Ciências Biológicas
Realidades e Virtualidades

Clécio Danilo Dias da Silva
(Organizador)

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Ciências Biológicas e da Saúde

APRESENTAÇÃO

Sabe-se que as Ciências Biológicas envolvem múltiplas áreas do conhecimento que se dedicam ao estudo da vida e dos seus processos constituintes, sejam essas relacionadas à saúde, biotecnologia, meio ambiente e a biodiversidade. As Ciências biológicas apresentam singularidades como campo de conhecimento e características próprias em relação às demais Ciências, exibindo características específicas em termos de objetos que estudam, objetivos que almejam, métodos e técnicas de pesquisa, linguagens que empregam, entre outros. Dentro deste contexto, o E-book "Ciências Biológicas: realidades e virtualidades" está organizado com 22 capítulos escritos por diversos pesquisadores do Brasil, resultantes de pesquisas de natureza básicas e aplicadas, revisões de literatura, ensaios teóricos e vivências no contexto educacional.

No capítulo "BACTÉRIAS ENTOMOPATOGÊNICAS COM POTENCIAIS DE CONTROLE BIOLÓGICO" Alves e colaboradores efetivaram uma revisão de literatura explicitando as principais bactérias com potenciais de controle biológico, buscando caracterizar suas particularidades e aplicações na agricultura. Cordeiro e Paulo em "DETERMINAÇÃO DOS DADOS DE COEFICIENTE DE PARTIÇÃO DA LINHAGEM BACTERIANA LACTOBACILLUS ACIDOPHILUS ATCC 4356 NOS SISTEMAS AQUOSOS BIFÁSICOS, FORMADOS PELA DEXTRANA NATIVA E PELO PVA" apresentam no capítulo o emprego dos sistemas aquosos bifásicos utilizando poliacetato de vinila (PVA) e um exopolissacarídeo, identificado como dextrana, produzido pelo Leoconostoc pseudomesenteroides R2, e verificaram que esta consiste em uma alternativa excelente de imobilização de células bacterianas para promover a encapsulação, protegendo os microorganismos das intempéries do ambiente.

Vila e Saraiva no capítulo "CONDIÇÕES FISICOQUÍMICAS PARA A PRODUÇÃO DE CAROTENÓIDES POR FLAVOBACTERIUM SP." estudaram os fatores físico-químicos como a temperatura, fontes de carbono e nitrogênio e composição mineral na produção de carotenóides de um isolado antártico identificado como Flavobacterium sp. No capítulo "IMOBILIZAÇÃO DE FRUTOSILTRANSFERASE EM SÍLICA GEL E BUCHA VEGETAL PARA A SÍNTESE DE FRUTOOLIGOSSACARÍDEOS" os autores apresentam a influência da temperatura de imobilização na velocidade e rendimento de imobilização de enzimas Frutosiltransferase extracelulares de Aspergillus oryzae IPT-301 imobilizadas em sílica gel, assim como a atividade recuperada e estabilidade destas enzimas imobilizadas em bucha vegetal.

Costa e colaboradores em "BIOPROSPECÇÃO DE FUNGOS AMAZÔNICOS PRODUTORES DE L-ASPARAGINASE EXTRACELULAR" realizaram uma bioprospecção através de fungos filamentosos produtores de Lasparaginase extracelular provenientes de solos Amazônicos da área territorial da cidade de Coari, Amazonas. No capítulo "TESTES DE SUBSTRATOS PARA PRODUÇÃO DE HIDROLASES DE INTERESSE BIOTECNOLÓGICO

DE FUNGOS FILAMENTOSOS DA AMAZÔNIA" Costa e colaboradores testaram diferentes resíduos agrícolas (cascas de castanha-do-pará, mandioca e banana) como substratos para produção de hidrolases por fungos filamentosos amazônicos no município de Coari, amazonas.

De autoria de Fernandes e Colaboradores, o capítulo "DIVERSIDADE DE USO MEDICINAL DA FLORA EM UMA ÁREA DE CERRADO NA CHAPADA DO ARARIPE, NE, BR" realizaram um levantamento da diversidade de plantas medicinais em uma área de Cerrado na Chapada do Araripe, e investigaram a percepção da comunidade local sobre a aplicabilidade dessa flora em enfermidades e as epistemologias envolvidas nesses conhecimentos. Em "ETNOECOLOGIA: TRANSVERSALIDADE PARA A CONSERVAÇÃO DE ÁREAS NATURAIS PROTEGIDAS" Dutra e colaboradores desenvolveram um ensaio explorando a relevância da transversalidade entre a Etnoecologia e a Educação Ambiental para a conservação da biodiversidade de áreas naturais protegidas.

Albuquerque e colaboradores em "DESEQUILÍBRIOS AMBIENTAIS OCASIONADOS POR LIXEIRAS VICIADAS NA CIDADE DE MANAUS – AM" realizaram uma revisão da literatura com bases de dados especializadas sobre as problemáticas ambientais ocasionadas por lixeiras viciadas na cidade de Manaus – AM. De autoria de Almeida Júnior e colaboradores, o capítulo "RESISTÊNCIA AO TRIPES DO PRATEAMENTO ENNEOTHRIPS FLAVENS MOULTON (THYSANOPTERA: THRIPIDAE) NOS GENÓTIPOS DO AMENDOINZEIRO ARACHIS HYPOGAEA L. ERETO" avaliaram a resistência aos tripés, a interação de genótipos e inseticida e o potencial produtivo de genótipos de amendoim.

No capítulo "AÇÃO DE BIOESTIMULANTES VIA TRATAMENTO DE SEMENTES PARA GERMINAÇÃO E DESENVOLVIMENTO DE PLÂNTULAS DE CUCURBITA MOSCHATA L." Matsui e colaboradores avaliaram a emergência e desenvolvimento de plântulas de Cucurbita moschata provenientes de sementes tratadas com um bioestimulante e um extrato de algas. Veras e colaboradores em "LEVANTAMENTO DE FORMIGAS EM ÁREAS ANTROPOMORFIZADAS NA UNIVERSIDADE ESTADUAL DO PIAUÍ, TERESINA – PI", realizaram um levantamento dos gêneros de formigas encontradas em áreas antropomorfizadas, especificamente locais de alimentação, na Universidade Estadual do Piauí (UESPI), no campus Poeta Torquato Neto, Piauí.

Silva, Teixeira e Sesterheim em "INFLUÊNCIA DO ENRIQUECIMENTO AMBIENTAL SOBRE A PRODUÇÃO DE RATOS LEWIS EM UM CENTRO DE PESQUISA" avaliaram a influência do enriquecimento ambiental nos índices zootécnicos de unidades reprodutivas de ratos Lewis. Em "PROCEDIMENTOS DA BIOLOGIA MOLECULAR UTILIZADAS PARA DESVELAR CRIMES" Aguiar e colaboradores apresentam os principais métodos que a biologia molecular e a genética forense dispõem para desvendar e entender os diversos tipos de crimes por intermédio dos marcadores moleculares.

Aguiar e colaboradores em "MÉTODO SOROLÓGICO E MOLECULAR DA TOXOPLASMOSE" discutem aspectos do diagnóstico sorológico e molecular da

toxoplasmose. Os autores ainda identificaram a importância do conhecimento sobre a infecção pelos profissionais de saúde, visto que o diagnóstico correto resulta da correlação das variáveis clínicas com a resultados de análises laboratoriais. Em “PROFISSIONAIS DOS CUIDADOS DE SAÚDE, DIGNIDADE HUMANA E BIOÉTICA” Rocha, Chemin e Meirelles efetivaram uma revisão bibliográfica apresentando a Bioética como uma ferramenta norteadora para compatibilizar as necessidades de pacientes e o respeito a profissionais dos cuidados de Saúde, também detentores de dignidade.

