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Extractivism and Management of Vines in a Quilombola Community in the Brazilian Semiarid region

Naildes Correia Soares[1]
Universidade Estadual de Feira de Santana

Marcondes Albuquerque de Oliveira[2]
Instituto Agronômico de Pernambuco

Paulo Sérgio Santos-Neves[3]
Universidade Estadual de Feira de Santana

Grênivel Mota da Costa[4]
Universidade Federal do Recôncavo da Bahia

Reinaldo Farias Paiva de Lucena[5]
Universidade Federal da Paraíba

[1] Mestre em Ecologia e Evolução pela Universidade Estadual de Feira de Santana (UEFS), Feira de Santana, Bahia, Brasil. Secretaria de Educação do Estado da Bahia (SEEBA). Rua Arivaldo de Carvalho, s/n, Feira de Santana, Bahia, Brasil, CEP: 44036-900. **ORCID**: https://orcid.org/0009-0005-8345-8870. **Lattes**: http://lattes.cnpq.br/9700952743716846. **E-mail**: soarescorreianaildes@gmail.com

[2] Doutor em Biologia Vegetal pela Universidade Federal de Pernambuco (UFPE), Recife, Pernambuco, Brasil. Instituto Agronômico de Pernambuco (IPA). Avenida General San Martin, 1209/1210 – San Martin, Recife, Pernambuco, Brasil, CEP: 50761-000. **ORCID**: https://orcid.org/0000-0001-8958-1953. **Lattes**: http://lattes.cnpq.br/2112733072604156. **E-mail**: marcondesoliveira@yahoo.com.br

[3] Mestre em Botânica pela Universidade Estadual de Feira de Santana (UEFS), Feira de Santana, Bahia, Brasil. Programa de Pós-graduação em Botânica (UEFS). Av. Transnordestina, s/n – Novo Horizonte, Feira de Santana, Bahia, Brasil, CEP: 44036-900. **ORCID**: https://orcid.org/0000-0002-4717-1785. **Lattes**: http://lattes.cnpq.br/4574121821632121. **E-mail**: paulosergio.ns@hotmail.com

[4] Doutor em Botânica pela Universidade Estadual de Feira de Santana (UEFS), Feira de Santana, Bahia, Brasil. Técnico Administrativo em Educação (UFRB). Av. Rui Barbosa, 710 – Centro, Cruz das Almas, Bahia, Brasil, CEP: 44380-000. **ORCID**: https://orcid.org/0000-0001-5080-8444. **Lattes**: http://lattes.cnpq.br/5547532842342433. **E-mail**: grenivel@gmail.com

[5] Doutor em Biodiversidade pela Universidade Federal Rural de Pernambuco (UFRPE), Recife, Pernambuco, Brasil. Programa de Pós-graduação em Desenvolvimento e Meio Ambiente (UFPB). Centro de Ciências Exatas e da Natureza, Campus I, s/n – Cidade Universitária, João Pessoa, Paraíba, Brasil, CEP: 58051-090. **ORCID**: https://orcid.org/0000-0002-1195-4315. **Lattes**: http://lattes.cnpq.br/0588527774815010. **E-mail**: rlucena@dse.ufpb.br

Ligia Silveira Funch[6]
Universidade Estadual de Feira de Santana

Eraldo Medeiros Costa Neto[7]
Universidade Estadual de Feira de Santana

ABSTRACT

This study investigated the management and conservation of lianas in a quilombola community in Coração de Maria, Bahia. Interviews were conducted with 33 extractivists/artisans, along with field observations and botanical collections identified at UEFS. A total of 40 taxa from 12 families were identified, with Bignoniaceae being the most cited (64.68% of use mentions). Participants demonstrated extensive traditional knowledge, with women predominantly leading the activities, which are carried out without formal division of labor. Liana use is guided by traditional practices, but the analysis of harvest frequency showed no correlation between perceived abundance and use, suggesting potentially predatory management. As a result, it is recommended to develop sustainable management policies, conduct phytosociological and phenological studies, and promote the preservation and transmission of traditional knowledge, especially among younger generations, to ensure sustainable continuity of this activity.
Keywords: Ethnobotany; Management; Socio-environmental sustainability.

