (Amorim & Boff, 2009; Costa *et al*., 2017). All over the world, medicinal plants have played an important role on the processes of healing and struggling for survival of human civilizations. The close relationship between human beings and local flora has made it possible and necessary to develop a field of science called Ethnobotany (Albuquerque, 2005). The "South Plateau of Santa Catarina Region", in the state of Santa Catarina, southern Brazil, has special ecological conditions and socio-cultural peculiarities, where "Ombrofila Mista Forest" can be found interleaved with exotic forestry plants and field crops (Martins-Ramos *et al*., 2010). Both extensive livestock husbandry and large plantations of exotic timber plant species have been the main causes of reduced flora diversity, and both may pressure farmers to either move within rural areas or leave them.to reduce and move on the traditional family farm. This situation has worsened since the 1970s, when public policies started to encourage the establishment of fruit orchards, intensive crop farming and reforestation with *Eucalyptus* and *Pine* trees (Pereira *et al*., 2006). The landscape became a mosaic of crops, livestock, exotic timber plantations, and native small forest fragments called "capão". However, despite the fact that there was an economic pressure to push forest into reduced areas, there is still great richness of native species in the Atlantic Biome, as reported elsewhere (Zank & Hanazaki, 2012). Therapeutic and aromatic species (*Cunila microcephala* and *Poiretia latifolia*) were reported by Amorim & Boff (2009) to occur in the Coxilha Rica community of South Plateau of Santa Catarina, despite the great changes in the Natural Grassland of Highland ecosystems for farming. The native fruit species *Acca sellowiana*, which therapeutic properties have been abundantly reported by farmers in that region, has been recently domesticated (genetically selected by research) to produce fruits for the market (Santos *et al*., 2009). The vegetation present and predominant in the South Plateau of Santa Catarina is closely related to the history of occupation of the region and the ways in which rural populations have settled in and made use of plant resources.

The region of the South Plateau of Santa Catarina is ethnically diverse. The Tupi-Guarani native Indian aboriginal occupation came first, followed by incursions from "*bandeirantes*" (settlers) of São Paulo, who were Spanish descendants; The last internal migrations came from southern Brazil with Italian descendants (Pereira *et al*., 2006). Before the Italian internal migration, rural areas were strongly occupied by mixed-race people that gave origin to a social group identified as "Caboclo", with their own way of living and understanding nature (Bloemer, 2000). With regard to medicinal plants in the rural areas of the region under study, these are categorized through a system that points to ethnic-cultural influences (Martins & Welter, 2009). Menegatti *et al*. (2014) report that there is an understanding in the rural communities of the South Plateau of Santa Catarina about the need to preserve native forest among family farmers. However, their perception does not render productive and organized practices for this purpose. This aspect differs from the observations made by González-Cruz *et al*. (2015), in their study on the Mayas of the Yucatan Peninsula (Mexico); as well as the observations of Reyes-García *et al*. (2011), in relation to the Tsimane community, in the Bolivian Amazon (Bolivia). In these studies, they have reported a collectively constructed code of conduct that consciously governs traditional populations in environmental management.

Public polices on medicinal plants, as a valid healing procedure throughout public health service, the "Sistema Único de Saúde" - SUS (Brazil's National Health System), have encouraged studies and research on the identity of medicinal plants associated with their popular use (Silva & Moraes, 2009). This could help the implementation of plant medicinal treatments at health basic units located in each city.

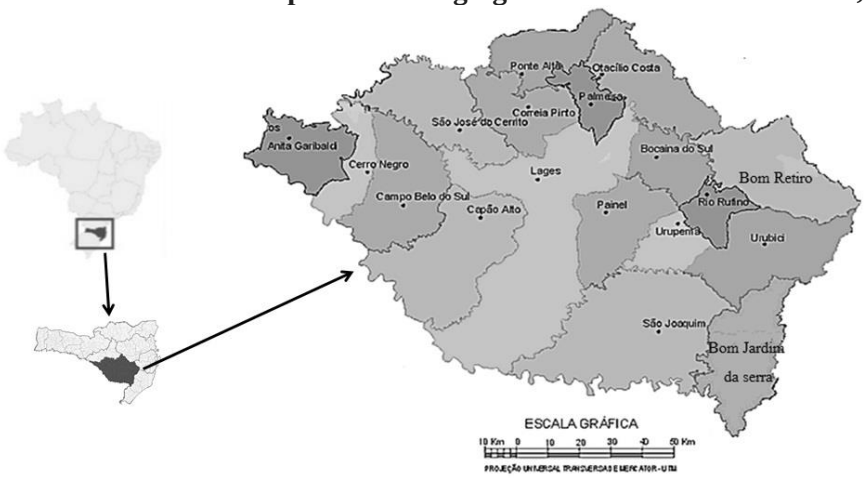
The objective of this study was to identify medicinal plants and their mode of cultivation by rural families, as well as the general characterization of the areas where they occur. Additionally, it was sought to identify the existence of popular knowledge pattern among family farmers, considering age and gender.

