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Ethnobotanical survey of medicinal flora in the rural community Rio dos Couros, state of Mato Grosso, Brazil

[Estudio etnobotánico de la flora medicinal en la comunidad rural Rio dos Couros, estado de Mato Grosso, Brasil]

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Abstract: The aim of this work was to register the traditional knowledge about medicinal plants, as well as raise the socioeconomic profile of the residents from the community Rio dos Couros (Brazil), in order to relate them the level of botanical knowledge. The methodology adopted was the "snowball", through semi-structured interviews. Levels of agreement regarding the main uses (PUC) and use value (UV) were applied, as well as the ICD for classification of health problems. Difference of age, residence time and individual income were elements that interfered in the level of botanical knowledge. We recorded 81 different plants distributed in 38 botanical families, with Fabaceae as the most cited. The highest value for PUCc was attributed to *Strychnos pseudoquina* (87%), and the respiratory problem was one of the most common diseases among the community.

Keywords: Ethnobotany, Medicinal plants, Biodiversity, Traditional knowledge.

Resumen: El objetivo de este trabajo fue registrar el conocimiento tradicional sobre las plantas medicinales, así como levantar el perfil socioeconómico de los moradores de la comunidad del Rio dos Couros (Brasil) con el fin de relacionarlos con el nivel de conocimiento botánico de la comunidad. La metodología adoptada fue la “bola de nieve” a través de entrevistas semiestructuradas. Se aplicaron índices de concordancia en cuanto a los usos principales (CUP) y el valor de uso (VU), así como para la clasificación de los problemas de salud (CID). La diferencia de edad, tiempo en la comunidad y renta individual fueron los factores que más interfirieron en el nivel de conocimiento botánico. Fueron registradas 81 especies, distribuidas en 38 familias, siendo Fabaceae la más citada. El más alto valor en CUPc fue atribuido *Strychnos pseudoquina* (87%) y las afecciones del aparato respiratorio fueron una de las enfermedades más comunes en la comunidad.

Palabras clave: Etnobotánica, Plantas medicinales, Biodiversidad, Conocimiento tradicional.

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INTRODUCTION

The Ethnobotany is the scientific area that studies the broad relationship between man and plants and the way people use plant resources (Rodrigues, 2007). Since Brazil houses one of the richest and most varied floras in the world, the collection of medicinal plants end up having highlighted importance for it potential as sources in the development of new drugs (Jacoby *et al*., 2002; Borba & Macedo, 2006; Di Stasi, 2007, Badke *et al.*, 2012).

Every human society accumulates the necessary environmental information which uses for the sake of their survival (Amorozo, 1995). In regions where environmental and social transformations are in process, the information related to the interactions between local people and plants can be lost within few generations. In this context Ethnobotany is a very useful tool that can be applied to prevent this lost (Gandolfo & Hanazaki, 2011).

For this reason, the present works aimed to collect and registered the traditional knowledge about the medicinal plants, as well as raise the socioeconomic profile of residents in the rural community of Rio dos Couros, Cuiabá, MT, Brazil, in order to relate them the level of botanical knowledge.

MATERIAL AND METHODS

Study Area

The study was conducted in the rural community of Rio dos Couros, stated of Mato Grosso; about 60 km from the capital Cuiabá (15˚30'15˚40'S and 55˚35'55˚50'W). The community is located in the Cerrado biome at the Baixada cuiabana region and is made up of approximately 60 families of farmers. The main activities in the area are linked to subsistence agriculture (Figure 1).