Extrativismo e manejo de cipós em uma comunidade quilombola em uma região semiárida brasileira

RESUMO

Este estudo investigou o manejo e a conservação de lianas em uma comunidade quilombola em Coração de Maria, Bahia. Foram realizadas entrevistas com 33 extrativistas/artesãos, observações de campo e coletas botânicas identificadas na UEFS. Identificaram-se 40 táxons pertencentes a 12 famílias, sendo a Bignoniaceae a mais citada (64,68% das menções). Os participantes demonstraram amplo conhecimento tradicional, com predominância feminina na liderança das atividades, realizadas sem divisão formal de trabalho. O uso das lianas é guiado por práticas tradicionais, mas a análise da frequência de coleta revelou ausência de correlação entre abundância percebida e exploração, sugerindo manejo predatório. Diante disso, recomenda-se o desenvolvimento de políticas de manejo sustentável, realização de estudos fitossociológicos e fenológicos, e valorização dos saberes locais, especialmente entre os jovens, para garantir a continuidade da atividade de forma sustentável.
Palavras-chave: Etnobotânica; Manejo; Sustentabilidade socioambiental.

[6] Doutora em Biologia Vegetal pela Universidade Estadual de Campinas (UNICAMP), Campinas, São Paulo, Brasil. Programa de Pós-graduação em Botânica (UEFS), Feira de Santana, Bahia. Brasil. Av. Transnordestina, s/n – Novo Horizonte, Feira de Santana, Bahia, Brasil, CEP: 44036-900. **ORCID**: https://orcid.org/0000-0001-7096-0187. **Lattes**: http://lattes.cnpq.br/8845087913178096. **E-mail**: ligiafunch@yahoo.com

[7] Doutor em Ecologia e Recursos Naturais pela Universidade Federal de São Carlos (UFCSar). Programa de Pós-graduação em Botânica (UEFS), Feira de Santana, Bahia. Brasil. Av. Transnordestina, s/n – Novo Horizonte, Feira de Santana, Bahia, Brasil, CEP: 44036-900. **ORCID**: https://orcid.org/0000-0003-0278-1974. **Lattes**: http://lattes.cnpq.br/2521953264550977. **E-mail**: eraldont@uefs.br

Extractivismo y manejo de vides en una comunidad quilombola de una región semiárida de Brasil

RESUMEN

Este estudio investigó el manejo y la conservación de lianas en una comunidad quilombola en Coração de Maria, Bahía. Se realizaron entrevistas a 33 extractivistas/artesanos, además de observaciones de campo y recolección botánica, con identificación en la UEFS. Se identificaron 40 taxones pertenecientes a 12 familias, siendo Bignoniaceae la más citada (64,68 % de las menciones de uso). Los participantes demostraron un amplio conocimiento tradicional, con predominancia femenina en el liderazgo de las actividades, llevadas a cabo sin división formal del trabajo. El uso de las lianas está guiado por prácticas tradicionales, pero el análisis de la frecuencia de recolección no mostró correlación entre la abundancia percibida y su uso, lo que sugiere un manejo potencialmente depredador. Por ello, se recomienda desarrollar políticas de manejo sostenible, realizar estudios fitosociológicos y fenológicos, y fomentar la preservación y transmisión de los saberes tradicionales, especialmente entre los jóvenes, para asegurar la continuidad sostenible de esta actividad.

Palabras-clave: Etnobotánica; Gestión; Sostenibilidad socioambiental.

INTRODUCTION

Plant biodiversity has been explored as a source of resources for various purposes, including food, medicine, artisanal crafts, magical-religious practices, fuel, and technology (ARAUJO *et al*., 2015; LUCENA *et al*., 2021). Among natural resources, non-timber forest products (NTFPs) stand out due to their wide range of offerings, such as flowers, fruits, latex, and plant fibers, without necessarily leading to resource depletion (HOMMA, 1993; SCUDELLER 2007; GRAVA *et al*., 2019; FERREIRA *et al*., 2022). NTFPs comprise about 25% of forest plant species worldwide, particularly in tropical forests, where they exhibit rich diversity and abundance (ARAÚJO, 2014; ROWE, 2018; BONGERS *et al*., 2002; DELGADO-JUNIOR; ALVES, 2017; PINHEIRO *et al*., 2020).

