Ethnoveterinary Knowledge and Practice Applied to Domestic Animals Raised in the Ukraine Colonization Community of Palmital, Paraná State, South Brazil.

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Research Article

Keywords: Ethnoveterinary medicine, medicinal plants, livestock diseases, cattle, european american traditional knowledge

Posted Date: April 6th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-380247/v1>

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**Ethnoveterinary knowledge and practice applied to domestic animals raised in the Ukraine
colonization community of Palmital, Paraná state, south Brazil.**

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Abstract

Background: A broad spectrum of medicinal plants are used to treat livestock in rural areas of
Brazil. The knowledge brought by the first European colonizers merged with traditional indigenous
knowledge to treat domestic animals. With the advance of modern medicine, this knowledge is
threatened to disappear. Ethnopharmacological studies in northeastern and the Amazon region
of Brazil have been conducted, but influence of east Europeans and ethnopharmacological
studies in south Brazil are scarce. To find out which plants are used for what purposes by farmers
in the rural area of Ukrainian colonization of Palmital, middle west of Paraná state, Brazil.

Methods: A semi-structured interview was applied through a non-random sampling with residents
with experience in animal husbandry following the “snowball” method. The collected information
regarded local plant names, parts of plants used, mode of preparation, route of administration,
domestic species and disease treated. The interviewees were encouraged to show the plants
used. Photographs were taken and specimen were collected for the family, genus, species
identification and storage. The ethnobotanical methods of the informant consensus factor (ICF)
and use value (UV) were applied and calculated.

Results: 30 women and 20 men reported a total of 45 plant species belonging to 29 families to
be used for ethnoveterinary practices. Medicinal plants were used mostly with cattle and goats
for 12 different general veterinary uses, with the highest ICF for mastitis and for antiparasitic.

Conclusion: A list of native and introduced medicinal plants could be generated. Most plants
were used to treat cattle health problems, as the most important livestock species bred in the

community. Similar studies with European communities of immigrants in Brazil are unknown and could be a valuable source of information of how cultural blends translate themselves in the use of medicinal plants.

Keywords: Ethnoveterinary medicine, medicinal plants, livestock diseases, cattle, european american traditional knowledge

Background

Ethnoveterinary medicine has been practiced in different regions of the world, such as Benin [1], Brazil [2-6], Ethiopia [7-9], India [10-13], Italy [14], Kenia [15], Nepal [16], Nigeria [17], South Africa [18], Spain [19], Swiss [20], Trinidad and Tobago [21], Pakistan [22] and Uganda [23], to maintain health or treat illnesses of domestic animals. Regarding the targeted animal species, specific for pastoral people, ruminants have higher value and therefore are more often addressed for treatment in countries with this tradition [17;21;24-27].

Ethnoveterinary knowledge has grown over centuries in different communities all over the world, and as commercial drugs are penetrating the most remote rural areas [28], this knowledge could disappear before fully understood. In rural areas the use of medicinal plants for animal health purposes is often the only option, since conventional treatments are expensive or require monitoring by a veterinarian [29-30]. Local knowledge does not stay unaltered under the arrival of another culture or technology [31]. Also, ethnoveterinary medicine is not an immutable knowledge, although anchored upon traditions, but rather evolves over centuries blending different cultures [32-33].

Brazil as one of the countries with greatest biodiversity in the world [34] naturally focused studies in Amazon and northeastern areas and native plants [3-5]. However, in large areas of Brazil, particularly in southern regions of the country, the colonization brought along their own

traditional knowledge[78]. This blend of cultures is in itself a promising ground for studies in the ethnoveterinary science.

In this context, the present study describes the ethnoveterinary practices of residents of Ukrainian origin in the rural area of the municipality of Palmital, Paraná state, south Brazil.

Methods

Study area

The municipality of Palmital with a total area of 817,649 km² and 14,329 inhabitants [35], situated in the central west region of Paraná State in south Brazil at latitude 24° 53' 35" south and longitude 52° 12' 10" west of Greenwich with an average altitude of 840 above sea level. Eleven rural communities (Barra Grande, Divisor dos Antunes, Sanga Funda, Linha Cantuana, Rio Duas Casas, Rio Guaraipo, Vila Burei, Linha Nova, Passo do Xaxim, Palmitalzinho, Linha São Paulo) were evaluated between November of 2011 and January of 2012 (Fig. 1). The communities are in an ecotone between the araucaria forest (mixed ombrophilous forest) and the subtropical forest (seasonal semideciduous forest) with a climate characterized according to the Köppen "Cfa" standard in subtropical temperate with the average temperature of the warmest month above 22 °C and that of the coldest month below 18°C, with no dry season and few frosts [36]. The area was colonized in the late 19th and until the thirties of the 20th century by Ukrainian (Ruthenian) immigrants which occupied areas former under control of native Guarani [37].