MATERIAL AND METHODS

The study was conducted from November 2011 to December 2012 by visiting farmers pointed as medicinal plant growers. The geographic area considered comprised 18 cities in the region of the South Plateau of Santa Catarina, Southern Brazil, with a total area of 16,085 km² and a population of 286,291 inhabitants (Brazil, 2010) (Figure 1). In this region, 18% are rural inhabitants (Brazil, 2010).

Family farming evolves around the cultivation of corn and beans, associated with the cattle production of meat and milk. The cities of Lages and São Joaquim have populations of more than 20 thousand inhabitants, and the other cities studied the rural population is less than 5 thousand inhabitants (Brazil, 2010). Veiga (2004) reports that in this region, even larger cities are essentially rural, as there is no socioeconomic and socio-cultural distinction between the rural and urban inhabitants of these cities. Even the inhabitants considered urban have complementary occupation in productive agricultural activities forming a rural-urban continuum (Pereira *et al*., 2006).

Figure 1
Geographic location of the municipalities belonging to Planalto Sul Catarinense, SC, Brazil.



The South Plateau of Santa Catarina is located in the Atlantic Forest biome, which predominant forest type is the Araucaria Forest associated with Natural Grassland of Highland ecossistem (Siminski *et al*., 2011). Respondents were sampled through the intentional technique according to Tongco (2007). In each city, initial contact was made through the rural extension service, the local department of agriculture, and health workers. The *snowball* technique for the interviews was used, as suggested by Bailey (1994). Sample sufficiency was achieved by making use of the answer saturation curve on quoted medicinal species following Peroni *et al*. (2010). The number of respondents by gender and age group were not previously established, since the methodology adopted was unsystematic.

Legal measure, to access data associated with medicinal plants, have been taken according to the Ethics Committee of the "Universidade do Estado de Santa Catarina" (State University of Santa Catarina), case number 334.932. Data assessment was accomplished through semi-structured interviews, with further follow-ups, to characterize the occurrence of areas of medicinal plants (Albuquerque *et al*., 2014).

Medicinal plants were identified in terms of species, according to the APGII classification system, preserving local denominations, or the lowest level of taxon, made possible by the phenological stage at the time of the interview (APG II, 2003). Sample of plants were made in all the interviews for later botanical identification. In case of doubt in the

identification of the species, the collected material was identified only in terms of genus. In any case, all plants were classified into their respective botany family. The local herbarium of the Agricultural Research and Rural Extension Service Agency of Santa Catarina (Epagri-Lages) received and kept the samples. The identification was made by comparison with the herbarium at the State University of Santa Catarina (UDESC-Lages), the Digital Flora Site of Rio Grande do Sul (UFRGS, 2013), and with the help of related references (Lorenzi & Matos, 2008; Souza & Lorenzi, 2005). Whenever necessary, samples were sent to an expert in their respective taxon. We chose to adopt specimen expression to make reference to the plants that have been identified only in terms of genus.

Sampled plants were categorized as native, introduced or naturalized as regards the Brazilian Biomes. Introduced specimens were considered to be those that were cultivated and needed to be cultivated in annual cycles; While naturalized specimens were those that did not need cropping or other human interventions for their continuous survival (Lorenzi & Matos, 2008). The growth habits was classified as arboreal, herbaceous, shrubs, and climbing (Souza & Lorenzi, 2005). For practical purpose we did not consider sub-shrubs, such as *Rose* and *Ruta graveolens*, among other.

The systematization of popular knowledge involved combining qualitative and quantitative methods in Ethnobotany (Albuquerque *et al*., 2014). The identity of respondents was not revealed for ethical reasons. The interviews were made after respondents' consent. The places of occurrence and/or cultivation mentioned by respondents were grouped in backyards, field grasses and "capão" (small forest fragment). The following definitions were used: (i) backyards - areas located around the houses, where they also cultivate food plant species; (ii) field grasses - areas used for agricultural cultivation in summer or intended for grazing during the winter, as well as areas with vegetation in primary successional stage, so-called "paddocks", where cattle can move and occasionally feed on grass; (iii) capão - small forest fragments, which areas suffer minor anthropogenic interference compared to other areas. These categories were defined based on how family farmers in the region referred to the areas where the medicinal plants mentioned were placed. These expressions were adopted because they are expressive of peculiar meanings to the region under study, reflecting the relationship of the farmers with the natural environment they inhabit.

