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Medicine bottled (*garrafada*): Rescue of the popular knowledge

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Using plants to treat health problems is an ancient practice that is still practiced today. One way that plants are used to improve health is through medicine bottled (*garrafada*). A medicine bottled is a homemade mixture of medicinal plants added to a solvent. Medicines bottled are medicinal mixtures that have been widely used, especially by residents of rural areas. Therefore, the goal of this study was to determine the plant species and contents used to prepare medicine bottled by the Bananal Community in the municipality of Rondonópolis/MT/Brazil. Data was collected through semi-structured interviews with the residents of the community. Data analysis was descriptive. The study revealed a total of 12 medicine bottled types used by the community, with 27 plant species belonging to 24 genera and 14 families. The most frequently cited families were Fabaceae, Rutaceae, Moraceae, and Bignoniaceae. The most frequently cited species was *Brosimum gaudichaudii* Trécul, known popularly as a *mama-cadela*; was used in three cited medicine bottled. Some medicine bottled was produced with a single species of medicinal plant and others with three or more. Their therapeutic purposes were diverse, with some medicine bottled indicated to treat one disease and others to treat two or more diseases. It can be concluded that the Bananal community demonstrates knowledge about the plant species used and how to extract their active compounds. The strong historical and cultural context, in addition to the diversity and availability of native plant resources in Brazil, may have perpetuated the use of medicine bottled in the Bananal Community.

Key words: Medicinal plants, medicine bottled (*garrafada*), popular knowledge.

INTRODUCTION

The rural populations receive diverse understandings and classifications (Iglehart, 2018). In North America, in the United States, the Census Bureau's 2010, classifies by

rural the entire population, housing and territory not included in an urban area; 59.5 million people (19.3% of the population) are rural (HRSA, 2017).

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In the countries of South America, specifically in Brazil, the rural population is characterized as people who have their livelihoods, production and social reproduction predominantly related to land (Brasil, 2013). Particularly noteworthy are family farmers, peasants, rural workers and settlers residing or not in the countryside. They are represented by 30 million people, about 15.64% of the total Brazilian population (IBGE, 2010). They are distributed in diverse races, ethnicities, peoples, religions, cultures and production systems (Brasil, 2013). It is by far the most important social group in the health area (Iglehart, 2018).

When we observe in a global context, we note that despite the differences between developed and developing countries, the health issue of the rural population is the same throughout the world (Strasser, 2003). In the national context, access to care is a major problem and it is a challenge to be overcome (Soares et al., 2015), either by the organizational aspect or the geographical aspect (Donabedian, 2002).

In the first instance, there is a waiting time for the service (Mendes et al., 2012), health professionals failure (Oliveira et al., 2017; Iglehart, 2018; Strasser, 2003), deficiency of sanitation and quality of health services (Soares et al., 2015). The second is the distance to the service unit, travel time, travel cost and access limitations (Mendes et al., 2012; Soares et al., 2015).

Given the difficulties that reduce the population's access to health services and the demand due to exposure to risk factors, the question is how do these rural communities treat their illnesses? From this question arises another important aspect, the traditional medicine that uses the popular knowledge usually acquired from the ancestors, for the preparation of medicine. Although modern medicine is growing from time to time, traditional medicine still plays a large role in the treatment of different diseases (Birhanu and Ayalew, 2018).

The use of medicinal plants prepared in different ways for treatment and cure of disease is the first choice of home remedies due to the availability of raw material at the site (Singh et al., 2017; Umair et al., 2017; Pasa, 2011) or, in some cases, because it is the only source of therapeutic resources (Messias et al., 2015).

A number of different forms of preparation of these medicinal products are available, such as decoction, extract, juice, powder, paste, infusion, tea (Umair et al., 2017; Aziz et al., 2018) and medicine bottled (Saric-Kundalic et al., 2010; Lima et al., 2016).

The term known as medicine bottled (*garrafada*) raises doubts about origin, may have been derived from the *Triaga Brasília*, secret formulas known to physicists and priests (Camargo, 2011) which is composed of more than 60 substances (Santos, 2009), in particular for medicinal plants.

Probably, the term triaga was replaced in the popular

way by medicine bottled, being supposed that the priests supplied their medicines in glasses and in bottles (Camargo, 2011). Carreira and Santos (2001) infers that the bottled medicine (*garrafada*) is a combination between wine and medicinal plants and the term appeared in Portugal between the sixteenth and eighteenth centuries.

In spite of the past decades, and with the advancement in the field of allopathic drugs in the present day, there are still practitioners of this folk medicine in Brazil. The use of medicine bottled, is a strong tradition that stays in the culture of Brazil. Usually, the apprentices are populations *quilombolas*, riverine, healers, herblists (*raizeiros*) people that live in the rural communities and other people that adhere to that habit.