Fig. 1. Map of the study areas located in the municipality of Palmital, Paraná state, South Brazil, with distribution of the 11 rural locations visited.

Data collection

One of the authors (S. T. Burei) is from the community and this facilitated the first contact and the adopted methodology, as she is a person known in the community. This study was conducted in accordance with guidelines developed by the National Health Counsel by means of the Research Ethics Committee (Resolution 196/96), and the protocol was approved by that committee (CAAE 00517312.0.0000.0020). A semi-structured interview was applied through a non-random sampling with residents, who had experience in animal husbandry, but not necessarily medicinal plants uses, following the “snowball” method [38]. The interviews based on questionnaire with open and closed questions only began after explaining the objectives of the study to the subjects and the agreement of the participants. The questionnaire was focused on the livestock bred by the interviewee, his uses of medicinal plants, parts used and processing, what diseases of livestock were treated or what a symptom was addressed, possible side effects observed, who makes the diagnosis of the disease in the community, where does the knowledge come from and what are the reasons for the use of medicinal plants in the community. The interviewees were encouraged to show the plants used, which were photographed and specimen were collected for the family, genus, and species identification by L. A. Acra and deposited in the HUCP herbarium, the plant collection of the Pontifical Catholic University of Paraná for storage.

Data analysis

Data were tabulated using Microsoft Excel spreadsheets and analyzed with following ethnobotanical methods: the informant consensus factor (ICF) and use value (UV). The ICF was calculated using the formula $ICF = (N_{ur} - N_t) / (N_{ur} - 1)$, where “ N_{ur} ” is the number of use reports cited by each informant for the particular medicinal plant and “ N_t ” is the total number of informants interviewed for that singular medicinal plant [39-40]. The UV was calculated using the formula $UV = U_i / N_i$, where “ U_i ” is the number of use reports cited by each informant for the particular medicinal plant and “ N_i ” is the total number of informants interviewed for that singular medicinal plant [40;51]. To evaluate difference in gender t-Student test was used ($p < 0.05$).

Results

Informants

After obtaining their informed consent, 50 interviews were done with 20 men and 30 women, residents of 11 localities of the rural area of Palmital-PR, with an average age of 49 (29-83) years. From these 36 (72%) used medicinal plants in the treatment of animal health issues and to treat their own human diseases, making no distinction and 14 (28%) did not use medicinal plants. Women reported more plant species than men ($p < 0.001$).

Disease diagnosis was made usually by the farm's owner (66%). He received his knowledge about diseases and the use of medicinal plants through oral passed communication between his relatives (50%), traditionally passed by his ancestors (22.2%), neighbors, books or other means of information (27.8%). For more serious cases or if the medications used have not had a satisfactory effect, the veterinarian was requested at the farm.

Informant consensus factor (ICF) of the animal diseases

Cattle and goats are responsible for most cases of medicinal plants uses with 91.67 and 2.77%, respectively. The use of medicinal plants in horses, fowl and swine together represented the rest (5.56%) of the cases. The specific diseases treated were not informed.

In total 12 general uses of medicinal plants were informed as: antibiotic, anti-inflammatory, against mastitis, antiparasitic, antitoxin, constipations, dyspepsia, as an insect repellent, against intestinal diseases, retained placenta, skin injury and warts (Table 1). The variance in the frequency count of the 25 most popular remedies was 6.8333 and the variance in ICF for 12 ailment categories was 0.0973.

Table 1. Veterinary uses of medicinal plants in domestic animals of farmers (n = 50) from the municipality of Palmital - PR and their consensus factors of informants (ICF).