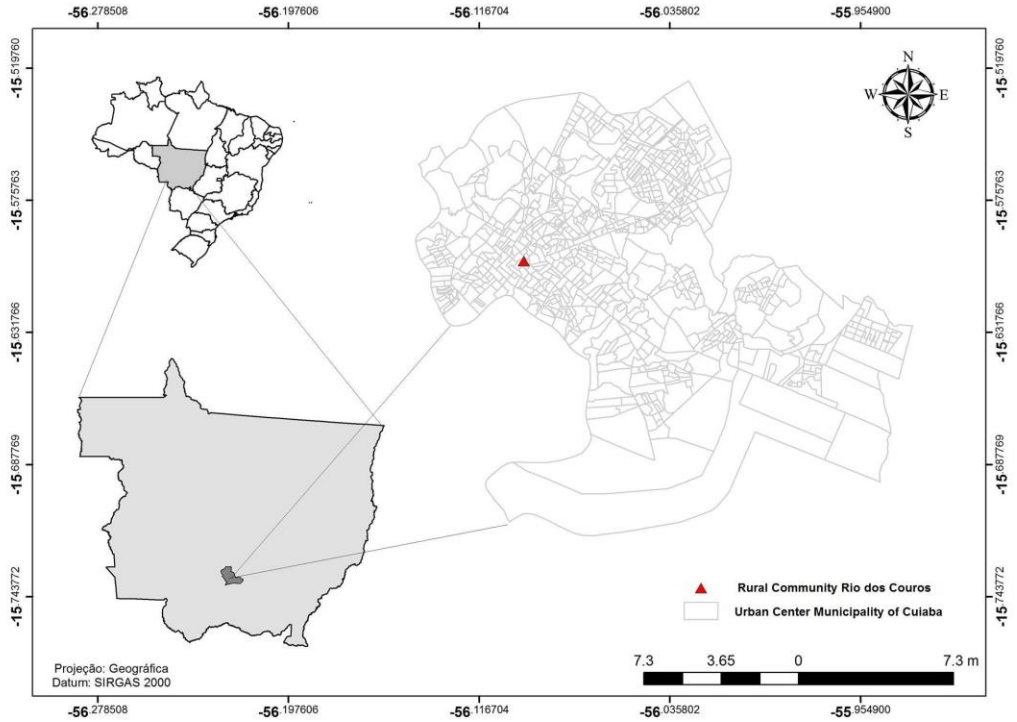

Figure 1
Location of the study area: map of Brazil, Mato Grosso (Cuiabá), rural community Rio dos Couros, Cuiabá, MT, Brazil.

Collection and analysis of Data

Data was collected from September 2013 to October 2014 through weekly and biweekly visits. The "snowball" method, which is to ask the interviewee if he meets another resident who understands the subject studied, regardless of age or gender, was applied to identify principal informants and collect the ethnopharmacological data (Bailey, 1994). An informed consent was also used and signed by the informants. Semi-structured interviews (socioeconomic issues and ethnobotany), direct observation and field diary were performed during "walks in the woods" (Fonseca-Kruel & Peixoto, 2004), where vernacular names and plant uses were discussed. After the interviews samples were collected and identified with the aid of professionals at the Central Herbarium of the State University of São Paulo (UNESP), Federal University of Mato Grosso (UFMT); and Tropicos database (Tropicos, 2014).

Quantitative analysis

Collected data was organized and analyzed using methods of descriptive statistics also processed as quantitative data using the methods cited by Amorozo & Gély (1988), Pasa (2013), descrived as follows:

a) Fidelity level (FL): Following Friedman *et al.* (1986) and modify by Amorozo & Gély (1988), which adapted the methodology for the calculation of the percentages of principal use concordance (PUC), calculated for medicinal plants, mentioned in this research for five or more informants.

$$PUC = (Fid/Fsp) \times 100$$

Where Fid is the frequency of informants that cited the principal use; and Fsp is the frequency of informants that cited the plant.

b) Correlation factor of each plant (CF)

$$CF = Fsp/Fspmc$$

Where, Fsp is the frequency of informants that cited the plant; and Fspmc is the number of citations of the most cited plant.

c) Importance values of most cited plant by informants (PUCc)

$$PUCc=PUC \times CF$$

Where, PUCc is the calculated and corrected percentage of concordance.

The index of Use Value (UV) (Phillips & Gentry, 1993a; Phillips & Gentry, 1993b modify by Silva & Andrade, 1998) was applied to investigate the use of the plant of variation.

$$UV = \sum Ui /n$$

Where Ui is the summe of the uses for each species; and n is the number of informants.

The main indications of the plants cited by respondents were categorized according to the International Statistical Classification of Diseases and Related Health Problems (ICD), adopted by the World Health Organization (WHO, 2010).

RESULTS AND DISCUSSION

Were interviewed 50 people in the community (25 men and 25 women). Most informants were local farmers with some basic scholarity and incomes that vary from 100 to 900 USD$ per month, associated in some cases with the gain of retirement. Women and men showed a similar level of knowledge when the issue at hand was the use of plants as medicine, for which, there was no relationship between increased knowledge whit gender. This result was also obtained by Silva & Proença (2007) and Giraldi & Hanazaki (2010) on ethnobotany research in the Brazil. The age ranged from 25 to 74 years in women and 37 to 73 years in men. Residents older than 47 years were more abundant in the community.