No capítulo “O JOGO COMO UMA ESTRATÉGIA DIDÁTICA PARA O ENSINO DA EVOLUÇÃO VEGETAL” Fernandes e Souza Júnior analisaram a eficácia do jogo didático “Detetive – Evolução Vegetal” no processo de ensino-aprendizagem de estudantes do ensino fundamental de uma escola municipal de Ceará-Mirim, Rio Grande do Norte, observando a influência da estratégia didática utilizada para a compreensão da evolução das plantas através dos seus táxons: briófitas, pteridófitas, gimnospermas e angiospermas. Santos, Conceição e Sales no capítulo “JOGO “BINGO DA REVISÃO”: APLICAÇÃO DE INSTRUMENTO PEDAGÓGICO NAS AULAS DE CIÊNCIAS NUMA ESCOLA PÚBLICA DO MUNICÍPIO DE ALAGOINHAS-BA” avaliaram a relevância do jogo “Bingo da Revisão” como uma atividade lúdica para melhoria da aprendizagem e instrumento de revisão para os discentes do ensino fundamental, na Escola Estadual Luiz Navarro de Brito, município de Alagoinhas, Bahia.

Maximo e Krzyzanowski Júnior no capítulo “AS REDES SOCIAIS NO PROCESSO DE BUSCA DE INFORMAÇÕES CIENTÍFICAS NO ENSINO MÉDIO: UM ESTUDO DE CASO NAS AULAS DE MICROBIOLOGIA” fizeram um levantamento e verificaram os tipos de fontes que estão sendo utilizadas pelos estudantes da educação básica nas pesquisas sobre assuntos científicos, com ênfase em temas da microbiologia. No capítulo “A EXPERIMENTAÇÃO NO ENSINO DE CIÊNCIAS: EM BUSCA DE UMA APRENDIZAGEM SIGNIFICATIVA” Souza e colaboradores apresentam um relato de experiência de ex-bolsistas do PIBID/UESC-Biologia sobre o desenvolvimento de uma aula prática utilizando a metodologia experimentação com turmas do ensino fundamental em uma instituição da rede pública de Ilhéus, Bahia.

Em “DEMOCRATIZAÇÃO DO CONHECIMENTO CIENTÍFICO: A EXPERIÊNCIA DO PROJETO “SABERES DA MATA ATLÂNTICA” Agrizzi, Teixeira e Leite apresentam e discutem as iniciativas e os impactos alcançados pela proposta de popularização da ciência do projeto “Saberes da Mata Atlântica”, desenvolvido pelo grupo de pesquisa BIOPROS, da Universidade Federal de Viçosa, Minas Gerais. Rodrigues e Sousa em “OBJETOS DE APRENDIZAGEM MULTIMÍDIA E ENSINO DE BIOLOGIA: UMA ABORDAGEM SOBRE BIOMAS BRASILEIROS” investigaram alguns objetos de aprendizagem destinados ao ensino de Biologia, que realizam uma abordagem sobre os biomas brasileiros, analisando as abordagens dos conteúdos biológicos, com base em referenciais da área e em suas aproximações com documentos oficiais da educação brasileira, propondo sugestões sobre

suas possibilidades de utilização.

Em todos os capítulos, percebe-se uma linha condutora envolvendo diversas áreas das Ciências Biológicas, como a Microbiologia, Micologia, Biologia Celular e Molecular, Botânica, Zoologia, Ecologia, bem como, pesquisas envolvendo aspectos das Ciências da Saúde, Ciências Ambientais, Educação em Ciências e Biologia. Espero que os estudos compartilhados nesta obra contribuam para o enriquecimento de novas práticas acadêmicas e profissionais, bem como, possibilite uma visão holística e transdisciplinar para as Ciências Biológicas em sua total heterogeneidade e complexidade. Desejo a todos uma boa leitura.

Clécio Danilo Dias da Silva

SUMÁRIO

CAPÍTULO 7

DIVERSIDADE DE USO MEDICINAL DA FLORA EM UMA ÁREA DE CERRADO NA CHAPADA DO ARARIPE, NE, BR

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RESUMO: No semiárido nordestino ouso de plantas medicinais é uma prática comum como primeira via de tratamento. Este trabalho objetivou conhecer a diversidade de plantas medicinais em uma área de Cerrado na Chapada do Araripe, assim como a aplicabilidade dessa flora e as epistemologias envolvidas nesses conhecimentos. Para tanto, foram utilizados os índices de importância relativa e consenso do informante, a fim de conhecer a versatilidade das espécies e o consenso de uso das mesmas entre os moradores da comunidade. O discurso do sujeito coletivo foi analisado para entender os conhecimentos envolvidos no processo de coleta das plantas e como esses conhecimentos são passados. Foram registradas 79 espécies, sendo 46 nativas. Dez espécies apresentaram IR>1, indicando alta versatilidade, dentre elas Stryphnodendron rotundifolium foi a que alcançou maior valor (2,0). 13 categorias de sistemas corporais agruparam as 61 indicações terapêuticas citada pela comunidade, sendo que as categorias com maior concordância de uso foram: neoplasias (0,82) e doenças do sistema respiratório (0,75). Para algumas espécies, são escassas pesquisas em busca de comprovação de suas atividades como é o caso de Xylopia sericea. E ainda, levantou-se uma preocupação à cerca da conservação das espécies.

PALAVRAS-CHAVE: Fator de consenso; Etnobotânica; Plantas Medicinais; *Stryphnodendron rotundifolium;* versatility; *Xylopia sericea.*

DIVERSITY OF MEDICINAL FLORA USAGE IN A CERRADO AREA IN THE CHAPADA DO ARARIPE, NE, BR

ABSTRACT: The use of medicinal plants is a common practice as a first choice of treatment in the northeastern semiarid. This study aimed to understand the diversity of medicinal plants used in a Cerrado area in the Chapada do Araripe, as well as the applicability of this flora and epistemologies associated with these. The Relative Importance and Informant Consensus Factor were analysed in order to understand the versatility of the species and usage consensus among the residents of the community. The collective subject discourse was analyzed to understand the knowledge involved in the plant collection process and how this knowledge is passed. 79 species were recorded, of which 46 were native. Ten species presented a RI>1, indicating high versatility, including *Stryphnodendron rotundifolium* with the highest value (2.0). 13 body system categories encompassed the 61 therapeutic indications cited by the informants, where the categories with the highest usage agreement were: neoplasms (0.82) and diseases of the respiratory system (0.75). For some species, such as *Xylopia sericea,* research addressing their activities is scarce. Moreover, a concern for the conservation of species has arisen.

KEYWORDS: Consensus factor; Ethnobotany; Medicinal plants; *Stryphnodendron rotundifolium;* versatility; *Xylopia sericea.*

1 I INTRODUCTION

Brazil, known worldwide for its mega-biodiversity, is also home to a considerable ethnic and cultural diversity (BRAZIL, 1998), which due to human interactions with flora, has the use of medicinal plants as a common alternative form of therapy (COAN; MATIAS, 2013), especially due to the difficulty in accessing healthcare services in some rural communities (ROQUE *et al.* 2010). In the Brazilian semi-arid, access to medicinal plants is subject to temporal resource availability, as well as with the degree of interest in a certain resource (ALBURQUERQUE; ANDRADE 2002).

The Chapada do Araripe is located in the Brazilian semiarid, having two federal conservation units (Chapada do Araripe Environmental Protection Area and Araripe National Forest) that play an important role in the conservation of water, fauna and flora. The Chapada do Araripe provides resources such as food, medicinal plants and is a source of income for local rural populations (CREPALDI *et al.* 2016; SOUSA-JÚNIOR *et al.* 2016). Moreover, due to several environmental factors, the Chapada do Araripe presents a variety of vegetation phytophysiognomies, including the Cerrado (MORO *et al.* 2015), a phytogeographic domain characteristic of Central Brazil, however, which also reaches Northeastern regions, including the states of Bahia, Maranhão and Ceará (RIBEIRO; WALTER, 2008), presenting itself with fragmented and disjoint areas in the middle of the semiarid (MORO *et al.* 2015).