Veterinary uses	Use report	Plant species per category	ICF
Antibiotic	1	1	0.00
Anti-inflammatory	2	2	0.00
Mastitis	27	10	0.65

Antiparasitic	17	5	0.75
Antitoxin	3	3	0.00
Constipations	1	1	0.00
Dyspepsia	1	1	0.00
Insect repellent	17	7	0.63
Intestinal diseases	7	7	0.00
Retained placenta	8	6	0.29
Skin injury	20	10	0.53
Warts	2	2	0.00

Characteristics of ethnoveterinary uses of the cited medicinal plant and use value

A total of 45 plant species belonging to 29 families were reported to be used in the region for ethnoveterinary practices (Table 2). The families Asteraceae (8) e Lamiaceae (5) were the most representatives in species numbers. Other important families were Malvaceae, Rutaceae, Fabaceae e Myrtaceae with two species each.

The most mentioned species during the interviews were *Allium ampeloprasum* L., *Ilex paraguariensis* A.St.-Hil. and *Urera baccifera* (L.) Gaudich. Ex Wedd., with respectively 11, eight and seven citations.

Over the half of the informants (58%) used these plants in ethnoveterinary practices together with other products such as salt, alcohol, oil, animal fat, beeswax, cachaça (sugarcane liquor), vinegar and coffee powder. Salt was the most frequently used, added to the macerated (24%) or to an infusion of the plant (12%). Water was the main vehicle, mentioned in 52% of times in the preparation of the medicinal plants.

For the preparation of a veterinary ailment, all parts of the vegetal were mentioned to be used. Most commonly leaves (75.5%), followed by roots (14.2%), bulb (9.4%), stem (4.7%), bark (2.8%), seeds (2.8%), fruit (1.9%) and flower (1.9%) were prepared. In 26% of the cases two different parts, leaves and roots were prepared as infusion and used as an insect repellent for cattle. Routinely these preparations are applied externally (61.6%) and less often per oral route (38.4%). The plants are used as infusions (57%), ointments (20%), macerated (13%), *in natura* (4%), toasted (3%), fried (2%) and dehydrated (1%).

For nearly half of the informants (46%) the medicinal plants are used only with their domestic animals and 20% of them use it also to treat human diseases. The majority of these

plants grows on the farm, some are of spontaneous growth in different types of environments, such as roadsides, along streams, lawns, abandoned pastures and are predominantly herbaceous plants (33%), trees (26%) and shrubs (21%).

Of the 45 identified species 55.6% were of exotic origin and 44.4% were native plants. When assessing the form of use, 77.06% of the plants mentioned are used immediately after harvest. 28 interviewees reported that there is no suitable harvest time with harvest all year round, referring to 21 plant species.

In the only closed question of the questionnaire, the informants were asked to declare their motivation to use medicinal plants with their domestic animal. The answers showed that 42% of them wanted to help their sick animal, 26% declared that medicinal plants were better than conventional veterinary medicines, which were not available for 14%. Medicinal plants were considered cheaper (24%) than the conventional veterinary medicine. Doses were not standardized and treatment lasted until the clinical signs decrease. The UV was in general low, with the highest value reaching 0.22 for *Allium ampeloprasum* L. followed by two native species, *Ilex paraguariensis* A.St.-Hil. and *Urera baccifera* (L.) Gaudich. Ex Wedd. with 0.16 and 0.14 respectively (table 2).

Table 2 should be inserted here.

Discussion

Traditional knowledge

Medicinal plants are used by different civilizations traditionally to heal human and animal diseases and health problems [1;21]. Brazil is a traditional immigrant country, that had welcome immigrants from all over the world during the last 500 years [41]. Although Brazil figures upon the most diverse countries, from biodiversity to ethnic composition, ethnoveterinary studies have focused upon the plants [2;5], traditional uses [3] but did not attempt to verify how much of this knowledge was probably passed on by the ancestors with their specific immigrant background, and how much was passed on by the native, indigenous population, to the newcomer. The

possibility of an autonomous learning process seems in this specific community of Ukrainian origin unlikely, because of the relative recent immigration [42].

A common feature of passing on ethnoveterinary knowledge is by oral tradition as also seen by Monteiro et al. [4] in Brazil, Benítez et al. [19] in Spain and Verma [12] in India, exemplifying different regions of the world. Despite cultural language barriers, to be located in a common political border might have facilitated the adoption of ethnoveterinary practices using local native plants, supposed to be known only to natives. Political separation has influence upon ethnoveterinary practices [43]. The fact that there was an important learning process, could be verified by the proportion of 55.6% uses of exotic plants and 44.4% of native plants. This study to our knowledge is the first to document the traditional medicinal plant knowledge of an east European immigrant group in Brazil. This will allow to compare the data in the future with the literature of the place of origin (Ukraine) as done in respect to swiss ethnoveterinary practices by Stucki et al. [33]. Also, this knowledge is under threat due to the extinction of smallholder farmers and advancement of commercial drugs [28].