Liana species, commonly known as vines, provide several non-timber forest products (NTFPs) that play an important role in the daily lives and well-being of many people and communities living in or around forests (ENGEL *et al*., 1998). These products also offer significant profitability, promoting local development (ALBUQUERQUE; HANAZAKI, 2010). The extraction of these products relies heavily on the extensive efforts of traditional communities, whose way of life is closely linked to the collection of these plant resources. The communities use these resources for various purposes, such as human and animal medicine, food, fencing, construction of traditional houses, firewood, crafts, fodder, etc. (FERREIRA; GAMA, 2005; BIRHANE et al., 2020).

Extractivism and management of lianas by traditional populations typically involve a set of sustainable techniques based on selective collection, which considers factors such as plant observation, cutting cycles, environmental conditions, usage areas, collection frequency, and timing (DIEGUES; VIANA, 2000; VIEIRA, 2011; SCIPIONI *et al*., 2012). This extractive activity does not necessitate detailed knowledge of the exploited liana species and occurs within a sociocultural context (VIDAL; GERWING, 2003; VALENTE, 2009; GOMEZ *et al*., 2016; LIMA *et al*., 2020).

The management of vines is associated with the ethnobotanical knowledge that traditional communities have about the spatial distribution of resources, types of use and forms of exploitation, combined with the socioeconomic importance that plant fibers represent for these peoples (HANAZAKI 2003; SANTOS *et al*., 2016). As an example, the species *Heteropsis flexuosa* (Kunth) G.S.Bunting (Araceae), known as **cipó-titica**, is widely exploited by communities in the North, Northeast and Central-West regions) to make various products, such as baskets, hampers, lamps, decorative objects, among others (GRAVA *et al*., 2019).

The conservation strategies adopted by many traditional peoples and communities include, for example, extraction methods, selection of the vegetative parts of interest, observation of aspects and reuse of wood (FERREIRA; BENTES-GAMA, 2005). These are relevant points to support sustainable management strategies and the conservation of biodiversity in general. The valorization of ethnobotanical knowledge, extractive practices and sustainable management adopted by traditional populations should constitute one of the pillars of a new conservationism (GUARIM-NETO; MACIEL, 2008).

Although lianas are found in abundance in the canopy of tropical forests, they account for 25% of woody species and up to 35% of the diversity of vascular plants in these environments (BARBOSA; RIZEK JUNIOR, 2014), in the Neotropics, studies about lianas as a central focus are scarce and the ecology of this plant group is little known (HOMMA, 1993; ENGEL *et al*., 1998; SANTOS *et al*., 2021; NASCIMENTO *et al*., 2022, 2023; SPEROTTO *et al*., 2023). Thus, considering that traditional communities have a framework of information on various aspects of plant diversity (GUARIM-NETO; MACIEL, 2008), the relationship between traditional knowledge and plant resources can contribute to the conservation of exploited species and the associated biocultural heritage (SANTOS *et al*., 2016).

Considering that vine extraction plays an essential role in domestic life and as a source of additional income for communities that have a traditional lifestyle (VIANA *et al*., 2016; RAMOS *et al*., 2017), this study evaluated extractive practices related to the use of lianas in handicrafts and the possible impacts arising from their exploitation by a quilombola community located in the semiarid region of the state of Bahia, Northeastern Brazil. Additionally, we investigated the management of lianas, especially those species that are extracted with greater intensity due to the quality of the plant resources or their socioeconomic potential.