Ethnobotanical research in Cerrado regions are common in both Central Brazil (CAMARGO *et al.* 2014, GUIDO *et al.* 2013, LIMA *et al.* 2012, SOUZA *et al.* 2016), as well as in disjoint Cerrados in Northeast Brazil, (BAPTISTEL *et al.* 2014; MORAES *et al.* 2016;

OLIVEIRA *et al.* 2010) including in the Chapada do Araripe, where popular knowledge has been transmitted to successive generations (MACEDO *et al.* 2018; MACEDO *et al.* 2016a; MACEDO *et al.* 2015; RIBEIRO *et al.* 2014a). Ethnobotanical research and the quantitative indices applied to these are important guidelines for the selection of plants for bioprospecting and ethnopharmacological research (SANTOS *et al.* 2018), where many of these studies, such as Costa *et al.* (2012), Freitas; Rodrigues; Gaspi (2014) and Figueiredo *et al.* (2016), have already proven the potential of several popular species.

In this context, the objective of this study was to identify and analyze medicinal plants in terms of their use, noting their preparation methods, and to verify the versatility of the species, as well as the consensus of the informants on their use, without losing sight of the epistemological aspects pertinent to the relationship between the knowledge involved in the collection process and popular knowledge transmission through the discourse of the collective subject, as well as providing an input for future studies in the bioprospecting field.

2 | MATERIALS AND METHODS

This study is of a descriptive nature, using sample survey from field studies, under the influence of ethnography. Given its exploratory nature, however, qualitative research, direct observations and interviews were used.

2.1 Study Area

This study was carried out in the Baixa do Maracujá (Figure 1), a rural community located in the district of Santa Fe that is part of the municipality of Crato, in the south of Ceará, located in the Northeastern region of Brazil. The municipality has approximately 128,680 inhabitants, distributed across an area of 1176,467 km², which is located geographically under the coordinates 7°14'03"S and 39°24'34"W with an altitude of 426.9 m (IBGE, 2016; IPECE, 2015).

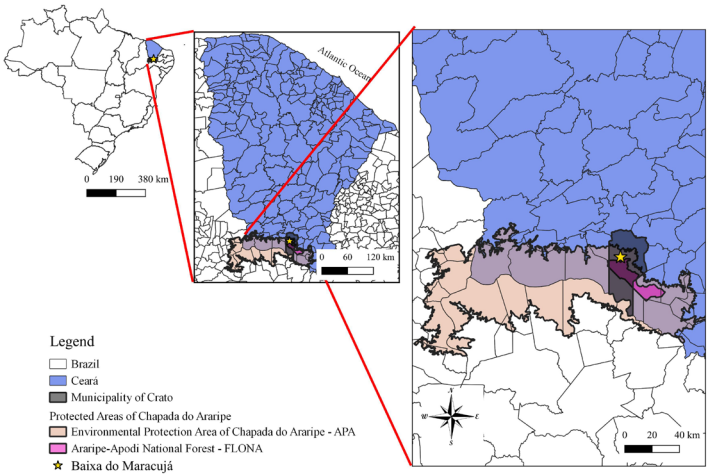

Figure 1. Location map of Baixa do Maracujá, Crato-CE.

Baixa do Maracujá is part of the Environmental Protection Area (Área de Proteção Ambiental; APA) of the Chapada do Araripe, 7º11'7,151"S and 39º31'21,51"W at 859 m of altitude, being very close to the Araripe National Forest and sustainable use conservation units, both of which are important conservation areas managed by the Chico Mendes Institute for Biodiversity Conservation (ICMBio). The community is composed of approximately 158 families, with this number varying according to fruiting of the pequi tree (*Caryocar coriaceum* Wittm.), a plant with economic importance for the region, which during its harvest attracts extractivists who collect the fruits for extra income. As for access to public health, the community has a community health agent who provides informative and preventive care. The nearest healthcare unit is approximately three kilometers away in the Santa Fe district and has only one healthcare team which is responsible for serving more than five thousand families, thus hindering care.

2.2 Ethical Aspect

Members of the community were informed of the study and those who agreed to participate signed the Term of Consent, according to Resolution 510/2016 of the National Health Council - CNS do Brasil (BRAZIL, 2016). The project was approved by the Ethics in Research Committee - CEP of the Regional University of Cariri under process number 2.482.351/2018.

2.3 Collection Of Information And Choice Of Informants

Semi-structured interviews were conducted as described by Albuquerque *et al.* (2010) and Amorozo and Viertler (2010). Informants were chosen using the snowball technique (BAILEY, 1994), through which 30 key informants and local experts (22 women and 8 men),

ranging in age from 32 to 74 years. All informants practice subsistence agriculture and extractivism as a form of income generation, with some already being retired and others receiving assistance from government programs such as Bolsa Família.

2.4 Collection And Identification Of Botanical Material

Following acquisition from the Authorization for activities with scientific purpose (No. 64011-1), through the Biodiversity Authorization and Information System - SisBio, guided tours with the help from participants were organized to collect botanical material, with species in the reproductive phase being collected (ALBUQUERQUE *et al.* , 2010). The collected material was duly herborized following the methodology by Mori *et al.* (1989). After drying, the material was deposited in the Caririense Dárdano de Andrade-Lima Herbarium of the Regional University of Cariri (HCDAL - URCA) for botanical identification. The plants were identified according to the APG IV. The scientific names were conferred on the databases "Flora do Brasil" (Flora do Brasil, 2020 in construction) and Tropicos. This research was also registered (No. AAE43FD) in the National System of Management of Genetic Heritage and Associated Traditional Knowledge (SisGen), in accordance with Law No. 13.123/2015.

2.5 Data Analysis

To analyze the ethnobotanical data, these were organized into tables and analyzed using the following parameters: Informant Consensus Factor - ICF (TROTTER; LOGAN, 1986) which identifies the most prominent body system in the community, being calculated by the formula: ICF= $(n_{ur} - n_t)/(n_{ur} - 1)$, where n_{ur} corresponds to the number of usage citations in each subcategory and n_t corresponds to the number of species used in this subcategory. The maximum value is 1.

The Relative Importance - RI parameter (BENNETT; PRANCE, 2000), determines the importance and versatility of a species based on the numbers of medicinal properties and body systems for which they are cited. RI is obtained through the formulas: RI= NSC + NP. Where NSC= NSCE/NSCEV and NP= NPE/NPEV. NSC is the Number of Body Systems, NSCE is the number of body systems treated by a particular species, NSCEV is the total number of body systems treated by the most versatile species; NP is the number of properties, NPE is the number of properties assigned to a given species and NPEV is the number of properties assigned to the most versatile species.

The Collective Subject Discourse - CSD (LEFEVRE; LEFEVRE, 2005) parameter, a method that represents the thought of a collective from individual statements, and corresponds to the collective speaking through the person of an individual, this being a synthesis statement where individual discourses presenting similar meanings are grouped into categories (LEFEVRE; LEFEVRE 2005; LEFEVRE; LEFEVRE, 2014), was used for the remaining interview data. The DSC Soft v. 2.0. was used for DSC analysis.

3 | RESULTS AND DISCUSSION

3.1 Diversity Of Medicinal Plants, Their Parts And Methodologies Used

A total of 79 species belonging to 34 families and 73 genera were recorded, of which 46 were native and 33 were cultivated, a result in agreement with similar ethnobotanical studies where a variation of 38 to 137 registered species have been, with even greater numbers being found in recent studies in Cerrado areas of the Chapada do Araripe and in the Brazilian Northeast, such as Baptistel *et al.* (2014), Fagundes *et al.* (2017), Macêdo *et al.* (2018), Macedo *et al.* (2016), Moraes *et al.* (2016), Macêdo *et al.* (2015), Ribeiro *et al.* (2014), Sousa *et al.* (2016), and Vieira *et al.* (2015).