As verified by Sharma et al. [11], in Palmital ethnoveterinary practices were also applied mostly by women, the main involved in animal breeding. Milk as a primary production branch employs predominantly women in Paraná, while farm management remains to 93% with the man [44]. Cattle breeding accounts for 45% of local economy. Begossi et al. [45] stated that woman have a more profound knowledge of medicinal plants, but man know more species. Women are more often familiar with the act of identifying, naming and describing the use of a plant species in their environment. They assume the role of disseminating knowledge and the use of plant resources [46-47]. Other studies also verified that women are more specialized in medicinal plants than men [48-50], but this might depend upon the social environment, as for example in Ethiopia, traditional medicine is dominated by men [8]. Traditional knowledge relies on elder, more experienced people in the community, similar to other Brazilian studies [3-4;51].

Plants used to treat animal health problems

The Asteraceae and Lamiaceae families had the highest number of plants reported in this study, which confirms previous studies [52]. Ethnobotanical surveys carried out in the Amazon

region [4-5;53] and in other countries [54-56] underline the importance of species of the Asteraceae family in ethnoveterinary, whereas Lamiaceae family is in first position of introduced medicinal plants in South America [52].

Allium ampeloprasum L., *Ilex paraguarienses* A. St-Hil and *Urera baccifera* (L) Gaudich Ex Wedd were the species with the highest ICF and UV, the three of them directed to the treatment of mastitis, the most serious disease in respect to milk losses in dairy cattle [57]. *Allium ampeloprasum* L. also was used as antiparasitic, a major concern mainly in tropical areas and in Brazil for cattle [58]. *A. ampeloprasum* has been reported to have cytoprotective and anti-inflammatory properties [59] which could explain the use in cattle mastitis. The other two mainly cited plants were also used against mastitis. *Urera baccifera* (L) Gaudich Ex Wedd has reported antimicrobial and anti-inflammatory activities [60] and *Ilex paraguarienses* A. St-Hil is used in Argentina against mastitis [61]. Yerba Mate included in the diet of dairy cows had the potential to improve milk production [62-63] and to improve the immune system of lambs [64].

A former study made by Souza Júnior et al. [65] in a region about 160 km distant from Palmital, unfortunately without determining ICF and UV, listed the ten most cited medicinal plants by farmers and *U. baccifera* was also cited against mastitis. Other plants of this list cited by our informants included *Aloe vera* (L.) Burm. F., *Psidium guajava* L., *Leonurus sibiricus* L., *Mentha x piperita* L. and *Symphytum officinale* L., whereas *Datura stramonium*, *Eucalyptus citriodora* and *Chenopodium ambrosioides* were not mentioned.

The similarity in proportion of exotic to native plant species found in our study demonstrates a natural cultural exchange process, where new knowledge and costumes are incorporated into traditional habits, probably propelled by the curiosity and necessity of rural people [52]. This proportionality of knowledge of native to introduced plant species was previously reported in northeastern Brazil [66], but this author stated that there was a significantly higher use of native plants.

The preference in using leaves among the farmers of Palmital, is positive in respect to survival for the plant species, not endangering them severely in comparison to the usage of the whole plant or stems, bark, or roots [67]. Most of the studies conducted elsewhere in Brazil indicated also leaves as the most frequently used plant part [4;51;68] but Silva *et al.* [69] indicated

as the most common part the bark of the plants, probably as most of the species described were shrubs and trees.

The most common preparation mode was to use water mainly for boiling plant material, but also soaking or macerating it. Water was also the main extraction method and vehicle used in other ruminant ethnoveterinary studies [8;11;15;17;21;23;70;71]. Interestingly several preparations used salt to macerate or combined with water for the ailments. The use of salt to add palatability [21] and into the infusion to be administered orally [23;70] is common also for dairy cattle [11]. Given as a lick, salt preparations surprisingly are not so common, for this purpose ashes, kaolin, potassium [17] or CaCO_3 [70] had been reported. Some studies have claimed that the mixture of plant extracts with different materials as fats and oils, charcoal, alcohol, sugar and honey [5;27] can reduce the active ingredients of the plants [4;11;22;72].