MATERIAL AND METHODS

Study area

The study was carried out with residents of the quilombola community Raiz do Engenho do Mangalô, located at coordinates 12°14’S and 38°48’W (Figure 1). The community is located 7.4 km from the urban area of the municipality of Coração de Maria, which is in the Central-North mesoregion of the state of Bahia, in a transition area between the Atlantic Forest and the Caatinga (CIDADE BRASIL, 2024), therefore, its flora presents species from the phytogeographic domains of the Atlantic Forest and the Caatinga (ANUNCIAÇÃO *et al*., 2022). The area is characterized by a sub-humid to dry climate, with an average annual temperature of 24°C, a minimum of 20°C and a maximum of 34°C. The rainy season runs from April to July (PREFEITURA MUNICIPAL DE CORAÇÃO DE MARIA, 2017).

The community received this name due to a resident who planted mangalô (*Lablab purpureus* (L.) Sweet, Leguminosae), associated with the history of slavery of the ancestors (GRAVA *et al*., 2019).

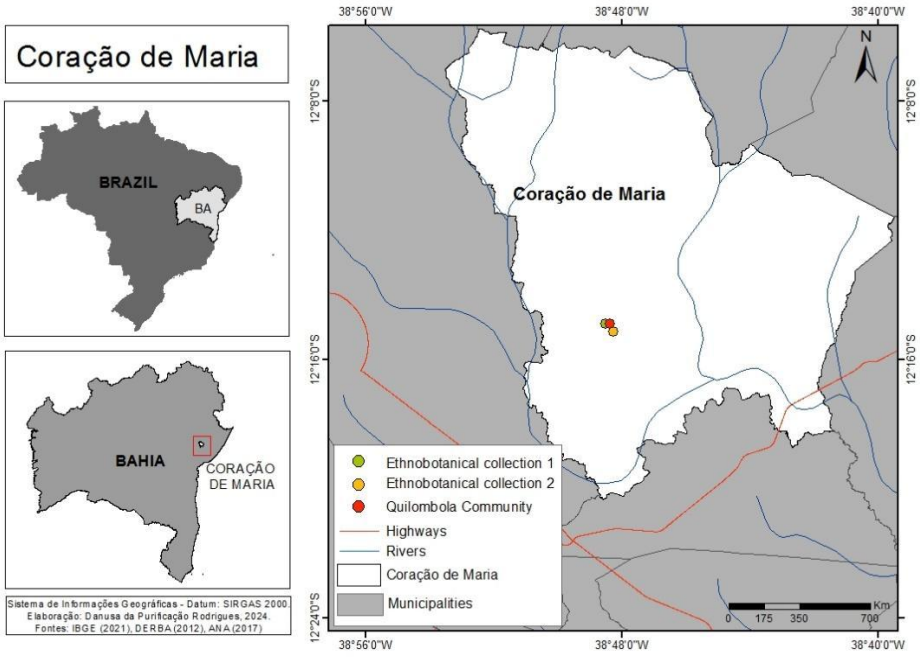
The community is made up of 40 farming families who cultivate pineapple, cassava and corn, as well as raising poultry, pigs and cattle. Some of the residents are involved in community-based tourism activities, including the sale of handicrafts made with materials extracted from the Mata Antônio Pinto, a native area of the Atlantic Forest that is vital to the community from a socioeconomic and historical-cultural point of view (IPATRIMÔNIO, 2016; CIDADE BRASIL, 2024). It is a well-preserved forest fragment located near the homes of the quilombola families. Access to the area is via a local road (Figure 2).

Data collection

Data collection took place between October 2022 and April 2023, after approval by the Human Research Ethics Committee of the State University of Feira de Santana (CAAE No. 61200422.7.0000.0053). The Term of Consent duly signed by the Community Leader was also obtained, authorizing the research to be carried out, following the current legislation of the National Health Council (Resolution No. 466/2012). The study is registered in the National System for the Management of Genetic Heritage and Associated Traditional Knowledge - SisGen (Registration No. A201F61).