The families with the highest number of recorded species were Fabaceae (12), Lamiaceae (8), Asteraceae (8) and Myrtaceae (5), with other families varying between 3 and 1 species. The Fabaceae family also stood out in other studies carried out in the northeastern semi-arid region, in areas with Caatinga, Cerrado and Carrasco vegetation (MACÊDO *et al.* 2018; OLIVEIRA-JÚNIOR; CONCEIÇÃO, 2010, SILVA *et al.* 2015; SOUZA *et al.* 2014).

The most commonly used parts were: leaves with 41.6% of the indications, followed by bark (23.03%), root (14.04%) and latex (8.71%). Other parts such as the stem bark, fiber (bark fiber), flower, fruit peel, fruit, oil, seed and mucilage account for 12.62% of indications. These results are in contrast with data from Ribeiro *et al.* (2014a), a study performed in a Cerrado area where the most commonly used part was the bark; and in agreement with Aguiar *et al.* (2012) and Santos *et al.* (2016), studies carried out in rural areas of Piauí, where the leaves and barks were the most commonly used parts.

The main forms of usage were: decoction (37%), soaking in water (18%) and syrup (10%), followed by bathing (5%), maceration (4%) and bottled (4%). Other forms of use including plaster, latex with water, oil with honey, fruit pulp, roast ground seeds and infusion, collectively totaled 26%. The preparation of teas, by decoction or infusion, also presented a greater number of indications in other similar studies in the Brazilian Northeast (BAPTISTEL *et al.* 2014; MORAES-REGO *et al.* 2016; RIBEIRO *et al.* 2014a; SANTOS *et al.* 2016).

3.2 Species Versatility

Of the 79 studied species, 51 were indicated for the treatment of more than one symptom/disease and 28 were indicated for only one (Table 1). *Stryphnodendron rotundifolium* Mart. was the most versatile species with a RI of 2.0. Nine other species obtained a RI>1: *Himatanthus drasticus* (Mart.) Plumel (1.94), *Croton heliotropiifolius* Kunth (1.88), *Hancornia speciosa* Gomes (1.81), *Sideroxylon obtusifolium* (1.39), *Xylopia sericea* A.S.-Hil. (1.31), *Aloe vera* (L.) Burm. f. (1.18), *Menta* sp. (1.18), *Ximenia americana* L. (1.05) and *Caryocar coriaceum* Wittm. (1.04).

Stryphnodendron rotundifolium Mart. (barbatimão), with the highest relative

importance (RI=2) value, presented the highest number of therapeutic indications (15), encompassing 7 body systems, being important for the treatment of wounds, vaginal infection, general inflammation, gastritis and cancer, among others. The most commonly used *Stryphnodendron rotundifolium* Mart. part is the bark, with the preparation method varying between water-based, decoction or in powder. In a study carried out in the Cerrado area of the Chapada do Araripe by Macedo *et al.* (2015) and Oliveira *et al.* (2014), barbatimão was also one of the most versatile species with a RI of 1.72, a value lower than the one found in the present study, however, its usage indications were similar. In other studies, barbatimão was considered to be antibacterial and modulatory, as well as a preventive agent for diseases associated with oxidative and gastroprotective stress (COSTA *et al.* 2012; OLIVEIRA *et al.* 2011; RODRIGUES *et al.* 2008).

Himatanthus drasticus (Mart.) Plumel (1.94), "janaguba", was the second most versatile species, indicated especially for cancer, digestive system disorders, inflammation, and other symptoms, totaling 12 therapeutic indications across eight body systems. Its main form of use is latex diluted in water, corroborating with Soares *et al.* (2015) who obtained a similar report for its indications. An antitumor activity was observed against sarcomas in tests using the leaf extract (SOUSA *et al.* 2010), however, no influence was observed against lung cancers in tests using the latex (FRANCE *et al.* 2011). Moreover, a gastroprotective effect for the latex was observed in mice (COLARES *et al.* 2008) and an anti-inflammatory effect has also been verified (ALMEIDA *et al.* 2017).

Croton heliotropiifolius Kunth (RI = 1.88), "velame", obtained 11 therapeutic indications, including blood problems, inflammation, wound and skin diseases, where the roots are used by soaking these in water or by decoction, with the root also being chewed. In other studies, the use of "velame" leaves were reported with similar therapeutic indications, however, these obtained lower relative importance values than the present study (MACÊDO *et al.* 2016; MACÊDO *et al.* 2015; SARAIVA *et al.* 2015). The stem bark ethanolic extract of this species has demonstrated an antifungal activity (QUEIROZ *et al.* 2014) and the leaf essential oil displayed an antibacterial activity (ALENCAR-FILHO *et al.* 2017).

Hancornia speciosa Gomes (1.81), mangaba, was indicated for 10 symptoms encompassing eight body systems, with the latex diluted in water or the bark soaked in water being its main form of use. Its main indication was to regulate and clear the blood, followed by hypertension, cancer, gastritis and others. In other studies, "mangaba" was also cited as an antihyperlipidemic (SILVA *et al.* 2010), as a hypoglycemic (MACÊDO; FERREIRA, 2004) and a potential anti-inflammatory (TORRES-RÊGO *et al.* 2016). In toxicity and genotoxicity tests, the results indicate the latex is unlikely to cause damage to human health (RIBEIRO *et al.* 2016). In other tests, "mangaba" also showed a free radical scavenging activity (LIMA-NETO *et al.* 2015).

Sideroxylon obtusifolium (1.39), "quixaba", was indicated for eight symptoms across six body systems, being indicated especially for pain, stroke and inflammation. The most

commonly used part is the peel, soaked in water or in a bottle. The use of the bark was also recorded in other studies, with indications for the same symptoms (PEDROSA *et al.* 2012). The "quixaba" bark ethanolic extract presented analgesic, antinociceptive and anti-inflammatory activity (ARAÚJO-NETO *et al.* 2010), while the fruits presented an antioxidant activity (FIGUEIREDO; LIMA, 2015). The anti-inflammatory activity of the stem bark extract has also been reported (LEITE *et al.* 2015).

Xylopia sericea A.S.-Hil. (1.31), "imbiriba", obtained eight therapeutic indications, encompassing five body systems, for the treatment of cough, flu and stomach problems, also being cited for menstrual cramps, however, a disagreement among informants was noted, since it was reported that women cannot ingest "imbiriba" during the menstrual period. Nothing addressing the later has been reported in the literature, indicating a lack of studies in this regard. The most commonly used part is the fruit peel, which can be prepared by decoction, bottled or be chewed. RODRIGUES; CARVALHO (2008) also report its use for stomach problems. Antibacterial activities, tumor cell inhibition, leishmanicidal and anti-inflammatory activities have also been recorded (MENDES, 2014; MENDES *et al.* 2017).