As reported in other studies [4;23;55;73-74] the informants did not report a standardization of dosages and the treatment duration was based on the remission of clinical signs. Although the risk of incorrect usage of medicinal plants, toxic or other adverse effects exist [56;75], no side effects were reported.

According to Trotter and Logan [39], plants with higher informant consensus factor (ICF) values are thought to have better potency as compared to medicinal plants with a lower value. The ICF of 17 plant species by different groups was null, which is either a sign of randomly chosen plants or no information exchange about their use [76]. On the other side, plants used as antiparasitic (ICF 0.75), mastitis (ICF= 0.65), as insect repellent (ICF=0.63) and for skin injuries (ICF=0.53) had higher values, that might be interpreted as better selection criteria for this plants or higher exchange of information. The ailment topics are common in veterinary ruminant medicine, with contribution for a better exchange of knowledge. However, although placenta retention is a common problem in cattle, this topic has received a low score (ICF= 0.29). Compared to specific dairy cattle ethnoveterinary medicine as practiced in India [11] our ICF scores were lower. That could indicate that the traditional knowledge about the cited medicinal plants is at risk to disappear gradually [77;78], or could also be the consequence of access to modern veterinary medicine[43], as happened with the ethnoveterinary practices in communities of the Ukrainian /Romanian border. On the other side, one of the reasons reported not to use modern veterinary medicine in our study was the high costs of modern veterinary practices

compared to the use of plant medicine. Ethnoveterinary practices are considered to contribute to lower veterinary health costs of livestock animals [10;16].

Conclusion

This study was able to describe a list of 45 plants used in ethnoveterinary practices by farmers of Ukrainian origin and cultural background living in a rural area of state of Paraná, south Brazil. Most plants were used to treat cattle health problems, as the most important livestock species bred in the community. Similar studies with European communities of immigrants in Brazil are unknown and could be a valuable source of information of how cultural blends translate themselves in the use of medicinal plants. Also, it could be used in the future for comparative studies of historical developments of the use of medicinal plants, in the country of origin of the immigrants and in the new homeland. Women and oral tradition for the passage of ethnoveterinary knowledge was essential for this community.

Declarations

Ethics approval and consent to participate

This study was conducted in accordance with guidelines developed by the National Health Counsel by means of the Research Ethics Committee (Resolution 196/96), and the protocol was approved by that committee (CAAE 00517312.0.0000.0020).

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed in the current study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare not to have any competing interests.

Funding

This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (CAPES) – Finance Code 001.

Authors' contributions

Conceptualization, R.D.
 Conducted the ethnobotanical survey, S.T.
 Methodology, D.A., L.A., S.H. and R.D.
 Analyzed the data, S.T., D.A., C.S., L.A., S.H. and R.D.
 Writing, all authors.
 Editing, D.A., B.B., C.S. and R.D.
 Review, D.A., C.S., L.A., S.H. and R.D.
 All authors read and approved the final manuscript.

Acknowledgements

We thank the interviewees for sharing their traditional knowledge so that They can be passed on to Society and in special to the friend and biologist Igor Kintopp Ribeiro for adapting the map.

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567 9.

Table 2. Plant species, parts used, method of preparation and use-value of ethnoveterinary remedies of residents of an Ukrainian colony in southern Brazil.

Family	Scientific name and voucher number	Local name	English name	Origin	Part used	Use category	Prep. / admin.	IN*	UV*
Asteraceae	<i>Achyrocline satureioides</i> (Lam.) DC. HUCP - 22.111	macela	macela	native	Leaves and flowers	Mastitis	Infusion / Topical	1	0.02
Asteraceae	<i>Ageratum conyzoides</i> (Lam.) DC. HUCP - 22.089	erva-de-são- joão	mentrasto	exotic	Leaves and flowers	Retained placenta	Infusion / Oral	1	0.02
Amarylidaceae	<i>Allium ampeloprasum</i> L. MBM - 98.649	alho-poró	leek	exotic	Bulb	Antiparasitic, Mastitis	Macerated / Oral, Infusion / Topical	11	0.22
Xanthorrhoeaceae	<i>Aloe vera</i> (L.) Burm. f. MBM - 390.586	babosa	aloe	exotic	Leaves	Skin injury	Topical	1	0.02
Chenopodiaceae	<i>Alternanthera brasiliana</i> (L.) Kuntze HUCP -22.088	terramicina	-	native	Leaves	Anti- inflammatory	Infusion / Topical	1	0.02
Bignoniaceae	<i>Amphilophium crucigerum</i> (L.) L.G.Lohmann HUCP -22.098	cipó-pente-de- mico	-	native	stem	Mastitis	Infusion / Topical	1	0.02