Data Analysis

Richness estimators Jackknife 1 and 2 were used to evaluate the number of species that could be counted during the survey, regardless of the number of citations per species (Peroni *et al*., 2010). The Respondent Diversity Value-IDV for ethno-knowledge distribution analysis of medicinal plants was estimated according to Byg & Balslev (2001), whose respondents were grouped by gender and age. Thus, the interviewees were grouped by gender. Subsequently, in each gender, the interviewees were grouped into age groups of 9-year interval. The female group consisted of members aged from 30 to 90 years, while the male group consisted of members aged from 50 to 90 years. The Kruskal-Wallis test was used to determine differences among the respondents.

RESULTS AND DISCUSSION

Ethnobotany related to medicinal plants

The respondents (43) were 38 to 92 years old, consisting of 15 men and 28 women. Active family farmers accounted for 17, while the other defined themselves as "retired farmers", but living in rural areas. The respondents reported 147 different specimen used in healing processes. There was no significant difference between genders (IDV; p=0.1644) or among age groups (IDV; p=0.4829). The diversity of specimen reported was not different among age groups even for the same gender (male; IDV, p=0.3422; female, IDV, p=0.5158). This finding contrasts with Borges & Peixoto (2009), who reported that men have a broader knowledge about species that are used as wood whereas women keep better references about medicinal and food plants. Equivalent data for genders on medicinal plants have also been reported by Miranda & Hanazaki (2008) and Lopes & Lobão (2013). The highest IDV was found in men above 80 years old and women from 70 to 80 years old. That means old people can better preserve local knowledge on medicinal plants than younger. In other scenarios, such as in central Brazil,

age is also a main factor correlated to information about healing with medicinal herbs (Costa *et al*., 2017). Also Begossi *et al*. (2002), in a study developed in the "Caiçaras" tribe in Rio de Janeiro, found that participants older than 50 years had more information on species than the younger. When asked if young people were concerned about the use of medicinal plants, the answers were very similar to this: "Well, they do not care about that anymore. Nowadays, people are always in a hurry and plants heal slowly according to them." According to Lopes and Lobão (2013), is the fact that older people maintain most of the information on the matter is a robust indication that community does not acknowledge young people as a possibility of local knowledge reference. Nevertheless, in our study, women between 30 to 40 years old presented the highest IDV, among female groups. This suggests that women exchange more knowledge than men, probably throughout social events. Monteiro *et al*. (2006) in a study carried out in two communities in Northeastern Brazil, found higher VDI in women bellow 40 years old; whereas in men, higher IDV was found above 40 years old.

The medicinal specimen indicated by farmers were sorted into 128 botanical species comprised into 19 genus. In total, there were 60 botany families (Table 1). It was found that 40% of cited specimen were indicated by one or/and two respondents. This frequency distribution influenced the 1 and 2 Jackknife index, which indicated the rarity of the species. As a matter of fact, the richness index Jackknife 1 was 186 estimated number of species and Jackknife 2, 199 species. Such fact suggests that a significant amount of plant species is not common nor shared among local inhabitants. Zank & Hanazaki (2012), studying medicinal plants along the Santa Catarina coast, also found similar information to the one in this present study when considering the richness estimator, which estimated 286, whereas the reported species were only 197.

Table 1

Medicinal plants reported by farmers in the South Plateau of Santa Catarina, Brazil, given the botanical identity of species, popular names, local status of occurrence (N=native, I=introduced, Nt=naturalized), growth areas (He=herbaceous, Tr=climbing, Ab=shrubby, Ar= tree), source systems (Q=backyard, C=field grass, Fr="Capão"- small forest fragment, Do*=donation), N=number of citations of the specimen, * Samples that were identified only until the genus taxon.

Species	Botanical families	Popular names	Local occur	Growth habits	Source systems	N
Echinodorus grandiflorus (Cham. & Schltdl.) Micheli	Alismataceae	chapéu-de-couro	N	He	C, Q	11
Sambucus australis Cham. & Schltdl.	Adoxaceae	sabugueiro	N	Ar	C, Q	03
Alternanthera sp.*	Amaranthaceae	parreirinha de são-joão-maria	N	He	C	02
Dysphania ambrosioides (L.) Mosyakin & Clemants	Amaranthaceae	erva de santa maria	N	He	Q, C	08
Pfaffia glomerata (Spreng.) Pedersen.	Amaranthaceae	fáfia	N	He	Q	03
Lihtraea brasiliensis Marchand	Anacardiaceae	pau-de-bugre, bugre	N	Ar	Fr	01
Schinus sp.*	Anacardiaceae	aroeira	N	Ar	Fr, Q, C	03
Annona sp.*	Annonaceae	ariticum	N	Ar	Fr	01
Anethum graveolens L.	Apiaceae	endro	I	He	Q	03
Foeniculum vulgare Mill.	Apiaceae	funcho	Nt	He	C, Q	05
Petroselinum crispum Mill.	Apiaceae	salsinha	I	He	Q	04
Pimpinella anisum L.	Apiaceae	anis	I	He	Q	01
Aristolochia triangularis Cham.	Aristolochiaceae	cipó-mil-homens	N	Tr	C, Fr, Q	12