Medicine bottled are homemade medicines that have as solvents wine or cane brandy, water, honey and addition of various types and parts of medicinal plants, such as barks, fruits, leaves, roots or flowers, dried or green, the which are macerated for three to several days (Dantas et al., 2008). Being a preparation of popular origin, there is no fixed relation between the quantity of plant material and the amount of liquid (Jorge, 2009).

The use of plants for the treatment of health is an important aspect for the rural population (Brasil et al., 2017) and although the use of medicine bottled in several various communities is current, researches on the subject are scarce in the literature (Santos and Silva, 2015). This fact boosted this research. On the stage and with the contribution of ethnobotany research and ethnopharmacology, the present study aimed to know the species of plants and the content used in the preparation of the medicine bottled for residents in the rural community of Bananal, Rondonópolis, MT, Brazil.

MATERIALS AND METHODS

Description of the study area

The research was performed in the Bananal Community, Rondonópolis, Mato Grosso, Brazil. Historically, the colonization of the Bananal region began around 1920 with the migration and occupation of landless workers in the Rondonópolis territory (Lima, 2010). The Bananal Community is a rural area located north the Rondonópolis municipality at 16°8'58.68 "S and 54°35'10.63"O (Figure 1). The climate of the region is of agreement Aw Köppen type tropical thermal mega with dry summers and temperatures reaching an annual average of 27°C (INMET, 2017). The vegetation at the research site is dominated by savanna, with physiognomies of open and forested savannas.

Data collection

First, we visited the community to assess the location, meet the leaders, and present our objectives and the relevance of our study. The Community Health Agent (CHA) was assigned as the mediator during data collections/visits to residents' homes. The CHA has a Family Health Strategy Unit (FHS) in the Bananal Community, where residents receive monthly medical care and the CHA visits

Table 1. List of species registered in the production of bottled in the Bananal community, Rondonópolis, MT, Brazil.

Medicine bottled	Family	Scientific name	Popular name
	Adoxaceae	<i>Sambucus australis</i> Cham. & Schldl.	Sabugueiro
	Amaranthaceae	<i>Dysphania ambrosioides</i> (L.) Mosyakin & Clemants	Erva-de-santa-maria
	Asteraceae	<i>Mikania glomerata</i> Spreng.	Guaco
	Bignoniaceae	<i>Tabebuia aurea</i> (Silva manso) Benth. & Hook. F. ex. S. Moore	Paratudo
		<i>Jacaranda rufa</i> Silva Manso	Caroba
Medicine bottled 1	Bromeliaceae	<i>Bromelia balansae</i> Mez	Gravatá
	Fabaceae	<i>Hymenaea stigonocarpa</i> Mart. Ex <i>Dipteryx alata</i> Vogel	Jatobá Baru
	Lamiaceae	<i>Ocimum basilicum</i> L.	Alfavaca
	Moraceae	<i>Dorstenia cayapia</i> Vell.	Carapiá
	Rutaceae	<i>Citrus sinensis</i> (L.) Osbeck cv. <i>pera</i> <i>Citrus aurantifolia</i> (Christm.) Swingle. cv <i>tahiti</i>	Laranjeira Limão
Medicine bottled 2	Malvaceae	<i>Waltheria americana</i> L.	Malva-branca
Medicine bottled 3	Rutaceae	<i>Spiranthera odoratissima</i> A. St.-Hil.	Manaca
	Fabaceae	<i>Senna occidentalis</i> (L.) Link.	Fedegoso
Medicine bottled 4		<i>Amburana cearensis</i> (Allemão) A.C.Sm.	Amburana
	Lauraceae	<i>Cinnamomum pseudoglaziovii</i> Lorea-Hern.	Canela
	Moraceae	<i>Morus nigra</i> L.	Amora
	Rutaceae	<i>Ruta graveolens</i> L.	Arruda
Medicine bottled 5	Lauraceae	<i>Persea americana</i> Mill.	Abacate
	Euphorbiaceae	<i>Croton urucurana</i> Baill.	Sangra-d'água
Medicine bottled 6	Moraceae	<i>Brosimum gaudichaudii</i> Trécul	Mama-cadela
	Euphorbiaceae	<i>Croton antisiphiliticus</i> Mart.	Pé-de-perdizes
Medicine bottled 7	Fabaceae	<i>Pterodon emarginatus</i> Vogel	Sucupira
Medicine bottled 8	Bignoniaceae	<i>Jacaranda rufa</i> Silva Manso	Caroba
Medicine bottled 9	Apocynaceae	<i>Mandevilla velame</i> (A.St.-Hil.) Pichon	Velame-branco
	Apocynaceae	<i>Mandevilla velame</i> (A.St.-Hil.) Pichon	Velame-branco
Medicine bottled 10	Moraceae	<i>Brosimum gaudichaudii</i> Trécul	Mama-cadela
	Rutaceae	<i>Spiranthera odoratissima</i> A. St.-Hil.	Manacá
Medicine bottled 11	Fabaceae	<i>Stryphnodendron adstringens</i> (Mart.) Coville	Barbatimão
Medicine bottled 12	Moraceae	<i>Brosimum gaudichaudii</i> Trécul	Mama-cadela