Araucariaceae	<i>Araucaria angustifolia</i> (Bertol.) Kuntze HUCP - 21.641	pinheiro-do-paraná	-	native	Leaves	insect repellent, Antiparasitic	Infusion / Topical, Dehydrated / Oral	3	0.06
Aristolochiaceae	<i>Aristolochia triangularis</i> Cham. HUCP - 22.097	cipó-mil-homens	-	native	Leaves and stem	Insect repellent	Infusion / Topical	1	0.02
Asteraceae	<i>Artemisia vulgaris</i> L. HUCP - 22.114	artemísia	mugwort	exotic	Leaves	Antiparasitic	Infusion / Oral	1	0.02
Asteraceae	<i>Baccharis trimera</i> (Less.) DC. MBM - 185.803	carqueja	gorse	native	Leaves	Mastitis	Infusion / Topical	1	0.02
Asteraceae	<i>Baccharis vulnerari</i> Baker HUCP - 22.194	erva-sant'ana	-	native	Leaves	Mastitis	Infusion / Topical	1	0.02
Asteraceae	<i>Cabobanthus polysphaera</i> (Baker) H.Rob. HUCP -22.094	assa-peixe	-	native	Leaves and root	Insect repellent	Infusion / Topical	1	0.02
Caricaceae	<i>Carica papaya</i> L. HUCP - 11.576	mamoeiro	papaya	native	Fruit	Warts	Latex / Topical	1	0.02
Salicaceae	<i>Casearia sylvestris</i> Sw. HUCP - 22.102	guaçatonga	-	native	Leaves	Intestinal diseases	Infusion / Oral	1	0.02
Rutaceae	<i>Citrus limon</i> (L.) Osbeck HUCP - 11.354	limão	lemon	exotic	Fruit	Warts	Juice / Topical	1	0.02
Commelinaceae	<i>Commelina diffusa</i> Burm.f. HUCP - 22.101	trapoeraba	spederwort	native	Leaves	Intestinal diseases	Infusion / Oral	1	0.02

Rubiaceae	<i>Coutarea hexandra</i> (Jacq.) K.Schum. MBM - 191.825	quina-branca	-	native	Bark	Intestinal diseases	Infusion / Oral	1	0.02
Asteraceae	<i>Cynara scolymus</i> L. HUCP - 22.185	alcachofra	artichoke	exotic	Leaves	Mastitis	Infusion / Topical	1	0.02
Myrtaceae	<i>Eugenia uniflora</i> L. HUC - 22.069	pitanga	cherry	native	Leaves	Intestinal diseases	Infusion / Oral	1	0.02
Apiaceae	<i>Foeniculum vulgare</i> Mill. HUCP - 9.772	erva-doce	fennel	exotic	Leaves	Antitoxin, Mastitis	Infusion / Topical, Macerated / Oral	5	0.10
Aquifoliaceae	<i>Ilex paraguariensis</i> A.St.-Hil. HUCP - 22.095	erva-mate	-	native	Leaves and stem	Mastitis	Infusion / Topical	8	0.16
Fabaceae	<i>Inga semialata</i> (Vell.) C.Mart. HUCP - 22.113	ingá	shimbilo	native	Leaves and bark	Skin injury	Infusion / Topical	1	0.02
Convolvulaceae	<i>Ipomoea batatas</i> (L.) Lam. HUCP - 22.090	batata-doce	sweet potato	exotic	Leaves and stem	Mastitis	Infusion / Topical	1	0.02
Verbenaceae	<i>Lantana camara</i> L. HUCP - 22.099	quebranteira	-	native	Leaves	retained placenta	Infusion / Oral	2	0.04
Lamiaceae	<i>Leonurus sibiricus</i> L. HUCP - 22.100	cordão-de-frade	-	exotic	Leaves	Antitoxin	Macerated / Oral	1	0.02
Malvaceae	<i>Luehea divaricata</i> Mart. HUCP - 22.103	açoita-cavalo	-	native	Leaves and bark	Skin injury	Infusion / Topical	1	0.02