Acanthospermum australe (Loefl.) Kuntze	Asteraceae	carrapicho de velha	N	He	C	01
Achillea millefolium L.	Asteraceae	pronto-alívio	I	He	C, Q	25
Achyrocline satureioides (Lam.) DC.	Asteraceae	marcela	N	He	Q, C	08
Arctium minus (Hill.) Bernh.	Asteraceae	bardana	I	He	Q, C	06
Artemisia absinthium L.	Asteraceae	losna	I	He	Q	15
Artemisia alba (Art.)	Asteraceae	alcanfor	I	He	Q	07
Artemisia vulgaris L.	Asteraceae	artemija	I	He	Q	07
Baccharis articulata (Lam.) Pers.	Asteraceae	carqueja miúda	N	Ab	C	13
Baccharis caprariifolia DC.	Asteraceae	vassourinha de são-joão-maria	N	Ab	C	02
Baccharis trimera (Less.) DC.	Asteraceae	carqueja verdadeira	N	Ab	C	12
Bidens pilosa L.	Asteraceae	picão-preto	Nt	He	Q, C	04
Calendula officinalis L.	Asteraceae	calêndula	I	He	Q	06
Chamomilla recutia (L.) Rauschert	Asteraceae	camomila	Nt	He	Q	07
Chaptalia nutans (L.) Polak.	Asteraceae	arnica do mato	N	He	C	01
Conyza bonariensis L.	Asteraceae	buva	Nt	He	C	01
Cynara scolymus L.	Asteraceae	alcachofra	I	He	Q	09
Elephantopus mollis Kunth	Asteraceae	sassuaiá	N	He	C	01
Gochnatia polymorpha (Less.) Cabr.	Asteraceae	cambará	N	Ar	Q, C, Fr	20
Helianthus annuus L.	Asteraceae	girassol	I	Ab	Q	01
Hypochaeris sp.*	Asteraceae	dente-de-leão	Nt	He	Q	09
Leucanthemum vulgare (Lam.)	Asteraceae	margarida	I	He	Q	06
Mikania sp.*	Asteraceae	guaco	N	Ab	Do	04
Polymnia sonchifolia Poep. Endl	Asteraceae	batata-iacon	I	He	Q	02
Senecio brasiliensis (Spreng.) Less.	Asteraceae	maria-mole	N	He	C	04
Silybum marianum Gaertn.	Asteraceae	cardo-santo	Nt	He	Q	01
Solidago chilensis Meyen	Asteraceae	erva-lanceta	N	He	C	02
Stevia rebaudiana (Bertoni) Hemsl.	Asteraceae	estévia	I	He	Q	01
Tanacetum vulgare L.	Asteraceae	catinga-de-mulata	N	He	Q	08
Vernonia polyanthes Less.	Asteraceae	chimarrita	N	Ab	C	07
Berberis laurina Thunb.	Berberidaceae	são-joão	N	Ab	Fr	02
Dolichandra unguis -cati (L.) L.G.Lohmann	Bignoniaceae	unha-de-gato	N	Tr	Q	01
Handroanthus heptaphyllus (Mart.) Mattos	Bignoniaceae	ipê-roxo	N	Ar	Q	02
Jacaranda micranta Cham.	Bignoniaceae	carova	N	Ar	Fr, C	05
Symphytum officinale L.	Boraginaceae	confrei	I	He	Q	07
Coronopus didymus (L.) Sm.	Brassicaceae	mentruz	N	He	Q	04
Nasturtium officinale R. Br.	Brassicaceae	agrião	I	He	Q	06
Ananas bracteatus (Lindl.) Schult. & Schult.f.	Bromeliaceae	ananás	N	He	Q	01
***Tillandsia usneoides* (L.)L.**	**Bromeliaceae**	**barba de velho**	**N**	**Tr**	**C, Fr**	**03**
Maytenus* sp.	**Celastraceae**	**espinheira-santa**	**N**	**Ab**	**Q, C, Fr**	**15**
***Tradescantia purpurea* Boom**	**Comelinaceae**	**manta-de-viúva**	**I**	**He**	**Q**	**01**
***Bryophyllum pinnatum* (Lam.) Oken**	**Crassulaceae**	**erva da**	**I**	**He**	**Q**	**01**