residents' homes every two weeks. Our goal was to gain confidence and establish a good relationship with the community. Subsequently, we carried out collections/semi-structured interviews from January to December 2016. The interviews were previously authorized by the participants, who signed a free and clear consent form. The following requirements for conducting research were established: prior consent of the participant, 18 years or older, resident in the rural community and registered in the FHS, family member(s) with knowledge of plant uses. Residents who were not

found after three attempts during the data collection period were excluded from the survey. The medicinal plant species cited by the residents were visualized, photographed, and collected. The material was herbalized and identified by specialists and compared to exsiccate in the herbarium of the Federal University of Mato Grosso (UFMT), Cuiabá, MT. The scientific names of the species were confirmed using online databases of the Missouri Botanical Garden/Tropics (<http://www.tropicos.org>) and the species list of the Flora of Brazil (Reflora, 2018). For taxonomic

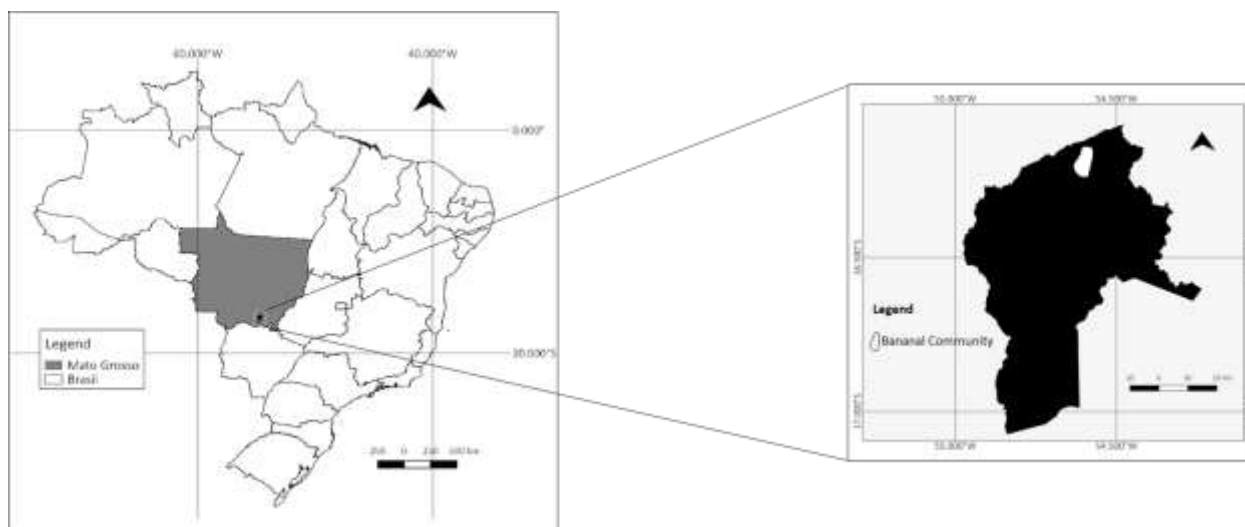


Figure 1. Location of the study site: Bananal Community, Rondonópolis, Mato Grosso, Brazil.



Figure 2. Medicine bottled (*garrafada*) preparation with *Mandevilla velame* (velame-branco) by inhabitant of the Bananal Community, Rondonópolis, Mato Grosso, Brazil.

Data analysis

The information obtained from participants was transferred to Microsoft Excel © 2013 program, using a general spreadsheet, and then descriptive analysis began. To calculate the similarity between the species used in medicine bottled, comparisons were made using a Jaccard similarity index (SJ), which expresses the similarity between environments based on the number of common species (Brower et al., 1998). The resulting floristic similarity matrix was used to generate a dendrogram.

Ethical aspects

Prior to data collection, the research was sent to the Comitê de Ética e Pesquisa do Hospital Universitário Julio Muller CEP/HUJM in compliance with resolution No. 466 of 12 December 2012 of the National Health Council and received favorable endorsement under CAAE number: 48675315.0.0000.5541. We state that the ethical aspects were fulfilled, and we informed participants about the objective of this study, anonymity of their identity, research consent, and their possibility of withdrawing at any time.