Unlike gender, age was a relevant factor for the distinction of knowledge within the community. Older people have greater knowledge about medicinal plants, either by life experience or because they are more affected by disease (Borges & Peixoto, 2009; Silva et al., 2012; Zucchi *et al*., 2013; Santos *et al*., 2014; Getnet et al., 2015). As well as the age, the income (lower income, higher registration of the plants used as the first option in combating and symptoms minimization of or diseases) and increased residence time in the community was crucial to better know and understand the composition of the medicinal flora.

It is worth mentioning that the progressive migration of young people above 18 years (48%) to the city of Cuiabá, for finding employment or continuing the studies, could eventually lead to the loss of botanical knowledge, as already said Amorozo (1995) the knowledge is only transmitted orally and through daily contacts, by means of past experiences.

About 100 medicinal plants were cited by the informants. We identified 71 at species level, 9 in

gender and 1 family, because of the conditions of the reproductive structure, distributed in 38 botanical families. 19 could not been identified, not being included in the results (Table 1). Most cited families (29% of all cited plants) were Fabaceae (11 sp.), Asteraceae (6 sp.), Lamiaceae (6 sp.), in accordance with several authors that also found this families to be of great importance's for traditional communities in the Brazil (Amorozo, 2002; Guarim-Neto & Amaral, 2010; Roque *et al.*, 2010; Pasa, 2011b; Alves & Povh, 2013; Zucchi *et al.*, 2013; Ribeiro *et al*., 2014) and outside the country (Ghorbani et al., 2011; Afolayan *et al*., 2014; Kim & Song, 2014; Polat *et al.*, 2015).

Most frequent species were the tree *Strychnos pseudoquina* A. St.-Hil (Loganiaceae) with 31 citations and the shrub *Lippia alba* (Lamiaceae) with 26 citations. For other species the number of citation were less than 25. Overall the tree growth habit (31%) performed more significant among the species mentioned, followed by herbaceous (26%), shrubs (23%) and subshrubs (14%). All other registered habit forms were around 1-3% (palm tree, vine, grass, epiphyte).

Table 1
Plants used in traditional medicine in the rural community Rio dos Couros, Cuiabá, MT, Brazil. 2014

Famíly/Scientific name	Brazilian (Popular) name	Used Part	Preparation method	Therapeutic indication
Amaranthaceae				
Alternanthera brasiliana (L.) Kuntze	Terramicina	Leaves	Tea, infusion and maceration	Antibiotic and anti-inflammatory
Dysphania ambrosioides (L.) Mosyakin & Clemants	Mastruz/Santa Maria	Leaves	Maceration with milk; Maceration with salt (direct application in the wound)	Worm; Bruise
Anacardiaceae				
Anacardium occidentale L.	Caju	Bark	Infusion and soak in water	Dysentery and stomach ache
Mangifera indica L.	Manga	Leaves	*In natura* preheated (external use); Tea	Headache; Cough
Myracrodruon urundeuva Allemão	Aroeira	Leaves	Tea	Kidney
Myracrodruon urundeuva Allemão	Aroeira	Bark	Bath and ointment	Bruise and healing
Apocynaceae				
Hancornia speciosa Gomes	Mangaba	Sap	Mix in sugar water (soak in water)	Hepatitis
Arecaceae				
Acrocomia aculeata (Jacq.) Lodd. ex Mart.	Bocaiúva	Root	Tea	Jaundice
Asteraceae				
Baccharis trimera (Less.) DC.	Carqueja	Leaves	Infusion	Stomach ache
Bidens pilosa L.	Picão	Leaves	Tea	Liver
Matricaria chamomilla L.	Camomila	Leaves	Tea and infusion	Tranquilizer for children, fever, jaundice and abdominal pain
Mikania glomerata Sprengel	Chá porrete	Leaves	Tea and infusion	Hoarseness, flu, cough and fever