Asteraceae	<i>Lychnophora ericoides</i> Mart. HUCP - 22.086	arnica	arnica	exotic	Leaves	Anti-inflammatory	Infusion / Topical	1	0.02
Malvaceae	<i>Malva parviflora</i> L. HUCP - 22.087	malva	mauve	exotic	Leaves	Skin injury	Infusion / Topical	2	0.04
Meliaceae	<i>Melia azedarach</i> L. HUCP - 9.232	cinamão	cinnamon	exotic	Leaves	Insect repellent	Infusion / Topical	1	0.02
Lamiaceae	<i>Mentha x piperita</i> L. HUCP - 22.107	hortelã	mint	exotic	Leaves	Skin injury, Antiparasitic	Infusion / Topical, Macerated / Oral	2	0.04
Musaceae	<i>Musa x paradisiaca</i> L. MBM - 356.634	bananeira	banana tree	exotic	Leaves and stem	Antiparasitic	<i>In natura</i> / Oral	4	0.08
Solanaceae	<i>Nicotiana tabacum</i> L. HUCP - 15.401	fumo	-	exotic	Leaves	Insect repellent	Infusion / Topical	1	0.02
Lamiaceae	<i>Origanum majorana</i> L. HUCP - 9.774	manjerona	marjoram	exotic	Leaves	Retained placenta	Infusion / Oral	1	0.02
Polygonaceae	<i>Persicaria punctata</i> (Elliott) Small HUCP - 22.096	erva-de-bicho	-	exotic	Leaves	Antitoxin	Macerated / Oral	1	0.02
Petiveriaceae	<i>Petiveria alliacea</i> L. HUCP - 22.108	guiné	guinea	native	Leaves and root	Insect repellent	Infusion / Topical	1	0.02

Fabaceae	<i>Phaseolus vulgaris</i> L. HUCP - 6.989	feijão	bean	exotic	Seed	retained placenta, Antiparasitic, intestinal diseases	Roasted / Oral	3	0.06
Plantaginaceae	<i>Plantago major</i> L. HUCP - 22.112	tanchagem	-	exotic	Leaves	Skin injury, antibiotic	Infusion / Topical, Infusion / Oral	3	0.06
Lamiaceae	<i>Plectranthus barbatus</i> Andrews HUCP - 22.104	boldo	boldo	exotic	Leaves	Dyspepsia;	Infusion / Oral	1	0.02
Rosaceae	<i>Prunus persica</i> (L.) Batsch HUCP - 15.366	pessegueiro	peach	exotic	Leaves	Intestinal diseases	Infusion / Oral	1	0.02
Myrtaceae	<i>Psidium guajava</i> L. HUCP - 23.847	goiabeira	guava tree	native	Leaves	Intestinal diseases	Infusion / Oral	1	0.02
Lamiaceae	<i>Rosmarinus officinalis</i> L. HUCP - 22.092	alecrim	rosemary	exotic	Leaves	Skin injury	Infusion / Topical	1	0.02
Rutaceae	<i>Ruta graveolens</i> HUCP - 22.110	arruda	-	exotic	Leaves and root	Retained placenta, insect repellent	Infusion / Oral, Infusion / Topical	3	0.06
Boraginaceae	<i>Symphytum officinale</i> L. HUCP -22.093	confrei	comfrey	exotic	Leaves	Skin injury	Infusion / Topical	1	0.02

Asteraceae	<i>Tanacetum vulgare</i> L. HUCP -9.894	catinga-de- mulata	-	exotic	Leaves	Constipation s, Skin injury, Mastitis	Infusion / Oral, Infusion /cleansing Infusion / Topical	5	0.10
Urticaceae	<i>Urera baccifera</i> (L.) Gaudich. Ex Wedd. HUCP - 22.091	urtiga	nettle	native	Leaves and root	Mastitis	Infusion / Topical	7	0.14

*IN: Informants number, UV: use value.

Figures

Figure 1

Map of the study areas located in the municipality of Palmital, Paraná state, South Brazil, 81 with distribution of the 11 rural locations visited. Note: The designations employed and the presentation of the material on this map do not imply the expression of any opinion whatsoever on the part of Research Square concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. This map has been provided by the authors.