Initially, visits were made to the community to meet the residents and to conduct preliminary surveys on both socioeconomic and ethnobotanical aspects of the vines. Data were obtained through informal conversations and semi-structured interviews with residents of both sexes who met the following criteria: (1) community residents; (2) over 18 years of age; (3) directly involved in the extractive activity and the phytocraft production chain. The selection of research participants occurred through the application of the "snowball" technique (ALBUQUERQUE *et al*., 2010; VINUTO, 2014), which is a common sampling method in qualitative studies. In this technique, an initial interviewee indicates another participant relevant to the study and so on, progressively expanding the network of interviewees.

Figure 1 – Location of the study area of the quilombola community Raiz do Engenho do Mangalô, Coração de Maria, Bahia and the botanical collection area (Mata Antônio Pinto).



Thirty-three residents (29 women and 4 men) involved in the production chain of vine-based handicrafts participated in the study. They identify as black people from quilombola families. The majority of those interviewed are between 63 to 72 years old, corresponding to 31% of the total, followed by the age groups of 43 to 52 years old (18%), 24 to 32 (15%), 53 to 62 (15%), 33 to 42 (12%), 73 to 83 (6%); 3% did not declare their age.

To collect specimens, three guided tours were carried out to the forest fragment known as Mata Antônio Pinto from October 2022 to August 2023. Plants were collected throughout the forest area through random walks, with samples in a sterile state and in the reproductive phase; the material was herborized following the usual procedures and methodological steps (PEIXOTO; MAIA, 2013) and deposited in the Herbarium of the State University of Feira de Santana–HUEFS (Code according to THIERS *et al*. 2009, continuously updated).

Taxonomic identification was performed at HUEFS and the Plant Taxonomy Laboratory with the help of specialized literature, by comparison with exsiccates from HUEFS and the virtual herbarium (CRIA, 2024), in addition to consultations with botanical experts. The names that make up the floristic list were updated according to the most current botanical classification system (APG IV 2016) and the List of Plants of Brazil (FLORA AND FUNGA OF BRAZIL, 2024), as well as their respective vouchers.

Figure 2 – Study area: Raiz do Engenho do Mangalô quilombola community, Coração de Maria municipality, Bahia, Brazil. A – Access road to the community; B and C – Streets in the community; D – Entrance route to the forest fragment; E – Vegetation aspect of the forest fragment.

Data analysis

Data from the following qualitative variables were tabulated and analyzed using Microsoft Excel R 4.3.3 software (MARTINS, 2006): profile of research participants, vine species, management and processing techniques, and use of vines.

The Fidelity Level (FL) was calculated to determine the relative importance indexes of the use of plants for the community that uses them (GUARIM-NETO; MACIEL, 2008). The data were analyzed using the "irr" package (SILVA *et al*., 2022) in the R software (version 4.3.3) according to the formula FL = (Ip/Iu) x 100%, where: FL is the ratio between the number of survey participants (level of fidelity); Ip represents the number of participants who mention each plant and specific purpose (highest); and Iu refers to the total number of participants who report the use of other plants for the same purpose. This equation calculates the proportion of participants who mention the plant for a specific purpose and was applied to each species of vine mentioned by the interviewees.

Due to the differences in the number of participants who mentioned uses for each species of vine, it was necessary to use the Popular Use Agreement (CUP) calculation, according to the formula CUP = FL x FC, where FC corresponds to the correction factor, that is, the number of participants who mentioned the species of vines divided by the number of individuals who mentioned the most used species (GUARIM-NETO; MACIEL, 2008). To investigate whether artisans collect the vines they claim to be the most abundant, Fisher's Exact Test was performed using R software (CONTADOR; SENNE, 2016). This test calculates the exact probability of

obtaining the observed contingency table, given that the margins are fixed. It utilizes hypergeometric probability distribution, with its equation applied to compare whether the frequencies of vine collection differ from what would be expected based on the reports of the most abundant vines by extractivists. To this end, 200 simulations were used in this test, generating the probability distribution of expected frequencies.