RESULTS AND DISCUSSION

Fifty residents from the Bananal Community were interviewed, who mentioned 12 types of medicine bottled (Table 1). Of these different medicine bottled (*garrafadas*), 27 plant species were used distributed in 24 genera and 14 families. The most frequently cited botanical families were: Fabaceae (19.35%), Rutaceae (16.13%), Moraceae (12.90%), and Bignoniaceae (9.68%).

Fabaceae also presented the highest number of cited species in other studies about medicinal plants (Birhanu and Ayalew, 2018; Lima et al., 2016; Morya et al., 2018; Alves et al., 2017; Santos and Silva, 2015; Agra et al., 2007). This can be attributed to the fact that this family is the third largest botanical family, with approximately

classification, we used the Angiosperm Phylogeny Group IV (Stevens, 2017).

19,000 species distributed among more than 725 genera (Schwirkowski, 2015). Fabaceae has wide geographic distribution, found in all Brazilian biomes, and presents many life forms, from small herbs to tall trees (Zappi et al., 2015).

Brosimum gaudichaudii, Trécul, popularly known as mama-cadela was the most frequently cited species, which was mentioned in the preparation of three medicine bottled. Studies about this species refer action to treatment of vitiligo (Filho et al., 2015) and other studies support the morphoanatomical, immunohistochemical, physiochemical, phenological, pharmacological, and toxicological aspects of the species (Martins et al., 2015; Land et al., 2017; Filho et al., 2015; Faria et al., 2015; Barbosa et al., 2014; Jacomassi et al., 2007; Cunha et al., 2008; Pozetti, 2005).

The three species *Jacaranda rufa*, popularly known as caroba, *Spiranthera odoratissima* popularly called manacá, and *Mandevilla velame*, popularly known as velame-branco, were each cited in the preparation of two medicine bottled (Figure 2). Studies with *S. odoratissima* (manacá) shows this species ability to treat liver and kidney diseases, stomach aches, headaches, infection and rheumatism. Performed chemical and morfo-anatomical studies, as well as pharmacological research give the anxiolytic, anti-inflammatory, analgesic, anti-protozoan, and leishmanicidal activities of the plant and even isolation of Tiliroside as inhibitor of *Trypanosoma cruzi* (Souza et al., 2018; Cornelio et al., 2017; Galdino et al., 2012; Nascimento et al., 2012; Matos et al., 2004; Matos et al., 2014; Carneiro Albernaz et al., 2012; Santos et al., 2011).

Ethnobotanical studies support the use of *Jacaranda rufa* for stomach aches (Barbosa and Pinto, 2003). Furthermore, other ethnobotanical studies with *M. velame* refer to its use as a depurative, antibiotic, anxiolytic agent and for treatment of woman's health issues (Yazbek et al., 2016; Messias et al., 2015; Pinto et al., 2013). Other research with *M. velame* include catalogues (Morokawa et al., 2013), and microbiological analyses of medicinal preparations made by herbalist (Braz et al., 2015).

Plant parts used

Regarding the plant parts used, the root was the most frequently cited for medicine bottled, followed by peel and leaf, while the least frequently cited parts were seed, middle of peel, flower, and fruit (Figure 3). Similar results were found in another study about medicine bottled, where researchers identified the peel as the most frequently used plant part, representing 48.7%, followed by the root with 18.5% (Dantas et al., 2008). The main components of medicine bottled were the peels of stems and roots (Alves et al., 2017), which aligns with the findings of this study. In the Bananal Community, the plant parts which residents used to make medicine

bottled may be related to their historical and cultural context. Historically, roots were used to prepare the brazilian triaga, where the roots were transformed into a powder and mixed with each other (Santos, 2009). Although widely used, Lagnika et al. (2016), states that the use of roots and bark can cause a devastating effect on biodiversity. In that sense, we advise that removal of these plant parts should be done consciously by community residents, in order to preserve the biodiversity of the local flora and ensure it for future generations.