Vernonia condensata Baker	Caferana	Leaves	Tea, infusion and maceration	Stomach
Vernonia polyanthes (Spreng.) Less	Assa – peixe	Leaves and flowers	Tea, infusion and syrup	Bronchitis (influenza, cough), kidney and anemia
Bignoniaceae				
Tabebuia aurea (Silva Manso) Benth. & Hook. f. ex S. Moore	Paratudo	Bark	Syrup, bath, soak in water, roast and then is made tea	Anemia, worm, influenza, hepatitis, stomach and healing
Bixaceae				
Bixa orellana L.	Urucum	Seeds	Maceration	Tonic for heart and blood thinner
Cochlospermum regium (Mart. ex Schrank) Pilg.	Algodãozinho	Root	Tea and soak in wine	Blood cleanser, worm and fortifying
Caricaceae				
Carica papaya L.	Mamão macho	Flower	Tea	High pressure
Caryocaraceae				
Caryocar brasiliense A.St.-Hil.	Pequi	Leaves	Tea	Kidney
Celastraceae				
Maytenus sp.	Espinheira santa	Leaves	Infusion	Anti-inflammatory
Costaceae				
Costus spiralis (Jacq.) Roscoe	Cana de macaco/ brejo	Leaves	Tea and infusion	Kidney
Cucurbitaceae				
Momordica charantia L.	Melão São Caetano	Leaves	Maceration	Dengue, malaria and liver
Dilleniaceae				
Curatella americana L.	Lixeira	Bark	Soak in water, bath and macerated (direct application to the injured site)	Stomach pain (diarrhea), hoarseness, kidney stone and healing
Euphorbiaceae				
Croton urucurana Baill.	Sangra d água	Sap	Mix in water or white wine (Soak in water)	Inflammation, diabetes, worms, gastritis, female infection, healing and blood cleanser
Jatropha curcas L.	Pinhão branco	Sap	Direct application in the injured site; Mix with water and ingest (Soak in water)	Healing; Dysentery
Jatropha gossypiifolia L.	Pinhão roxo	Leaves	Bath	Headache
Ricinus communis L.	Mamona	Leaves and fruit	Heats the leaf and adds the oil of the fruit	Headache and healing

Fabaceae				
Anadenanthera columbrina (Vell.) Brenan	Angico	Leaves	Tea	Diarrhea
Bauhinia sp.	Cipó tripa de galinha	Root	Soak in water	Diarrhea, dehydration and blood
Bauhinia sp.	Pata de vaca	Leaves	Tea and infusion	Diabetes, cholesterol and kidney
Cajanus cajan (L.) Millsp.	Feijão - Andu	Leaves	Tea	Diarrhea and stomach ache
Dipteryx alata Vogel	Cumbarú	Bark	Bath, soak in water, tea	Healing, dry cough and diarrhea
Hymenaea stigonocarpa Mart. ex Hayne	Jatobá	Bark	Tea, soak in water and syrup	Flu (dry cough), tonic, blood, inflammation and pain in the bones
Mimosa pudica L.	Dorme - dorme	Leaves	Bath	Tranquilizer for child sleeps
Pterodon pubescens (Benth.) Benth.	Sucupira	Seeds	Tea and infusion	Influenza, bronchitis, headache, anemia and stomach
Senna occidentalis (L.) Link	Fedegoso	All plant	Infusion	Stomach ache and worm
Stryphnodendron adstringens (Mart.) Coville	Barbatimão	Bark	Soak in water	Anti-inflammatory, Female inflammation, heart and gastritis
Tamarindus indica L.	Tamarindo	Leaves	Macerated (ingest); Bath to wash head	Labyrinthitis; Headache
Lamiaceae				
Hyptis suaveolens (L.) Poit.	Tapera velha	Leaves	Bath and tea	Cold, erysipelas, stomach pain and menstrual cramps
Leonotis nepetifolia (L.) R. Br.	Cordão de São Francisco	Leaves	Bath	Rheumatism
Mentha sp.	Hortelã/Poejo	Leaves	Tea and infusion	Flu (cough) and tranquilizer
Ocimum sp.	Alfavaca	Leaves	Tea and infusion	Flu, bronchitis and cough
Plectranthus barbatus Andrews	Boldo	Leaves	Tea, infusion and maceration	Stomach
Rosmarinus officinalis L.	Alecrim	Leaves	Tea and infusion	Heart, pressure and cough
Laureaceae				
Persea americana Mill.	Abacate	Leaves	Tea	Kidney and diuretic
Loganiaceae				
Strychnos pseudoquina A. St.-Hil.	Quina	Bark	Soak in water	Anemia, healing, intestinal worm, stomach, blood, headache, gastritis and appetite
Lythraceae				
Lafoensia pacari A. St.-Hil.	Mangava	Bark	Soak in water	Stomach, gastritis