		fortuna				
Kalanchoe* sp.	**Crassulaceae**	**bálsamo**	**I**	**He**	**Q**	**06**
***Cyperus meyenianus* Kunth**	**Cyperaceae**	**tiririca**	**N**	**He**	**C, Q**	**01**
Dicksonia sellowiana Hook.	Dicksoniaceae	xaxim	N	Ab	Fr	01
Dioscorea sp.*	Dioscoriaceae	batata cará	N	Tr	Q	01
Equisetum giganteum L.	Equisetaceae	cavalinha	N	He	Q	13
Senegalia bonariensis (Gillies ex Hook. & Arn.) Seigler & Ebinger	Fabaceae	nhapindá	N	Ab	Fr	01
Bauhinia forficata Link	Fabaceae	pata-de-vaca	N	Ar	Fr, C	11
Erythrina falcata Benth.	Fabaceae	corticeira	N	Ar	Fr	01
Mimosa amphigena Burkart	Fabaceae	unha-de-gato	N	Ab	Fr	03
Poiretia latifolia	Fabaceae	erva-de-touro	N	He	C, Q	03
Senna sp.*	Fabaceae	sene, fedegoso	N	He	Q, C	02
Hypericum connatum Lam.	Hypericaceae	copinha	N	He	C	02
Cunila galioides Benth.	Lamiaceae	poejo	N	He	C	04
Cunila microcephala Benth.	Lamiaceae	poejo	N	He	Q, C	06
Lavandula officinalis Chaix	Lamiaceae	alfazema	I	He	Q	06
Leonotis nepetifolia (L.) R.Br.	Lamiaceae	cordão-de-frade	I	He	Q	02
Leonurus sibiricus L.	Lamiaceae	rubim, mamangava	Nt	He	C, Q	04
Melissa officinalis L.	Lamiaceae	melissa, cidreira	I	He	Q	05
Mentha sp.*	Lamiaceae	hortelã	Nt	He	Q	26
Ocimum selloi Benth.	Lamiaceae	alfavaca	N	He	C, Q	11
Origanum vulgare L.	Lamiaceae	manjerona	I	He	Q	11
Plectranthus barbatus Andrews	Lamiaceae	boldo	Nt	He	Q	03
Rosmarinus offiicinalis L.	Lamiaceae	alecrim	I	Ab	Q	14
Salvia mycrophilla H.B.K.	Lamiaceae	anador, fontol	I	He	Q	05
Salvia officinalis L.	Lamiaceae	sálvia	I	He	Q	12
Stachys byzantina C. Koch.	Lamiaceae	pulmonária	I	He	Q, C	04
Thymus vulgaris L.	Lamiaceae	tomilho	I	He	Q	01
Laurus nobilis L.	Lauraceae	loro	I	Ar	Q, C	02
Ocotea sp.*	Lauraceae	canela	N	Ar	Fr	02
Persea willdenovii Kosterm.	Lauraceae	andrade	N	Ar	Fr	08
Struthanthus flexicaulis (Mart. ex Schult. f.) Mart	Loranthaceae	erva-de-passarinho	I	Tr	C, Fr	05
Cuphea carthagenensis (Jacq.) J.F.Macbr	Lythraceae	sete-sangria	N	He	C, Q, Do	06
Heimia salicifolia Link.	Lythraceae	erva da vida	N	He	C, Fr	02
Malva parviflora L.	Malvaceae	malva	Nt	He	Q	14
Sida rhombifolia L.	Malvaceae	guanxuma	N	He	C	06
Leandra australis (Cham.) Cogn.	Melastomataceae	pixirica	N	Ab	C	02
Cedrela fissilis Vell.	Meliaceae	cedro	N	Ar	Q	01
Morus nigra L.	Moraceae	amora do reino	I	Ar	Q	1
Acca sellowiana (O. Berg.) Burret	Myrtaceae	goiaba serrana	N	Ar	Q, C, Fr	14
Blepharocalyx salicifolius (Kunth) O.Berg.	Myrtaceae	murta	N	Ar	Fr	02
Calyptranthes concinna DC.	Myrtaceae	guamirim	N	Ab	Fr	01
Campomanesia guazumifolia (Cambess.) O.Berg.	Myrtaceae	sete-capote	N	Ar	C	01