RESULTS AND DISCUSION

Floristic diversity of lianas

We catalogued 40 taxa of lianas exploited for craft purposes, of which 39 were identified at the species level and one at the genus level. These plants are distributed in 12 botanical families. Bignoniaceae was the largest in number of representatives (17 species), followed by Sapindaceae (seven species), Araceae (three species) and Leguminosae (two species). The other families presented only one species (Table 1). The registered species have generalist habits and may occur in other biomes besides the Caatinga and Atlantic Forest. They are not listed in vulnerability status (FLORA AND FUNGA OF BRAZIL, 2024).

The predominance of Bignoniaceae and Sapindaceae is notable, with emphasis on the main representatives within these families: Bignoniaceae – *Fridericia pubescens* (L.) L.G.Lohmann (**cipó-pau**), *Adenocalymma* cf. *marginatum* (Cham.) DC. (**cipó-branco**) e *Anemopaegma laeve* DC. (**cipó-preto**), Sapindaceae – *Urvillea laevis* Radlk. (**cipó-costa-de-sapo-branco**), *Mikania hemisphaerica* Sch.Bip. ex Baker (**cipó-figo**), *Paullinia elegans* Cambess. (**cipó-estralador**). Bignoniaceae is recognized as one of the major families in tropical seasonally dry forests and shrublands (GENTRY, 1995),

The prevalence of these families is attributed to their greater abundance in transition areas between the Caatinga and the Atlantic Forest, regions known for their high diversity and quantity of species (CARVALHO *et al*., 2011; VARGAS; ARAÚJO, 2014; REZENDE; WEISER, 2014; CORDEIRO *et al*., 2015; SPEROTTO *et al*., 2023). Although families such as Leguminosae and Araceae are found in nearly all biomes—ranging from tropical forests to transitional areas between the Agreste and the Atlantic Forest (CORDEIRO *et al*., 2015)—there were few records of species in the studied area.

Table 1 – Cataloged botanical family/species and their use in artisanal production and products made in the quilombola community Raiz do Engenho do Mangalô, in the municipality of Coração de Maria, Bahia, Brazil.

Botanical family/species	Local names	1	2	3	4	5	6	7	8	9	10	11	12	Vouchers
APOCYNACEAE														
**Prestonia coalita* (Vell.) Woodson	Cipó-rama-de-leite	X	X	X	X		X	X	X	X	X	X	X	268.620
ARACEAE														
**Anthurium pentaphyllum* (Aubl.) G.Don	Cipó-imbé	X		X		X			X	X	X	X	X	268.612
**Philodendron acutatum* Schott	Cipó-imbé	X		X		X			X	X	X	X	X	268.592

**Philodendron rudgeanum* Schott	Cipó-imbé	X		X		X			X	X	X	X	X	268.613
ASTERACEAE														
***Mikania hemisphaerica* Sch.Bip. ex Baker	Cipó-figo													268.614
BIGNONIACEAE														
**Adenocalymma coriaceum* A.DC.	Cipó-branquinho, Cipó-branco		X	X	X	X	X		X	X	X		X	268.595 268.606
***Adenocalymma* cf. *marginatum* (Cham.) DC	Cipó-branco		X	X	X	X	X		X	X	X		X	268582
**Adenocalymma* cf. *salmoneum* J.C.Gomes	Cipó-janjão		X	X	X			X	X	X	X	X		268.594
**Adenocalymma pedunculatum* (Vell.) L.G.Lohmann	Cipó-joão-congo	X	X		X									268.601
**Adenocalymma validum* L.G.Lohmann	Cipó-janjão		X	X	X			X	X	X	X	X		268.596
**Anemopaegma chamberlaynii* (Sims) Bureau & K.Schum.	Cipó	X	X	X	X	X	X	X	X	X	X	X	X	268.605
**Anemopaegma gracile* Bureau & K.Schum.	Cipó-canudo-de-rego, canudo-liso, canudo	X	X	X	X		X	X	X	X	X	X	X	268.588
**Anemopaegma hilarianum* Bureau & K.Schum.	Cipó-pau-da-mata, cipó-pau-do-roçado	X	X	X	X			X	X	X	X	X		268.583
**Anemopaegma laeve* DC.	Cipó-preto	X	X	X	X	X		X	X	X	X	X	X	268.597
***Cuspidaria lasiantha* (Bureau & K.Schum.) L.G.Lohmann	Cipó-corrimão													268.584
**Dolichandra cynanchoides* Cham	Cipó-branquinho	X	X	X	X			X	X	X	X			268.586
**Dolichandra quadrivalvis* (Jacq.) L.G.Lohmann	Cipó-vara	X	X	X				X	X	X	X			268.610
**Dolichandra unguis-cati* (L.) L.G.Lohmann	Cipó-caititu, cipó-janjão, cipó-unha-de-gato, cipó-unha-de-lagartixa, cipó-unha-de-gavião	X	X	X	X	X	X	X	X	X	X	X	X	268581 268.591
**Fridericia chica* (Bonpl.) L.G.Lohmann	Cipó-sangue, cipó-tinta	X	X	X	X			X	X	X				268600
**Fridericia pubescens* (L.) L.G.Lohmann	Cipó-pau-da-mata, cipó-pau-do-roçado	X	X	X	X			X	X	X	X	X		268580 268.607
**Mansoa alliacea* (Lam.) A.H.Gentry	Cipó-alho	X	X	X		X		X	X	X	X	X	X	268587
**Mansoa hirsuta* DC.	Cipó-costa-de-sapo-branco		X	X	X			X	X	X	X	X		268617
CAPPARACEAE														
**Mesocapparis lineata* (Dombey ex Pers.) Cornejo & Iltis	Cipó-rama, cipó-rama-verde	X	X		X									268609
CELASTRACEAE														