	Brava		and tea	and ulcer
Punica granatum L.	Romã	Fruit peel	Tea	Sore throat, abdominal pain, inflammation of the uterus
Malpighiaceae				
Heteropterys tomentosa A. Juss.	Nó de cachorro	Roots	Soak in water or wine and infusion	Blood cleanser, anxiety and malaise
Malpighia glabra L.	Acerola	Fruit	Juice	Flu
Malvaceae				
Gossypium herbaceum L.	Algodão	Leaves	Maceration and tea	Female inflammation and flu
Unidentified	Malva Branca	Leaves	Bath	Cicatrizant
Myrtaceae				
Eucalyptus sp.	Eucalipto	Leaves	Tea, infusion and syrup	Flu (fiver, cough) and anemia
Psidium guajava L.	Goiaba	Shoots and Bark	Tea and soak in water	Diarrhea
Syzygium cumini (L.) Skeels	Jamelão	Leaves	Macerated - in food	Diabete
Nyctaginaceae				
Boerhavia diffusa L.	Amarra pinto	Root	Tea and macerated in water	Kidney
Oxalidaceae				
Averrhoa carambola L.	Carambola	Fruit	Juice	High pressure
Phyllanthaceae				
Phyllanthus sp.	Quebra Pedra	All plant	Tea and infusion	Kidney
Phytolaccaceae				
Petiveria alliacea L.	Guiné	Leaves	Bath and soak in alcohol	Discomfort (pain in the body)
Plantaginaceae				
Scoparia dulcis L.	Vassourinha	Leaves	Tea and infusion; Direct use of the leaf with salt or heated, over the injury	Infection and diabetes; Bruise - internal (bone)
Poaceae				
Aristida pallens Cav.	Barba de bode	Leaves	Tea	Diarrhea (in child)
Cymbopogon citratus (DC.) Stapf	Capim cidreira	Leaves	Tea and infusion	Sedative, flu
Eleusine indica (L.) Gaertn.	Pé de galinha	Roots	Tea	Urinary problem
Zea mays L.	Cabelo de milho	Corn hair	Infusion	Kidney
Polygalaceae				
Phlebodium decumanum (Willd.) J. Sm.	Caxinguelê	Roots	Macerated in water	Kidney
Rubiaceae				
Alibertia edulis (Rich.) A. Rich.	Marmelada	Leaves	Tea	Heart problems

ex DC.				
Morinda sp.	Noni	Fruit	Fruit juice mix with wine or grape juice	Body aches, stomach, low blood pressure, liver problems, flu
Palicourea sp.	Douradão/ Douradinha	Leaves	Tea	Kidney
Rutaceae				
Ruta graveolens L.	Arruda	Leaves	Tea and infusion	Headache, cramps, body aches and stomach
Zanthoxylum rhoifolium Lam.	Mama de porca	Leaves	Tea	Bleeding
Siparunaceae				
Siparuna guianensis Aubl.	Negra mina	Leaves	Bath (wash the head), tea and infusion	Headache (flu, sinusitis) rheumatism, kidney
Solanaceae				
Nicotiana tabacum L.	Fumo	Leaves	Bath and direct use of the heated leaves	Allergy and erysipelas
Solanum palinacanthum Dunal	Juã	Fruit	Bakes the fruit, put the shell on top (direct application in the site)	Furuncle
Urticaceae				
Cecropia pachystachya Trécul	Embaúba	Bark	Soak in water and tea	Kidney and high blood pressure
Cecropia pachystachya Trécul	Embaúba	Sprout	Tea	Bronchitis and cough
Cecropia pachystachya Trécul	Embaúba	Leaves	Bath (wash the head)	Headache
Verbenaceae				
Lippia alba (Mill.) N.E. Br. ex Britton & P. Wilson	Erva cidreira	Leaves	Tea and infusion	Soothing, flu and stomach
Stachytarpheta cayennensis (Rich.) Vahl	Gerbão / Gervão	All plant	Tea	Cough, healing and anti-inflammatory
Vochysiaceae				
Vochysia haenkeana Mart.	Cambará	Bark	Syrup	Cough, dysentery anemia
Qualea grandiflora Mart.	Pau-terra	Leaves	Tea	Tiredness
Xanthorrhoeaceae				
Aloe vera (L.) Burm. f.	Babosa	Sap	*In natura* (external use); Soak in water	Burn / cicatrizant; Gastritis and body pain
Zingiberaceae				
Curcuma longa L.	Açafrão	Roots	Tea	Sinusitis and flu
Alpinia speciosa (Blume) D. Dietr.	Colônia	Leaves	Tea and infusion	Soothing, high blood pressure and heart
Zingiber officinale Roscoe	Gengibre	Roots	Tea and infusion	Cough, bronchitis and hoarseness