Most used solvents

Three solvent types were cited for medicine bottled preparation, the most frequently used was wine with 58%, then water with 39% and alcohol 3% (Figure 4). Medicine bottled with alcohol solvents were for topical use only, with only one medicine bottled cited. All other medicine bottled must be ingested. The knowledge of the rural community corroborates with findings from the literature. Wine was used in the ancient *triagas* and some root extracts were added at the right time (Santos, 2009). A study about medicine bottled analysis (Dantas et al., 2008) found similar results as ours, citing white wine (56%) as the principal solvent, while water was one of the least cited solvents. Even though the main solvent is wine, other liquids can be used as solvents, as was found in this study. Water is the second most frequently used solvent in medicine bottled. Santos and Silva (2015), infers the liquid medium in which the plants are immersed depends on the community and the purpose of the medicine bottled. They affirm that some medicine bottled can only be produced with water and others with alcoholic beverages, due to the type of plant used. This study provides important data about the knowledge a community has about the preparation of medicinal plants in medicine bottled. Therefore, we infer that the community possesses knowledge about the plant species used, how they should be prepared, and the best solvents and methods to dilute and extract the active principles of the plant.

Preparation mode

Regarding the methods for medicine bottled preparation, the most frequently used method was mixing the plant (s) part (s) with the solvent, mostly wine, and allowing it to tan for a certain time period. It was found that the amount of time the plant remained in the solvent (tanned) was at the discretion of the producers, since the time varied from two to ten days.

Tanning is a method of extracting the active substances of a plant by soaking the plant in a liquid (Interviewed). This tanning method in wine has been reported by other researchers (Santos and Silva, 2015). One study

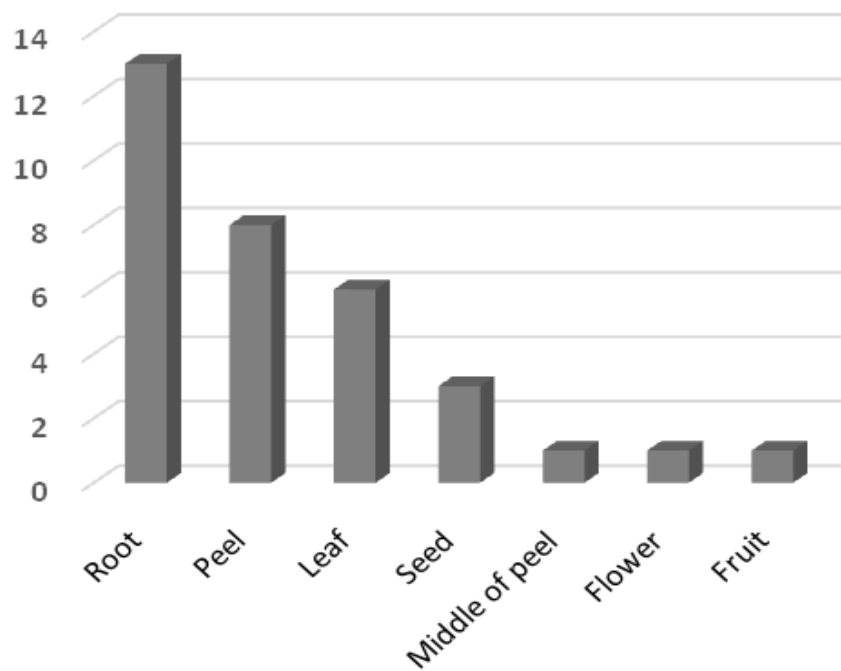


Figure 3. Plant parts used in medicine bottled (*garrafada*) preparations by inhabitants of the Bananal Community, Rondonópolis, Mato Grosso, Brazil.

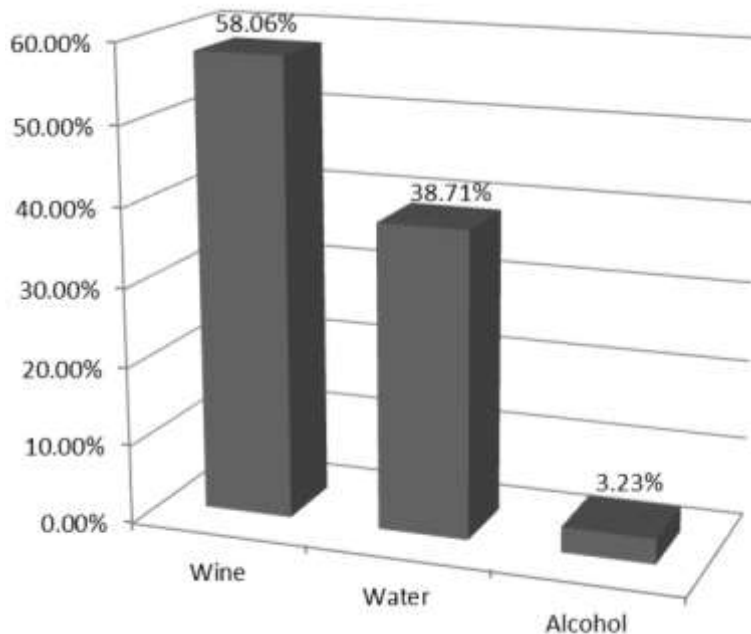


Figure 4. Solvents used to prepare medicine bottled (*garrafada*) by inhabitants of the Bananal Community, Rondonópolis, Mato Grosso, Brazil.