Campomanesia xanthocarpa O.Berg.	Myrtaceae	guabiroba	N	Ar	C	09
Eugenia uniflora L.	Myrtaceae	pitangueira	N	Ar	Fr	01
Mirabilis jalapa L.	Nyctaginaceae	maravilha	I	He	Q	01
Fuchsia regia (Vell.) Munz	Onagraceae	brinco de princesa	N	Ab	Q	01
Oxalis brasiliensis Lodd.	Oxalidaceae	trevo, azedinha	N	He	Q, C	04
Chelidonium majus L.	Papaveraceae	iodo da terra	I	He	Q	04
Passiflora caerulea L.	Passifloraceae	maracujá-do-mato	N	Tr	C,Q	05
Phyllanthus tenellus Roxb.	Phyllanthaceae	quebra-pedras	N	He	C, Q	10
Petiveria alliacea L.	Phytolaccaceae	guiné	N	He	Q	06
Piper sp.*	Piperaceae	jaguarandi	N	Ab	C,Q	11
Plantago major L.	Plantaginaceae	tanchagem	Nt	He	C, Q	13
Coix lacryma-jobi L.	Poaceae	lágrima de nossa senhora	N	Ab	Q	03
Cymbopogon citratus (DC.) Stapf	Poaceae	cana-cidreira,	I	He	Q	08
Polygonum persicaria L.	Poligonaceae	erva-de-bicho	N	He	Q,C	07
Adiantum curvatum Kaulf.	Polypodiaceae	avenca	N	He	Q	04
Pteridium aquilinum (L.) Kuhn	Pteridaceae	samambaia	N	He	Q, C	03
Acaena eupatoria Cham & Schltdl.	Rosaceae	parreirinha-do-mato	N	He	C	04
Eriobotrya japonica (Thunb.) Lindl.	Rosaceae	ameixa	I	Ar	Q	02
Prunus persica L.	Rosaceae	pessegueiro	I	Ar	Q	02
Rosa sp.*	Rosaceae	rosa	I	Ab	Q	03
Rubus sp.*	Rosaceae	amora-branca, amora-preta	N	Ab	Q, C	13
Richardia brasiliensis Gomes	Rubiaceae	erva de largarto	N	He	C, Q	03
Sansevieria trifasciata Hort. ex Prain	Ruscaceae	espada-de-são-jorge	I	He	Q	01
Ruta graveolens L.	Rutaceae	arruda	I	He	Q	17
Zanthoxylum rhoifolium Lam.	Rutaceae	mamica de porca	N	Ar	Fr	01
Casearia decandra Jacq.	Salicaceae	gauçatonga	N	Ar	C, Q	03
Jodina rhombifolia (Hook. & Arn.) Reissek	Santalaceae	cancorosa	N	Ab	Fr	02
Allophilus edulis (A.St.-Hil., Cambess. & A. Juss.) Radlk.	Sapindaceae	vacum	N	Ar	Fr	01
Smilax sp.*	Smilacaceae	Salsa-parrilha	N	Ab	Q, Fr	06
Datura sp.*	Solanaceae	copo-de-leite	Nt	He	Q	01
Solanum aculeatissimum Jacq.	Solanaceae	juá-do-mato	N	Ab	C	02
Solanum mauritianum Scop.	Solanaceae	fumo brabo	N	Ar	C	01
Solanum pseudo capsicum L.	Solanaceae	laranjeirinha	N	Ab	C	03
Solanum sp.*	Solanaceae	erva-de-galinha	N	Ab	C	01
Solanum variabile Mart.	Solanaceae	juveva-velame	N	Ar	C, Fr	03
Symplocos uniflora (Pohl) Benth.	Symplocaceae	sete-sangria	N	Ar	Fr, C	02
Tropaeolum majus L.	Tropaeolaceae	capuchinha	I	He	Q	02
Urera bacifera (L.) Gaudich.	Urticaceae	urtigão	N	Ab	C, Fr	06
Urtica urens L.	Urticaceae	urtiga, urtiga miúda	N	He	C	02

Aloysia gratissima (Gillies & Hook.) Tronc.	Verbenaceae	erva-cheirosa	N	Ab	C	07
Aloysia triphylla (L'Hér.) Britton	Verbenaceae	cidró	I	Ab	Q	01
Lantana montevidensis (Spreng.) Briq.	Verbenaceae	erva de raposa	N	Ab	C	02
Lippia alba (Mill.) N.E.Br.	Verbenaceae	erva-cidreira, sábia	N	Ab	C, Q	11
Stachytarpheta cayennensis (Rich.) Vahl	Verbenaceae	gervão	N	He	C, Q	08
Verbena litoralis Kunth	Verbenaceae	féu-da-terra	N	He	C	03
Vitex megapotamica (Spreng.) Moldenke	Verbenaceae	tarumã	N	Ar	C, Fr	01
Anchietea pyrifolia (Mart.) G. Don	Violaceae	cipó-sumo	N	Tr	Fr	02
Viola odorata L.	Violaceae	violeta	I	He	Q	06
Drimys sp.*	Winteraceae	casca d'anta	N	Ar	Fr	08
Curcuma longa L.	Zingiberaceae	açafrão	I	He	Q	02
Zingiber sp.*	Zingiberaceae	gengibre	I	He	Q	12