We attempted to use the words used by interviewees, as the popular name, preparation and therapeutic indication. Leaves were the most used part of the plant with 53% of the citations, followed by bark (14%) and root (10%). All plant and other parts (fruit, sap, sprout, seed, corn hair and flower) were less than 8%. The principal plant preparation method was "tea" (decoction) with 36% of all mentions, followed by infusion with 19%, soak in water or wine (13%), bath (10%) and maceration (9%), other preparation methods were less than 6% (*In natura*, syrup, ointment and juice). So, It´s clearly observed that the leaves and decoction are most common ways of preparing ethnopharmacological products and this results are in accordance's with the founding presented in the works Pasa (2011a & 2011b), Alves & Povh (2013), Meyer *et al*. (2012), Ribeiro *et al*. (2014), Sivasankari *et al*. (2014), as well as the works Silva *et al*. (2012), Oliveira & Menino Neto (2012), Ruzza *et al*. (2014) and Dei Cas *et al.* (2015) that mentioned the infusion method.

To check the percentage of concordance main use (PUC) plants selected for five or more informants were listed. The disease or symptom most often cited for each species was chosen based on the agreement between the responses of informants; and for the correction factor *Strychnos pseudoquina* was selected, for being the most cited species, getting 31 citations. The use value index (UV) was applied to determine the distribution of knowledge among people about the use of plants (Franco & Barros, 2006) (Table 2).

Table 2
Relative value of cocordance about the main uses and use value of medicinal plants in the rural community of Rio dos Couros, Cuiabá, MT, Brazil. 2014.

Scientific name	Health problem	Fsp	Fdi	NU	PUC	CF	PUCc	UV
Aloe vera	Cicatrizant	24	10	3	41,7	0,77	32,26	0,125
Alpinia speciosa	Sedative / high blood pressure	9	9	2	100	0,29	29,03	0,2
Alternanthera brasiliana	Anti-inflammatory	6	4	2	66,7	0,19	12,9	0,3
Bauhinia sp.	Diarrhea	5	4	2	80	0,16	12,9	0,4
Bauhinia sp.	Diabetes	9	8	3	88,9	0,29	25,81	0,3
Boerhavia diffusa	Kidney problems	12	12	1	100	0,39	38,71	0,08
Cajanus cajan	Intestinal problems	6	6	1	100	0,19	19,35	0,2
Cecropia pachystachya	Kidney problems	14	6	5	42,9	0,5	19,35	0,4
Cochlospermum regium	Blood cleanser	10	8	3	80	0,32	25,81	0,3
Costus spiralis	Kidney problems	14	14	1	100	0,45	45,16	0,07
Croton urucurana	Inflammation	22	11	8	50	0,71	35,48	0,4
Curatella americana	Stomach ache (undefined)	22	12	4	54,5	0,7	38,71	0,2
Cymbopogon citratus	Sedative / Flu	22	22	2	100	0,71	70,97	0,09
Dipteryx alata	Cicatrizant	11	6	3	54,5	0,4	19,35	0,3
Dysphania ambrosioides	Worms/bruise	12	12	2	100	0,39	38,71	0,2
Eucalyptus sp.	Flu	10	8	2	80	0,32	25,81	0,2
Gossypium herbaceum	Women inflammation	8	6	2	75	0,3	19,35	0,25
Heteropterys tomentosa	Blood cleanser	8	6	2	75	0,3	19,35	0,25
Hymenaea stigonocarpa	Flu (cough)	10	7	5	70	0,3	22,58	0,5