suggest that the medicine bottled should tan for seven days (Chaves and Barros, 2012). In general, (Jorge,

2009) states that medicine bottled can be made using dry or fresh plant material, and they macerate in a liquid,

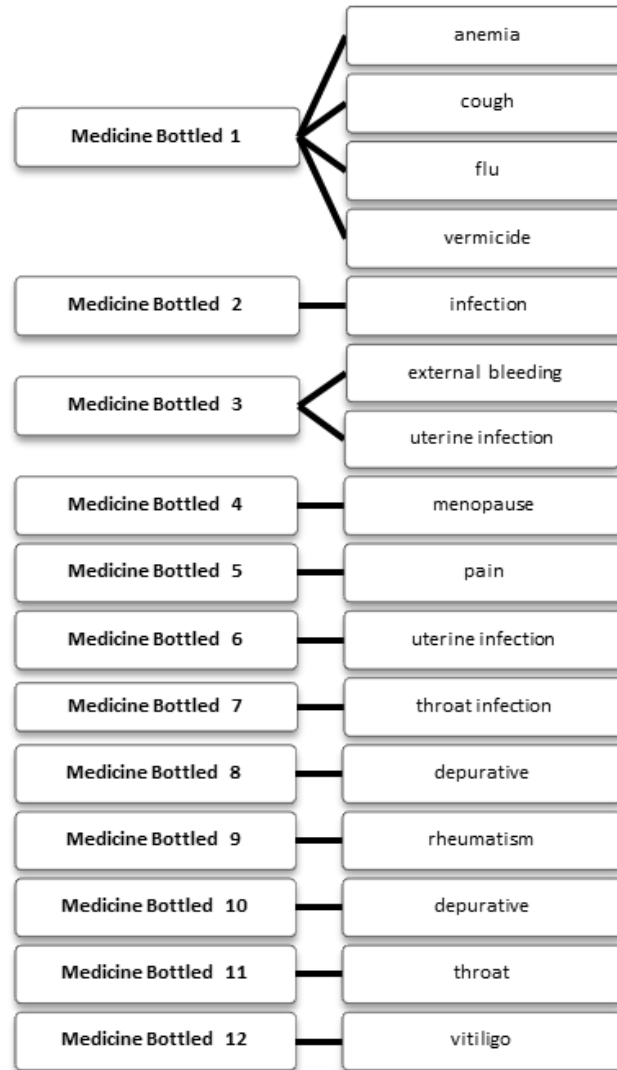


Figure 5. Types of diseases treated with medicine bottled (*garrafada*), Rondonópolis, Mato Grosso, Brazil.

usually cachaça, for a given period of time. Cane brandy has low alcohol grade (40 to 45°GL), which differs from most tinctures that have an alcohol grade between 50 to 700 GL. However, in terms of medicine bottled preparation, many residents did not mention the amount of time for tanning, stating that some plants should be placed in wine and ingested. This fact corroborates with (Santos, 2009), who refers to the divergence of preparation methods. Regarding the quantity of plant parts used in the medicine bottled (*garrafada*), in general, participants cited a small quantity as a “bunch” or a “hand full”. In the study by Santos and Silva (2015), they also cited no exact measurement, with a “small piece” cited to make a drink. The authors confirm that the most experienced community members already knew the appropriate amount of plants for the medicine bottled and did not know the exact measurement used. The quantity

is measured when they are in possession with the parts of the vegetable and carry out the measure with the hands.

Use purpose and composition of species

The plants used in the medicine bottled were indicated for a total of 13 use purposes (Figure 5). The most prominent uses were to treat throat infections, uterine infections, and as a depurative.

In this study, it was observed that most of the medicine bottled (10 medicine bottled -83.33 \cong 83%) were indicated for one single use purpose. The other medicine bottled (2 medicine bottled -16.66 \cong 17%) were indicated for two or more use purposes (Figure 5). Among the medicine bottled indicated with only one purpose, seven were