The 19 out of 147 plant sampled could be identified only up to the genus, due to the time of harvest and conditions that were not enough to go further. However, it was deemed relevant to include them because of the importance mentioned by respondents in the healing of the family: *Alternanthera* sp., *Schinus* sp., *Annona* sp., *Hypochaeris* sp., *Mikania* sp., *Maytenus* sp., *Kalanchoe* sp., *Dioscorea* sp., *Senna* sp., *Mentha* sp., *Ocotea* sp., *Piper* sp., *Rosa* sp., *Rubus* sp., *Smilax* sp., *Datura* sp., *Solanum* sp., *Drimys* sp., and *Zingiber* sp. Two other species, *Tagetes minuta* and *Trichocline macrocephala*, were not considered in the data analysis and ecological index because they were not present in the family farms, due to habitat modification, but they do belong to the cultural memories of the families. With the exception of *Solanum*, all other sample identified at a genus level (18) had no other specie throughout the study.

The highest number of citations of the specimen was found in the botany families of Asteraceae (29), Lamiaceae (16), Verbenaceae (6), Myrtaceae (6), Fabaceae (5), Solanaceae (5). The majority of specimen (64.6%) were native, followed by introduced (27.9%), and naturalized species (7.5%). This indicates that farmers are closely connected with the native vegetation and they know their potential therapeutic properties. A tree flora assessment made by Ferreira *et al*. (2012), in the same region of this present research, indicated greatest richness of species in Myrtaceae (18) and Asteraceae (10) families. However, introduced and naturalized specie were greater for Lamiaceae (13) and Asteraceae (13) families. This means that farmers are willing to create a diverse source to make a broad range of possibilities with medicinal therapeutic procedures.

In terms of introduced medicinal plant species, Zank & Hanazaki (2012), in the coast of the state of Santa Catarina, and Almeida *et al*. (2012), in the north-eastern Brazil, also found predominance in the families Lamiaceae and Asteraceae, which means that knowledge about these families know a higher number of sources of medicinal plants than others. The introduced species *Acheillea millefolium* (25) and the native *Gochnatia polymorpha* (20) were the most mentioned ones, whereas the group *Mentha* (26) represented the naturalized one. Both *Gochnatia polymorpha* and *Mentha* sp. are used for healing respiratory problems. However, *G. polymorpha* was cited to have a deeper effect when lung is congested. Moreover, despite the fact that forest remnants in rural areas of The state of Santa Catarina, are threatened by intensive crop farming and reforestation with *Eucalyptus* and *Pine* trees there still are a rich biodiversity concerning medicinal herbs maintaining by farmers if compared to other Brazilian regions (Macêdo *et al*., 2015; Costa *et al*., 2017).

Ethnobotany and medicinal plants habitat

The total cited medicinal specimens are

predominantly herbaceous (59.2%), followed by arboreal (20.4%), shrubby (16.3%), and climbing (4%). Considering backyards, we fund 75.4% herbaceous, 10% arboreal, 10% shrubby, and 4.6% climbing. Siviero *et al*. (2012) studying urban backyards in Acre identified 109 medicinal species that were distributed in 38% of herbaceous, 36% of shrubs, 18% of tree and 8% of climbing. Carniello *et al*. (2010) found 240 species in 29 urban quintals in Mato Grosso, with 29% of medicinal plants, with a predominance of herbaceous habit. Hanazaki *et al*. (2006) highlights the importance of backyard areas in the maintenance of collections of medicinal species because the predominance of herbaceous type. The medicinal plants found in the backyards of the present study include: native plants, introduced/from purchase, collection, exchange of seedlings and other sources of access - and naturalized, independent of cultivation. It is possible to relate the predominance of herbaceous habit due to the ease of collection and the reduced space of backyards that are areas for its maintenance. Naturalized plants include exotic spontaneous species, but kept in backyards because of their medicinal properties. The native arboreal species *Maytenus* spp., *Acca sellowiana*, *Capomanesia xanthocarpa* were brought closer to home in order to facilitate collection maintenance. On the other hand, *Gochnatia polymorpha*, *Sambucus australis*, *Laurus nobilis*, *Cedrela fissilis*, *Casearea decandra*, *Schinus* spp. were kept in backyard areas because of their architecture even to be medicinal. Therefore, backyards fulfill the function of cultivating medicinal plants, in addition to food and ornamental plants. Nevertheless, the backyards also represent spaces of sociability, exchange of knowledge and genetic material, through the donation of seedlings and seeds. According to Santos *et al*. (2013) this feature ensures genetic reproduction and associated ethno-cognition.