Hyptis suaveolens	Flu	8	3	4	37,5	0,3	9,68	0,5
Lafoensia pacari	Stomach problems	12	12	1	100	0,39	38,71	0,08
Lippia alba	Sedative/ Flu	26	23	3	88,5	0,8	74,19	0,1
Matricaria chamomilla	Child tranquilizer	9	6	3	66,7	0,29	19,35	0,3
Mentha sp.	Flu	15	15	1	100	0,48	48,39	0,07
Mikania glomerata	Flu (cough)	6	4	2	66,7	0,19	12,9	0,3
Mimosa pudica	Child tranquilazer	6	6	1	100	0,19	19,35	0,2
Momordica charantia	Dengue	9	6	3	66,7	0,29	19,35	0,3
Morinda sp.	Body aches	15	5	5	33,3	0,48	16,13	0,3
Myracrodruon urundeuva	Bruise	12	8	2	66,7	0,39	25,81	0,2
Ocimum sp.	Flu, bronchitis and cough	13	13	1	100	0,42	41,94	0,08
Palicourea sp.	Kidney problems	24	24	1	100	0,77	77,42	0,04
Petiveria alliacea	Malaise (body ache)	6	5	2	83,3	0,19	16,13	0,3
Phyllanthus sp.	Kidney problems	14	14	1	100	0,452	45,16	0,07
Plectranthus barbatus	Digestive problems	23	23	1	100	0,74	74,19	0,04
Pterodon pubescens	Bronchitis	5	3	4	60	0,2	9,68	0,8
Punica granatum	Throat inflammation	5	3	3	60	0,2	9,68	0,6
Rosmarinus officinalis	Heart and Pressure	6	4	2	66,7	0,19	12,9	0,3
Ruta graveolens	Analgesic/ Colic kidneys	12	6	4	50	0,39	19,35	0,3
Scoparia dulcis	Bruise	10	10	2	100	0,32	32,26	0,2
Senna occidentalis	Worms/Stomach problems	5	5	2	100	0,16	16,13	0,4
Siparuna guianensis	Headache (sinusitis, flu)	24	21	3	87,5	0,8	67,74	0,125
Solanum palinacanthum	Furuncule	10	10	1	100	0,32	32,26	0,1
Stachytarpheta cayennensis	Cough	10	7	3	70	0,3	22,58	0,3
Strychnos pseudoquina	Anemia	31	27	8	87,1	1	87,1	0,3
Stryphnodendron adstringens	Inflammation	19	18	3	94,7	0,6	58,06	0,2
Tabebuia aurea	Anemia	18	12	6	66,7	0,58	38,71	0,3
Tamarindus indica	Headache	5	4	2	80	0,16	12,9	0,4
Vernonia condensata	Digestive problems	13	13	1	100	0,42	41,94	0,08
Vernonia polyanthes	Bronchitis	10	9	3	90	0,3	29,03	0,3
Vochysia haenkeana	Cough	17	9	3	52,9	0,55	29,03	0,2

Abbreviations: Fsp = Absolute frequency of informants who cited the species; Fid = Absolute frequency of informants who cited the main uses; NU = Number of listed uses; PUC = Percentages of principal use concordance; CF = Correction factor; PUCc = Corrected percentages of principal use concordance; UV = Use Value.

Other authors have also applied these index in their studies, including Botrel *et al*. (2006), Franco & Barros (2006), Amaral & Guarim-Neto (2008), Roque *et al.* (2010), Cunha & Botolotto (2011), Pasa (2011b), Meyer *et al.* (2012), Alves & Povh (2013), Neto *et al*. (2014), Baptistel *et al.* (2014), Sivasankari *et al*. (2014), Yaseen *et al.* (2015).

We calculated the percentages of principal use concordance (PUC) for the 50 species mentioned. According to Amaral & Guarim-Neto (2008), the PUC serves to evaluate the importance of each species for a particular purpose. The PUCc is used to neutralize through of the Correction Factor (CF), the greater or lesser popularity of specie.

The higher values of the PUCc were assigned to the species *Strychnos pseudoquina* (87.1%), used for anemia, followed by *Palicourea* sp. (77.42%) for kidney problems, *Plectranthus barbatus* (74.19%) for stomach, *Lippia alba* (74.19%) and *Cymbopogon citratus* (70,97%) as for its sedative effect and for respiratory diseases. These results indicate the importance of these species in the community.

Other species that stood out showed PUC 100% (n = 17), indicating that each of the species were mentioned for the same use by all informants. However, it is interesting to note that, most of these species showed a PUCc lower than 50%. This is because when calculating PUCc, this value usually falls, being lower than the PUC due to the applicability the correction factor (CF) compared to the most cited plant, in this case *Strychnos pseudoquina*, with 31 citations. Thus, species such as *Vernonia condensata* used for digestive problems that had the PUC of 100%, is replaced by its corrected correlation value, PUCc to 41.94%, which means that this plant is used for many of the community residents and expressed a common use value within the locals.