Family and species	Popular name	Part used	Forms of use	Therapeutic indications	RI
Amaranthaceae					
***Alternanthera brasiliana* (L.) Kuntze HN-13.748**	Anador	Le	Decoction	Fever	0,21
***Alternanthera* sp. NC**	Dipirona	Le	Decoction	Hangover symtoms, fever, indigestion	0,63
***Dysphania ambrosioides* (L.) Mosyakin & Clemants HN-13.545**	Mastruz	Le	Maceration or leaves with milk	Knock, gastrits, skin deseases, broken bone, influenza	0,90
Anacardiaceae					
***Anacardium occidentale* L. HN-13.322**	Caju	Ba, Sb	Soacking in water or decoction	Inflammation, cicatrizing, toothache	0,63
***Mangifera indica* L. HN-13.636**	Manga	Le	Decoction	Cough	0,21
Myracrodruon urundeuva Allemão HN-13.750	Aroeira	Ba	Soacking in water	Inflammation, genitourinary infection, cicatrizing	0,63
Annonaceae					

Annona coriacea Mart. HN-13.576	Araticum	Fi, Le, Fl	Mastigate the leaves, flower tea, tie the fiber on the bite site	Snake bite	0,21
Annona muricata L. HN-13.923	Graviola	Le	Soacking in water	Diabetes	0,21
Xylopia sericea A. St.-Hil. HN-13.350	Imbiriba	Fp	Decoction, bottled, mastigate the fruit peel	Cough, influenza, hoarseness, sore throat, general pain, stomachache, indigestion, rheumatism, menstrual cramps	1,31
Apocynaceae					
Hancornia speciosa Gomes HN-13.348	Mangaba	La, Ba, Fr	Latex with water, soak in water, in case of broken bone put the latex on the spot and curl with a cloth	Cancer, gastrits, hypertension, thinning and cleaning the blood, varize, broken bone, inflammation, thyroid, worm	1,81
Himatanthus drasticus (Mart.) Plumel	Janaguba	La, Sb, Ba	Latex with water, stem bark or bark soak in water	Cancer, gastrits, ulcer, dor no stomachache, inflammation, cicatrizing, diabetes, blood	1,94

Table 1 List of medicinal plants indicated by residents of Baixa do Maracujá, in Crato state of Ceará, Northeast of Brazil (Continuation).

Family and species	Popular name	Part used	Forms of use	Therapeutic indications	RI
HN-13.349				circulation, thinning the blood, herniated disc	
***Secondatia floribunda* A. DC. HN-13.751**	Catuaba-cipó	Vi	Bottled	Back pain	0,21
Arecaceae					
***Cocos nucifera* L. NC**	Côco	Sb	Soak in water	Anemia	0,21
Aristolochiaceae					
***Aristolochia* sp. NC**	Jarrinha	Ra	Soak in water	Cough, menstrual regulation, inflammation in the uterus, controls the blood, influenza, cough	0,83
Asteraceae					
---- HN-13.575	Língua-de-vaca	Ro	Soak in water or decoction	Cough, influenza	0,28
***Acanthospermum hispidum* DC. HN-13.744**	Fideração	Ro	Decoction	Influenza, belly ache, diarrhea	0,49
***Achillea millefolium* L. NC**	Novalgina	Le	Decoction, infusion	Fever	0,21
***Acmella oleracea* (L.) HN-13.639**	Agrião	Le	Syrup	Cough, influenza	0,21
***Artemisia absinthium* L. NC**	Lorma	Le	Decoction	Belly ache, indigestion	0,28

***Baccharis trimera* (Less.) DC. NC**	Carqueijo	Le, Ra	Soak in water, bottled	Rheumatism	0,21
***Gymnanthemum amyg- dalinum* (Delile) Sch. Bip. ex Walp. HN-13.726**	Boldo	Le	Decoction or maceration	Belly ache, indigestion	0,28
***Mikania glomerata* Spreng. NC**	Galco	Le	Decoction, syrup	Influenza, kidney stones, antipyretic	0,63
Bixaceae					
***Bixa orellana* L. HN-13.546**	Urucum	Ba	Decoction	Asthma	0,21

Table 1 List of medicinal plants indicated by residents of Baixa do Maracujá, in Crato state of Ceará, Northeast of Brazil (Continuation).

Family and species	Popular name	Part used	Forms of use	Therapeutic indications	RI
Caryocaraceae					
***Caryocar coriaceum* Wittm. HN-13.321**	Pequi	Oi, Fl	Oil with honey, flower in the syrup or flower tea. For earache: warm the oil, moisten the cotton, and put in the ear. For swelling: heat oil and massage the swollen spot.	Inflammation, cough, influenza, knock, injury, earache, swelling.	1,04
Crassulaceae					
***Kalanchoe pinnata* (Lam.) Pers. HN-13.635**	Malva corama	Le	Syrup or juice	Sore throat, cough, influenza, inflammation in the uterus.	0,55
Euphorbiaceae					
***Croton heliotropiifolius* Kunth HN-13.554**	Velame	Ro	Soak in water, decoction, masticate the root.	Blood problems, diabetes, cholesterol, to lose weight, infection, belly ache, inflammation, seat bath, injury, skin diseases, cough	1,88
Fabaceae					
***Bauhinia cheilantha* (Bong.) Steud. HN-13.638**	Mororó	Le	Soak in water	Diabetes, kidneys	0,42
***Bowdichia virgilioides* Kunth HN-13.632**	Sucupira	Ba	Decoction	Column	0,21
***Cajanus cajan* (L.) Huth HN-13.362**	Andu	Le	Decoction	Fever	0,21
***Copaifera langsdorffii* Desf. HN-13.544**	Pau-d'óleo	Le	Decoction	Hoarseness, coryza, belly ache	0,49

***Dioclea violacea* Mart. ex Benth. HN-13.510**	Mucunã	Sw	Ingest the stem water	Ulcer	0,21
***Hymenaea courbaril* L. HN-13.579**	Jatobá	Ba, Sb, Fr, Fp	Decoction or soak in water, syrup, purê fruit flour or with honey	Cough, influenza, bronchitis, vitamin supplement, depression, nerves	0,83
***Libidibia ferrea* (Mart. Ex**	Pau-ferro	Ba	Soak in water	Knock, general pain, back pain	0,42

Table 1 List of medicinal plants indicated by residents of Baixa do Maracujá, in Crato state of Ceará, Northeast of Brazil (Continuation).

Family and species	Popular name	Part used	Forms of use	Therapeutic indications	RI
Tul.) L. P. Queiroz HN-13.543					
Mimosa tenuiflora **(Wild.) Poir. HN-13.640**	Jurema-preta	Ba	Decoction	Rheumatism	0,21
Senegalia tucumanensis **(Griseb.) Seigler & Ebinger HN-13.747**	Unha-de-gato	Ba	Decoction	Inflammation	0,21
Stryphnodendron rotundifolium **Mart. HN-13.580**	Barbatimão	Ba, Sb	Soak in water, powder bark, decoction	General pain, cicatrizing, gastritis, ulcer, inflammation, vaginal infection, sexually transmitted disease, belly ache, diarrhea, skin disease, postpartum bath, burn, cancer, hemorrhoid	2,0
Stylosanthes **sp. HN-13.578**	Arroz-chocho	Ro	Decoction	Swelling	0,21
Tamarindus indica **L. HN-13.548**	Tamarindo	Le	Decoction	Urinary infection, kidneys	0,28
Lamiaceae					
Mentha arvensis **L. HN-13.922**	Hortelã vick	Le	Syrup	Cough	0,21
Mentha piperita **NC**	Hortelã	Le	Infusion, para thrombosis puts the leaves of sauce in German brandy, inhalation	Headache, belly ache fever, cough, influenza, thrombosis, suffusion	1,18
Ocimum basilicum **L. HN-13.552**	Manjericão	Le	Bath, maceration, inhalation	Skin disease, earache, influenza	0,63
Ocimum gratissimum **L. HN-13.512**	Alfavaca	Le	Decoction bath	Itchiness, rash, fever	0,84

Plectranthus amboinicus **(Lour.) Spreng. HN-13.479**	Malva-do-reino	Le	Syrup	Cough, influenza, expectorant, asthma	0,41
Plectranthus barbatus **Andr. HN-13.363**	Malva-sete-dores	Le	Decoction, masticate the leaves	General pain, Belly ache, intestinal problems, indigestion	0,55

Table 1 List of medicinal plants indicated by residents of Baixa do Maracujá, in Crato state of Ceará, Northeast of Brazil (Continuation).