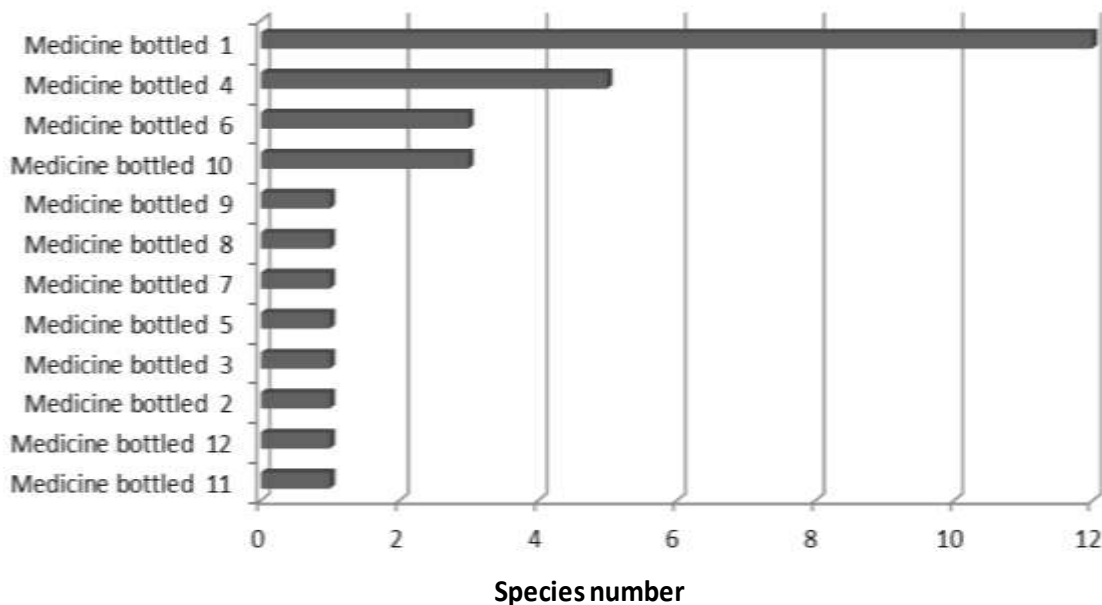


Figure 6. Number of plant species used to prepare medicine bottled (*garrafada*) in the Bananal Community, Rondonópolis, Mato Grosso, Brazil.

prepared with one plant species, these were medicine bottled 2, 5, 7, 8, 9, 11, 12. The other medicines bottled (4, 6 and 10) were prepared using associations of three or more plants species (Figure 6).

The medicine bottled indicated to treat more than one disease that is medicine bottled 3, is prepared with just a single kind of medicinal plant. The other medicine bottled 1, is made up of several species. This suggests that the popular knowledge residents have about medicinal plants and their uses is considerable and diverse. This finding is similar to the study by Agra et al. (2007), who reference a plant species with only one use purpose, as well as species used for more than five diseases. The authors support that the community members had considerable knowledge about plants and their uses, for a wide variety of diseases, which was due to the experience of previous generations.

The fact that some cited medicine bottled are produced with one medicinal plant species demonstrates that it is not the quantity of plants the community uses, but rather, their knowledge about how to use a plant. Furthermore, the drug potential and which solvent are used to prepare the medicine bottled to extract the plants active ingredient is the unique knowledge that the rural community holds. The preparation of medicine bottled using a single species was also reported by Chaves and Barros (2012), who mentioned that the medicine bottled are produced with the one or more plant part.

In daily practice, residents also used associate of different plants, that is three or more species. This method of composition of medicine bottled was also found in research conducted by Muniz and Ito (2016). In this

sense, the medicine bottled has a special focus, because it uses the combination of two or more medicinal plants to obtain an effect synergic with the maximum therapeutic effect (Aziz et al., 2018). According to Camargo (2011), the bottle plays a double role, complementary, the symbolic and functional. The first refers to that subjectively constructed in the religious myth, the belief on the part of the patient, the healer. The second is functional role, which each plant performs from its active principles, pharmacological activities, scientifically proven.

Medicine bottled (*garrafada*) could be stored and consumed for a period of time. This action is only possible due to the presence of alcohol contained in the solvents that is acting as a preservative (Thompson and Davidow, 2016). This corroborates the results found in this work. We report that the determination of the number of species used in medicine bottled (*garrafada*) is based on the experience acquired, with no wrong or right number of species used. Therefore, this study corroborates with the results of Jorge (2009) that there is no fixed relationship between the amount of plant material and liquid used for medicine bottled.