We also calculated the use value (UV) for each species, according to the number of citations and their informants. It was observed that 100% of the species have UV lower than 1, varying from 0.04 to 0.8. Species of daily use have minor UV, rather than species less used in the community, but with many different uses. The species with lower UV (0.04 to 0.09) were *Palicourea* sp., *Costus spiralis*, *Phyllanthus* sp. and *Boerhavia diffusa* with therapeutic indication for kidney problems; *Plectranthus barbatus* and *Vernonia condensata* for digestive problems; *Mentha* sp., *Ocimum* sp. and *Cymbopogon citratus* for respiratory problems; *Lafoensia pacari* to stomach problems. Moreover, these plants have from 12 to 24 citations, each with a single use indicated with 100% fidelity level or PUC.

Among the medicinal plants used, 13 categories of health complication or diseases were identifying. Most of them use the treatment of respiratory diseases (bronchitis, cough, flu, sinusitis - 23%), being followed by diseases of the genitourinary system (diuretic, kidney stone and colic) and digestive diseases (stomach problem) both at 11% (Table 3).

The most cited plant for respiratory problems was *Lippia alba* which also was cited for sedative effect (23 citations each use). Others authors like Feijó *et al*. (2013), Ribeiro *et al*. (2014), Costa & Mayworm (2011), also commented such indications. According to Lorenzi & Matos (2008) and Jannuzzi *et al.* (2011) its phytochemical diversity attributes to various uses, among them, the sedative (soothing), its effect is due to the high amount of *citral*, a major component of the essential oil. Already the assignment for the treatment of respiratory tract could be related to its slightly expectorant property (Lorenzi & Matos, 2008). The most cited plant for renal problems or kidney affections was *Policourea* sp. with 24 citations. While studying the medicinal properties of *Palicourea* sp. several authors confirmed their ethnopharmacology as a diuretic agent and others kidney problems, proving the importance of preserving local knowledge and the conservation of Brazilian biodiversity (Rodrigues & Carvalho, 2001; De La Cruz, 2008; Freitas *et al*., 2011; Moura *et al*., 2013).

For the treatment of digestive problems, *Plectranthus barbatus* was the most mentioned plant with 24 citations. Scientific proof of its activity is found in the works of Brito & Senna-Valle, 2011; Freitas *et al*., 2011; Vásquez *et al*., 2014; Neto *et al*., 2014. Justified by the scientific evidence of its gastric hiposecretora activity (Lorenzi & Matos, 2008). Data like these indicate the constant relationship between popular and scientific knowledge. Yaseen *et al.* (2015) emphasize that the ethnobotanical search may be used for future research of pharmacological nature in order to develop new herbal medicines.

Overall these three categories of diseases (respiratory problems, renal problems and digestive problems) have also been described as the most common in other works (Meyer *et al*., 2012; Chaves & Barros, 2012; Alves & Povh, 2013; Neto *et al*., 2014). However are there studies that show different

results depending of the most common diseases of the region, as recorded by Pasa (2004) in riverside community of bacia do rio Árica Açu, Cuiabá, Mato Grosso, Brazil.

CONCLUSION

The rural community Rio dos Couros is made up of residents who have a broad knowledge about the medicinal flora of the region, resulting in the registration of 81 medicinal species with different therapeutic indications. Differences in gender and education level did not affect the degree of pharmacological knowledge. By contrary, age, residence time and income seem to affect the level of information among the residents. In addition, the high level of agreement between informants about main uses of local plants, with instructions for its preparation, gives the community a cultural domain of their medicinal flora, especially for the plants used to treat respiratory, renal and digestive problems.

Table 3
Number of species found in gardens and woods used as medicinal plants for the rural community of Rio dos Couros, Cuiabá, MT, Brazil. 2014.

Categories of heath complication (ICD), according WHO (2010)	N° species
Genitourinary system (kidney problems: diuretic, kidney stone and colic)	6
Respiratory diseases (bronchitis, cough, flu, sinusitis)	13
Circulatory system (heart, hypertension)	2
Infections (throat, women inflammation)	2
Sedative (tranquilizer)	5
Anti-diarrhea	1
Blood and blood forming organs (blood cleanser, anemia, furuncule)	5
Digestive problems	6
Parasites (vermifuge)	2
Cicatrizant	5
Symptoms (undefined pain: headache, stomach ache, body ache, analgesic)	5
Diseases of the endocrine system (diabetes)	1
Immune system (Anti-inflammatory)	3

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