Family and species	Popular name	Part used	Forms of use	Therapeutic indications	RI
Rhaphiodon echinus **Shauer HN-13.547**	Bentônica	Ro	Decoction	Swelling, cough, influenza	0,63
Rosmarinus officinalis **L. HN-13.550**	Alecrim	Le	Infusion	Belly ache, cough, stroke	0,63
Lauraceae					
Persea americana **Mill. HN-13.581**	Abacate	Le	Decoction	Kidney problems	0,21
Lythraceae					
Punica granatum **L. HN-13.743**	Romã	Fp	Soak in water	Sore throat	0,21
Malvaceae					
Gossypium hirsutum **L. HN-13.589**	Algodão	Le, Ro, Se	Macerates and adds warm water	Inflammation, menstrual cramps, furuncle	0,63
Pavonia cancellata **(L.) Cav. HN-13.514**	Chave-de-cu	Ro	Decoction	Belly ache, diarrhea	0,28
---- HN-13.511	Malva-branca	Ro	Soak in water, decoction, syrup	Cough, influenza, tuberculosis, tune the blood, birth tooth	0,76
Malpighiaceae					
Janusia **sp. HN-13.590**	Salsa	Le	Toasted leaf powder	Injury	0,21
Meliaceae					
Cedrela fissilis **Vell. HN-13.642**	Cedro	Ba	Decoction	Indigestion	0,21
Myrtaceae					
Eugenia uniflora **L. HN-13.591**	Pitanga	Ba, Le	Soak in water, bottled, decoction	Inflammation, belly ache, worm, diabetes	0,84
Eucalyptos globulus **Labill. HN-13.516**	Eucalipto	Fo	Bath, decoction, inhalation	Fever, influenza, tiredness, body ache, headache, inflammation	0,84

Myrciaria strigipes **O.Berg HN-13.549**	Cambuí	Le	Decoction	Diarrhea	0,21

Table 1 List of medicinal plants indicated by residents of Baixa do Maracujá, in Crato state of Ceará, Northeast of Brazil (Continuation).

Family and species	Popular name	Part used	Forms of use	Therapeutic indications	RI
---- HN-13.592	Araçá	Le	Decoction	High blood pressure	0,21
Syzygium cumini **(L.) Skeels HN-13.519**	Oliveira	Le, Se	Decoction, roasted and ground seed	Diabetes	0,21
Olacaceae					
Ximenia americana **L. HN-13.746**	Ameixa	Ba	Soak in water, decoction	Inflammation, genitourinary infection, injury, skin disease, gastritis	1,05
Plantaginaceae					
Scoparia dulcis **L. HN-13.594**	Vassourinha	Ro	Syrup	Cough, measles	0,42
Poaceae					
Cymbopogon citratus **(DC.) Stapf. NC**	Capim-santo	Le	Decoction	Prevention of stroke, high blood pressure, belly ache	0,49
Saccharum officinarum **L. HN-13.629**	Cana-de-açúcar	Le	Decoction	High blood pressure	0,21
Polygalaceae					
---- HN-13.595	Pau-gemada	Ro, Rb	Root hit with water or with egg, root of sauce in water	Cholesterol, heartburn, rheumatism, gastritis, ulcer	0,76
Proteaceae					
Roupala montana **Aubl. HN-13.749**	Congonha	Le	Soak in water, decoction	Diabetes, osteoarthrits, back pain	0,49
Rubiaceae					
Coutarea hexandra **(Jacq.) K.Schum. NC**	Quina-quina	Ca	Soak in water	Influenza	0,21
Genipa americana **L. HN-13.452**	Jenipapo	Ba	Put bark shavings on the injury or broken bone	Broken bone	0,21
Tocoyena formosa **(Cham. & Schltdl.) K.Schum. HN-13.630**	Jenipapinho	Ba	Put bark shavings on the injury	Broken bone, knock, injury	0,34
Rutaceae					

Table 1 List of medicinal plants indicated by residents of Baixa do Maracujá, in Crato state of Ceará, Northeast of Brazil (Continuation).

Family and species	Popular name	Part used	Forms of use	Therapeutic indications	RI
***Citrus x aurantium* L.** **HN-13.921**	Laranja	Le	Decoction	Soothing, belly ache, diarrhea, stomach ache, indigestion	0,62
***Citrus x limon* (L.) Osbeck** **HN-13.634**	Limão	Fr	Syrup	Cough, influenza	0,28
***Ruta graveolens* L.** **NC**	Arruda	Le	Maceration	Headache and earache	0,42
Smilacaceae					
***Smilax japicanga* Griseb.** **NC**	Japecanga	Ra	Syrup	Infection, tune the blood	0,42
Sapotaceae					
***Sideroxylon obtusifolium* (Roem. & Schult.) T. D.Penn.** **HN-13.727**	Quixaba	Ba	Soak in water, bottled	Knock, general pain, diabetes, high blood pressure, inflammation, injury, vaginal, infection, gastritis	1,39
Turneraceae					
Turnera ulmifolia **HN-13. 596**	Chanana	Ro, Le	Decoction, seat bath	Diarrhea, belly ache, inflammation	0,49
Urticaceae					
***Cecropia pachystachya* Trécul** **HN-13.637**	Toré	Le	Decoction	Kidney problems	0,21
Verbenaceae					
***Lantana camara* L.** **HN-13.597**	Chumbinho	Fl	Decoction	Influenza	0,21
***Lippia alba* (Mill.) N.E.Br. ex P. Wilson** **HN-13.598**	Cidreira	Le	Decoction	Indigestion, belly ache, high blood pressure, Prevention of cerebral vascular accident, soothing, lack of appetite	0,83
Violaceae					
---- **HN-13.551**	Papaconha	Ro	Decoction, syrup	Fever, cough, influenza, expectorant, birth tooth, worm	0,97
Xanthorrhoeaceae					
***Aloe vera* L.** **HN-13.641**	Babosa	Lm	Leaf mucilage mixed with water or honey	Worm, diarrhea, inflammation, gastritis, hemorrhoid, cancer	1,18

Table 1 List of medicinal plants indicated by residents of Baixa do Maracujá, in Crato state of Ceará, Northeast of Brazil (Conclusion).

Zingiberaceae					
Alpinia zerumbet **(Pers.) B.L.Burtt & R.M.Sm. HN-13.924**	Colônia	Le	Decoction	High blood pressure	0,21

Table 1 List of medicinal plants indicated by residents of Baixa do Maracujá, in Crato state of Ceará, Northeast of Brazil (Continue).

Legend: RI: Relative Importance; HN: Herbarium Number; NC: non collected; Ba: Bark; Fi: fiber (bark fiber); Fl: flower; Fp: fruit peel; Fr: fruit; La: latex; Le: Leaves; Lm: leaf mucilage; Oi: oil; Rb: root bark; Ro: root; Sb: stem bark; Se: seed; Sw: stem water; Vi: vine;

Caryocar coriaceum Wittm. ("pequi"), *Aloe vera* (L.) Burm. f., ("babosa") and *Mentha* sp., (hortelã) presented RI values of 1.18, being indicated for seven symptoms and encompassing 5 body systems.

Caryocar coriaceum Wittm., "pequi", has been primarily indicated to treat inflammation and influenza. The oil, obtained from the fruit, is used for the preparation of syrups and for massages, while the flower is mainly used for the preparation of teas. In tests using the "pequi" oil or leaf extracts, the following activities were observed: anti-inflammatory, leishmanicidal, antioxidant and antibiotic modulator, significant anticonvulsant, gastroprotective and cardioprotective activity (FIGUEIREDO *et al.* 2016; LACERDA-NETO *et al.* 2017a; LACERDA-NETO *et al.* 2017b; OLIVEIRA *et al.* 2015; OLIVEIRA *et al.* 2017; SARAIVA *et al.* 2011; TOMIOTTO-PELLISSIER *et al.* 2018).

Aloe vera (L.) Burm. f., "babosa", has been indicated for the treatment of gastritis, diarrhea and worms, among others. The most commonly used part is the leaf mucilage, beaten with water or honey, where Battisti *et al.* (2013) obtained similar indications. "Babosa" was also indicated as an anti-parasitic by an indigenous community in Bahia (SANTOS-LIMA *et al.* 2016). The anti-inflammatory and cicatrizing activity of "babosa" was identified in *in vivo* and *in vitro* tests (FREITAS *et al.* 2014).