The type of growth habit infield grass areas, follows a frequency similar to that occurring in backyards, with a predominance of herbaceous (41), followed by shrubby (12), arboreal (12) and climbing (4). The management adopted in the field areas by the South Plateau of Santa Catarina farmers allowed the concomitant presence of herbaceous medicinal plants, shrubs and trees. The resulting landscape of management may have been determinant in the process of observation and identification of plants with curative potential by farmers. Thus, in the grass field areas, the occurrence, collection and conservation of medicinal plants shows characteristics of caboclo socio-cultural identity, related to the way of managing the land. One of the main cropping systems used in the Southern Catarina Plateau over time consisted in the felling and burning of native vegetation, followed by a cultivation period, which ceased when the natural fertility of the soil showed signs of wear (Siminski & Fantini, 2007). The area was left at rest to meet the slow and gradual process of successional plant regeneration. However, the modernization of agriculture reduced and/or eliminated the rest period of the land (Veiga, 2007). In addition, the reduction of the size of the properties due to family succession prevented resting of the areas for re-establishing the biota composition (Sacco dos Anjos & Caldas, 2003). This constrains the perpetuation of medicinal species in fragments of native vegetation or cultivated areas. Hanazaki *et al*. (2012) in a study carried out in the south coast of Santa Catarina, it was found that 36% of botanical species for medicinal use were obtained in areas of native forest, fields and shrub areas. While 60% were grown in backyards. Similarly, in the south of the State of São Paulo, Hanazaki *et al*. (2006) found that areas of preserved forest contained 36% of medicinal species, whereas recently disturbed environments and backyards had 42% of species.

The highest frequency of collection in the areas of capão is of plants with arboreal habit (19), although these areas are contiguous to the fields whose predominance is herbaceous (41). Both areas complement each other in the living pharmacy of the caboclos, and house almost all of the native arborescent plants for medicinal purposes (Table 1). It was also observed that the cattle circulate freely between fields and capons, whose plant biota is also a food source (*Araucaria angustifolia*), energy-firewood (*Mimosa scabrella*), besides being of medicinal use, which serves its multifunctional purpose (Siminski *et al*., 2011). Reis (2006) emphasizes that the use of native tree species to meet internal demands on the farm or even for sale is an intrinsic phenomenon to traditional rural populations. The long relationship with the environment has provided survival strategies for family farmers, who

have incorporated elements of the forest into their productive practices and the way of life that includes direct resources to face daily challenges such as illness.

The herbaceous habit (41%) of growing areas was also predominant for the native specimen. This is because the most common used part of the plants is the leaves and then the tree kind makes it hard to harvest (data not showed). The part of the plant used in curative processes has the highest frequency (84.5%) on leaves. The prevalence of leaves as a used part of medicinal plants was also recorded in a rural community in the State of Rio de Janeiro (Medeiros *et al.*, 2004), in two rural communities in Bahia (Pinto *et al.*, 2006), and in communities of fishermen on the coast of Santa Catarina (Merétika *et al.*, 2010). The greater availability of leaves throughout the year may be related also to leaf predilection. In the northeastern region of Brazil, Almeida *et al*. (2012) reported the herbaceous habit (49%) as predominant among 151 medicinal plant species. The cultivation system consisted of a majority mix of herbaceus, shrubby, and tree species. However, considering backyard, the herbaceous kind (72%) allows combining with vegetables and fruits, Hanazaki *et al*. (2006) argued that in São Paulo State, the backyard system also keeps ornamental plants and several food species. In that condition, herbaceous species facilitate to set such biodiversity and fulfil the multi-functionality of the backyard to the family. Santos *et al.* (2013) have pointed out the important role of the backyard in providing real conditions to agro-biodiversity guardians because they can promptly access the plants for their own use or exchange with visitors. Mixing cultivation or keeping self-consumption in natural ecosystems and avoiding fertilizers is a reflection from the culture community called "Cabocla" which made fewer interventions to the natural ecosystem than European immigrants (Siminski & Fantini, 2007). A study conducted by Hanazaki *et al*. (2006) in São Paulo, demonstrated a similar importance to preserve diversity of medicinal species in native forests (36%) and backyards (42%). In our study, small forest fragments (capão) are closely related to field grass because both areas have been visited by livestock, in which farmers grow medicinal plants in a similar way. The grass field is as important as forest sources. This is due to the fact that grass field is as much undisturbed as the forest ecosystem. The interaction with the environment over time has provided coping strategies for farmers, who started to incorporate forest elements in their production and survival practices (Reis, 2006).

CONCLUSIONS

There is high diversity of medicinal plants known and used by farmers in the South Plateau of Santa Catarina, in Brazil. Native species were most commonly found than introduced and naturalized ones. This aspect is associated with the knowledge that farmers have about the environment where they live and reproduce socially over time as members of the "Cabocla" community. The places of occurrence of medicinal plants reveal sociocultural characteristics related to survival strategies, despite the current official health system. This fact indicates that the local rural population has historically interacted with natural resources and their interference influences landscape composition and the ethnic knowledge shared by farmers.

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