Similarity

In relation to the similarity of plants used in the medicine bottled, we verified a division of two groups: G1 and G2 (Figure 7). The group 1 (G1) split into two sub groups: SG1 and SG2. The SG1 formed with 50% similarity, while the SG2 formed with 22% similarity. Group 2 (G2) represented the other samples of medicine bottled and

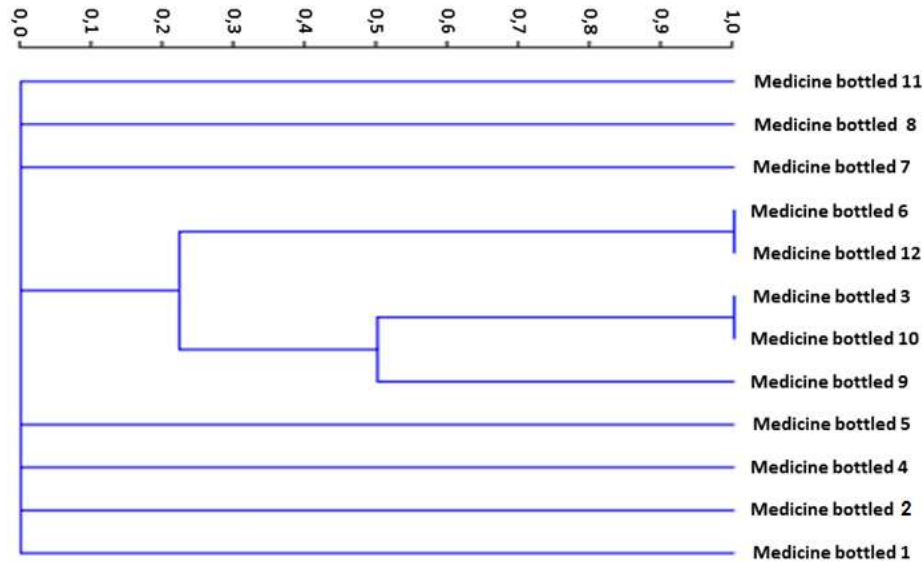


Figure 7. Dendrogram of Jaccard similarity between the medicine bottled (*garrafada*) produced by the Bananal community, Rondonópolis, MT.

showed similarity values = 0, which means that no species were shared in this group. In the SG1, the similarity was higher between the samples 3, 9, 10 who shared the species *S. odoratissim* (manacá) (3, 10) and *M. velame* (velame-branco) (9, 10). In the SG2, the similarity was greater among the samples 6 and 12, which shared the species *B. gaudichaudii* (mamacadela). These results show that there is a selective choice of the species that make up each medicine bottled. This diversity of choice could be related to the knowledge acquired from the participants' ancestors and new information. Although our results do not present the entire medicinal flora used by the Bananal Community, it still represents a portion of it.

Considerations

The methods used by people for home-based extraction of active principles are important and should be used with caution, as the concentration of active substances could increase or decrease depending on the method used (Saraiva et al., 2015). Study microbiological analyses carried out (Braz et al., 2015) on medicine bottled, syrups, and capsules found contamination by molds and yeasts, which can present high fungal load. The authors highlighted that the high degree of contamination present in the preparations may alter the effectiveness of medicine bottled and pose health risks. It is stressed that although the study community has no intentions of manufacturing and selling their medicine bottled, we agree with Braz et al. (2015) and support maintaining quality of medicine bottled to ensure their efficacy and to

keep users safe. The medicine bottled (*garrafada*) are produced by mixtures of several medicinal plants. They contain different active compositions that can potentiate or impede other physiological actions (Passos et al., 2018). In this way, we emphasize that special care should be taken to ensure the quality of products manufactured for internal or topical use. The appropriate manipulation, conservation, and identification of the product with the names of the plants, botanical component and used concentration are essential (Marques et al., 2015), as well as knowledge about associations between species that can increase effectiveness or inhibit the active compounds of the plant and cause adverse effects to human health (Muniz and Ito, 2016). The expressive use of medicinal plants by the population and popular knowledge needs studies that confirm the information about the actions of the plants. This is to minimize the side effects and toxicological effect, since its use must be reliable and safe (Firmo et al., 2012). The standardization of raw plant materials, including species selection, sowing, cultivation, harvesting, drying, storing, and quality evaluation is fundamental for plants with therapeutic purposes (Reis et al., 2011).

CONCLUSION

The community of Bananal uses the medicine bottled as alternative medicine for the treatment of their illnesses. Although differences exist in their preparation, the informers evidenced considerable knowledge about the medicinal plants and their action. The recognition of the

use of medicine bottled as a popular practice is important in the process of valorization of knowledge and rescue of tradition of a community. Medicine bottled research is still incipient and the present study contributes to the popularization of use of this resource as medicine in communities. The obtained result stimulates the accomplishment of researches of chemical, pharmacological, toxicological and clinical character. These can evaluate the interaction and the medicinal plants effectiveness in the treatment, as well, as discover bioactive potential that can generate new drugs. It is suggested that health professionals direct attention during the service to the rural community about the use of medicinal plants, once, which is part of the daily life of these people and public policies be implemented to strengthen popular knowledge and correct the rational use of plant resources.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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