For *Mentha piperita*, "hortelã", its main indications were for the treatment of fever, flu and headache. In a study in the northeastern semi-arid region, a species from the same genus was reported as the most versatile (RI=2.0), presenting the same therapeutic indications seen in the present study, with its form of use differring, it also being prepared by infusion (RIBEIRO *et al.* 2014b; RODRIGUES; ANDRADE, 2014). In another study its activity against fungi and plant bacteria was also reported (BAYAN; KÜSEK, 2018).

Ximenia americana L. (1.05), "ameixa", was indicated for five symptoms, belonging to five body systems. The main symptoms were inflammations, infections and wounds. The most commonly used part was the bark, soaked in water or by decoction, with Silva *et al.* (2015) also reporting similar properties. In other tests, the plum presented antimicrobial and anti-inflammatory activity, also being seen to aid the cicatrization process and reduce

chronic inflammation (COSTA *et al.* 2010; LEAL *et al.* 2016; NETO-JUNIOR *et al.* 2017; SILVA-LEITE *et al.* 2017).

The IUCN Red List of Threatened Species (IUCN, 2019) and the Red List provided by the National Center for Flora Conservation (CNCFlora, 2013) were consulted to verify the conservation status of the species. 21 species were found in the international list, of which 18, such as *H. drasticus* and *X. Americana*, are in the least concern (LC) category. *C. coriaceum* is categorized as endangered (EN). *Cedrela fissilis* and *Gossypium hirsutum* appear in the vulnerable (VU) category. Meanwhile, 11 species were found in the national list, of which eight species are in the PP category, 1 in VU and 2 in near threatened (NT). In this list *C. coriaceum* is in the LC category, *C. fissilis* appears again in VU, and *Bowdichia virgilioides* and *Smilax japicanga* are in NT. In a study addressing medicinal wood species with conservation priorities carried out in a Cerrado area close to this research, species availability and conservation priority scores were evaluated. The aforementioned study found that *H. drasticus*, *X. americana* and *C. coriaceum* are in category 1 conservation priority in that area, indicating that these species need more attention and conservation measurement applicabilities (RIBEIRO *et al.* 2017).

3.3 Informant Consensus

Sixty-one therapeutic uses, grouped into 13 body system categories, were indicated for the medicinal plants by the community (Table 2). All the categories presented informant consensus, ranging from 0.125 to 0.82. None of the categories reached the maximum value and seven presented a value ≥ 0.50. Lemos and Araújo (2015) recorded nine body system categories in common with the present study in a Cerrado area in Pauí, with similar values ranging from 0 to 0.80. In another study, a variation from 0 to 1 and a greater number of categories was recorded in a Cerrado area in Minas Gerais (ALVES; POVH, 2013).

The body system category presenting the greatest Informant Consensus Factor (ICF) was neoplasm (N) (0.82). Four species were cited by most informants to treat a single disease in this category, with *Aloe vera* L., *Stryphnodendron rotundifolium* Mart., *Himatanthus drasticus* (Mart.) Plumel and *Hancornia speciosa* Gomes being indicated for the treatment of cancer. These results contrast with Lemos and Araújo (2015), who did not obtain consensus in this category. However, Macêdo *et al.* (2015) also recorded a high ICF (0.77), with the *H. drasticus* and *H. speciosa* species also being reported.

Category and therapeutic use:	Number of usage citations	Number of plant species	ICF
N: Cancer.	18	4	0,82
RSD: Cough, influenza, hoarseness, sore throat, asthma, tuberculosis, bronchitis.	111	29	0,75

IPOCEC: Injury, snake bite, burn, hangover symtoms, knock, broken bone.	51	16	0,70
SSUCF: Fever, general inflammation, general pain.	82	29	0,65
DSD: Belly ache, gastritis, ulcer, indigestion, diarrhea, toothache, stomach ache.	70	31	0,57
CSD: cerebral vascular accident, high blood pressure, swelling, hemorrhoids, thrombosis, suffusion, blood circulation, thinning and cleaning the blood.	33	17	0,50
GSD: kidney problems, kidney stones menstrual cramps, vaginal infection, sexually transmitted disease, menstrual regulation, uterus inflammation, urinary infection.	27	14	0,50
NSD: headache, soothing,, depression.	10	6	0,44
SD: itchiness, rash, furuncles, generl skin disease.	11	7	0,40
IPD: worm, measles, infection.	9	6	0,25
BHD: anemia, controls the blood, blood problems.	5	4	0,25
ENMD: Diabetes, vitamin deficiency, thyroid, cholesterol.	14	11	0,23
MCTD: back pain, rheumatism, osteoarthritis, herniated disc	9	8	0,125

Table 2 Categories of body systems and informant consensus fator (ICF)

Legend: N: Neoplasm; **RSD**: respiratory system diseases; **IPOCEC**: Injury, poisoning and other consequences of external causes; **SSUCF**: Signs, symptoms, or undefined clinical findings; **DSD**: digestive system disease; **CSD**: circulatory system disease; **GSD**: genitourinary system diseases; **NSD**: nervous system disease; **SD**: Skin disease; **IPD**: infectious and parasitic diseases; **BHD**: blood or hematopoietic diseases **ENMD**: Endocrine, nutritional and metabolic diseases; **MCTD**: musculoskeletal and connective tissue diseases.

The second highest ICF was obtained for the respiratory diseases category (RSD) (0.75). In this category 29 species were registered for 111 usage citations. In Macêdo *et al.* (2015), this category also presented the greatest number of usage citations. *Plectranthus amboinicus* (Lour.) Spreng. (18) was the species with the most indications, followed by *Hymenaea courbaril* L. (11) and *Caryocar coriaceum* Wittm. (10). *P. amboinicus* leaves are used in the preparation of syrups; *H. courbaril* bark and stem bark are used for the preparation of teas, syrups or by soaking in water; *C. coriaceum* oil and flowers are used in the preparation of syrups and teas. Studies in other Cerrado areas also reported this category with a large number of species and citations, with ICF ranging from 0.69 to 0.70

(ALVES; POVH, 2013; LEMOS; ARAÚJO, 2015).

Injury, poisoning or other consequences of external causes (IPOCEC) obtained an ICF of 0.70, for which 16 species with 51 usage citations were reported, where wounds were the main form of injury, for which *S. rotundifolium* was the most cited species to expedite the healing process. A cicatrizing action was also the most cited indication for this system in other studies in the semiarid such as in Almeida-Neto *et al.* (2015), which, however, presented a lower consensus factor (0.48), while Cartaxo *et al.* (2010) reported an ICF of 0.80. Snake bites, which had *Annona coriacea* Mart. as the main indicated species, are another complication of this body system, this also being reported in Macêdo *et al.* (2015) and Macêdo *et al.* (2016).

The category Signs, symptoms, or undefined clinical findings (SSUCF) include: fever, general inflammation and pain. This category obtained an ICF of 0.65, with 29 species being cited for 82 indications. Inflammation was the symptom with the highest number of indications and *S. rotundifolium* was the most cited species for this system, also being the most cited species for this system in other studies (RODRIGUES; ANDRADE, 2014). Ribeiro *et al.* (2014b), identified many species in a Caatinga area in common with the present study and obtained an ICF of 0.70 for this system, classified as undefined conditions or pain. A much lower ICF (0.30) was recorded (SOUZA *et al.* 2014) in a carrasco area close to the study area of the present research.

The digestive system disorder (DSD) (0.57), circulatory system disorder (CSD) (0.50) and genitourinary system disorder (GSD) (0.50) categories, presented values close to each other. Lemos and Araújo (2015) also recorded these systems in the same order, however, the ICF values were: 0.66, 0.63 and 0.44, respectively. DSD stood out the most obtaining 70 usage indications and 29 species, with gastritis, ulcer and stomachache being the most cited symptoms. *Himatanthus drasticus* was the species with the most indications for this system, where its gastroprotective activity has been verified in several studies (COLARES *et al.* 2008; LEITE *et al.* 2009; PINHEIRO *et al.* 2013).

According to the World Health Organization (WHO, 2017), cardiovascular disease is the leading cause of death in the world, with hypertension as a major risk factor. For the TSC category, the hypertension symptom stands out, with the latex from *H. speciosa* being indicated for its treatment. In tests using the *H. speciosa* leaf extract, a high antihypertensive and cardioprotective effect was observed at low doses (SILVA *et al.* 2012).

For the GSD category, kidney problems and stones, vaginal infections and uterine inflammation obtained the most citations. *Cecropia pachystachia* was the most cited plant for kidney problems.

The categories presenting the lowest consensuses were: nervous system disorder (NSD) (0.44), skin disorders (SD) (0.40), infectious or parasitic diseases (IPD) (0.25), blood or hematopoietic disorders (BHD) (0.25), endocrine, nutritional and metabolic disorders (ENMD) (0.23) and musculoskeletal and connective tissue disorders (MCTD) (0.125).

3.4 Collective Subject Discourse

Upon realizing an abundance of ethnobotanical studies lack a Collective Subject Discourse analysis - CSD, two questions were selected to be analyzed with respect to the ethnobotanical knowledge present in the community, according to the technique proposed by Lefevre and Lefevre (2005). The first question: Is there a specific period for collection? Four response categories were recorded for this question (Figure 2).

The corresponding response “There is no specific period, collect when you need it.” to the Category A CSD question obtained the most answers, showing that most individuals collect the plants whenever they need it, without worrying about the period or collection time. Such actions may be detrimental to the plant, as well as to the efficacy of the home remedy, since the collection period may affect the chemical composition of the samples (NOUDJOU *et al.* 2007).

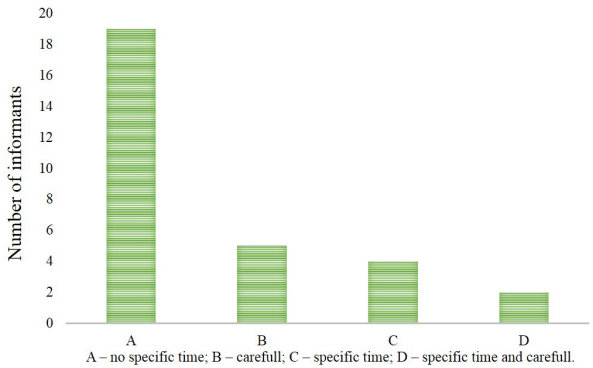

Figure 2 Graphic of the collective subject discourse categories.

The following was obtained For Category B CSD: “When I need it, I’ll pick it up, but you have to be careful. The bark is around the whole year, anytime you need it you can collect it, however, you have to be careful not to kill it. There were many of these in the bushes and people did not care, they took a bagfull to sell, then the IBAMA came in because people peeled everything and the plant died. Now you do not peel too much to avoid killing it, only take what is needed, you only need a few, however, you cannot get to the plant core or the plant dies”. In this discourse, a concern for bark collection is registered for some members, this being the second most used part, since bark extraction is a more aggressive methodology which may result in plant death (ALMEIDA; ALBUQUERQUE, 2002). This discourse shows the community is becoming aware of the need to conserve resources and shows the important role environmental agencies play in resource inspections in protected areas. Pedrosa *et al.* (2012), believe that conservative actions and socioeconomic changes

in the semi-arid populations influence the conservation status of a species.

Category C CSD refers to the specific time of day for collection: “We take mostly during the morning when the weather is cold, or in the evening when the temperature decreases, so the plant does not suffer as much. It is not good to take it when it is in the sun. Milk from “janaguba” and “mangaba” is best collected in the morning and when the moon is full. These have three collection periods and rest periods between them. From December to February, you cannot collect these because it is its gestation period, it begins to bloom and bear fruit, if collected during that period, they will be harmed and will not seed enough.”. In this discourse, members find it better to collect during cooler times, where the preference for these schedules may be due to the most commonly used part in preparations being the leaf, which is where volatile constituents evaporate from at room temperature (FERREIRA *et al.* 2016; SANTOS *et al.* 2004). The concern of traditional populations with latex collection is considered fundamental for the elaboration of sustainable management strategies (BALDAUF; SANTOS, 2013).

For Category D the following CSD was recorded: “It is better to take it during the morning, no one bothers a plant when it is hot because it hurts them too much. To remove the “janaguba” milk, you scrape between the bark and the stem bark. You have to be affectionate with them, if you are going to take the branch, pull it hard and break it, you will destroy the plant. You have to be careful, unless it is the case you have to pull it all out because you need the root.”. In this discourse a concern with the collection period is again noted, however, this is accompanied with a necessary care during the collection, in addition to addressing latex collection management, which is of great importance in species conservation, since collection may impact the species ecologically, depending on the amount of bark that is removed and the interval between the collections (BALDAUF; SANTOS, 2013).

The second question addressed was: With whom did you learn to use medicinal plants? For this question only one category was recorded, since the answers were uniform. The CSD was as follows: “I was born and raised here, thus I have the knowledge, I learned from my elders, they teach various types of remedies. From my grandparents this was passed on to my parents, from my parents to me. I learned from my grandmothers and my mother. The older people did not have a pharmacy’s prescription. My mother cured us at home, and she would teach us, I raised my children without ever taking them to the hospital and I’m getting the knowledge through to them”.

Thus, it is evident the elders are the guardians of this practice and are responsible for knowledge propagation, with this passage occurring directly by parents passing knowledge onto their children, which as highlighted by Cristo Miranda (2012), this communication occurs not only by the act of speaking, but also through social practices, this being the main form of popular knowledge transmission in communities. According to Torres-Avilez *et al.* (2014), scientists have assumed that older people are more knowledgeable than

younger people since they have interacted with people and natural resources more often. In a survey carried out in a quilombola community where Sousa *et al.* (2017) also analysed the collective subject discourse, the authors also recorded that elders are responsible for passing knowledge to younger generations (SOUSA *et al.* 2017).

4 I CONCLUSION

In this study a considerable number of native species were registered and the community demonstrated a good level of knowledge and applicability of the local medicinal flora to their needs. Despite the presence of primary healthcare, residents still resort to natural resources as the first treatment option. The applicability of the medicinal flora is evident given the variety of usage forms for the cited species, these being directly associated with the plant part and therapeutic indication, in order to best extract the benefits of the plants. This knowledge proves to be of matriarchal origin since women were the majority of respondents, with the grandmother and mother figures being verified in the CSD as the knowledge holders and as being responsible for communicating knowledge onto the next generations, a fact which perhaps may be a result of the caring roles that have been attributed to females throughout the history of humanity.

In terms of species versatility, ten species were considered the most versatile in the community according to the relative importance index, with *Stryphnodendron rotundifolium* obtaining the highest RI compared to the other species. *S. rotundifolium* has also been highlighted in other communities and many of its therapeutic indications have been proven in bioprospecting and ethnopharmalogy research. In the case of *Xylopia sericea*, a disagreement among the community regarding a therapeutic indication was observed, indicating the need for research addressing the activity of the species.

As for consensus, all categories obtained agreement of use among the informants, showing knowledge transmission between community members exists, especially in the neoplasia and respiratory system disorder categories which presented the highest ICF.

In terms of collection of the most cited species, the bark, the root and the latex are removed for its use, which can interfere with its conservation if sustainable approaches are not used, where this is already observed in the community for some species. Moreover, developing strategies aimed at the conservation of other species are also necessary, thus avoiding an imbalance in populations. Additionally, some species appeared on the endangered species lists, and thus the local conservation status needs to be further investigated through research.

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