**Prionostemma asperum* (Lam.) Miers	Cipó-sangue, cipó-rama-vermelha	X	X	X	X			X	X	X				268608
LEGUMINOSAE														
**Canavalia parviflora* Benth.	Cipó-joão-congo	X	X		X									268578
**Cratylia hypargyrea* Mart. ex Benth.	Cipó-amarelinho, cipó-rajado	X		X	X	X	X	X	X	X	X	X		268590
LOGANIACEAE														
***Strychnos divaricans* Ducke	Cipó-garajau													268593
MALPIGHIACEAE														
**Stigmaphyllon auriculatum* (Cav.) A.Juss.	Cipó-joão-congo	X	X		X									268579
PASSIFLORACEAE														
**Passiflora silvestris* Vell.	Cipó-maracujá		X	X	X			X	X	X	X	X		268611
RHAMNACEAE														
**Gouania lupuloides* (L.) Urb.	Cipó-ortiga			X	X	X		X		X	X	X	X	268589 268604
SAPINDACEAE														
**Paullinia elegans* Cambess	Cipó-estralador	X	X	X				X	X	X	X			268.603
***Serjania clematidifolia* Cambess	Cipó-costa-de-sapo-preto													268.602 268.616
**Serjania gracilis* Radlk.	Cipó-rama-preta	X	X											268599
**Serjania pernambucensis* Radlk.	Cipó-pipoqueiro		X	X	X			X						268618
**Serjania pinnatifolia* Radlk.	Cipó-rama, cipó-rama-verde, cipó-tingui	X	X	X	X			X	X	X	X			268585
**Serjania* sp.	Cipó-melindrosa	X	X	X								X		268615
**Urvillea laevis* Radlk.	Cipó-costa-de-sapo-branco		X	X	X			X	X	X	X	X		268604 268619

* Cited in interviews and collected. **Collected but not cited. 1. Hamper. 2. Tray. 3. Caçuá[8]. 4. Basket. 5. Hat. 6. Chicken coop. 7. Bottle. 8. Lamp. 9. Trash can. 10. Mandala. 11. Mussuá[9]. 12. Tulip. Voucher: represents the registration number(s) in the Herbarium of the State University of Feira de Santana/BA [HUEFS].

A study carried out in the forest fragment of the village of Carrapato (surrounding the Mangalô community) showed Leguminosae as the most representative, responsible for 22.2% of the species, followed by Bignoniaceae, Myrtaceae, Rutaceae, Euphorbiaceae and Sapotaceae; eight liana species was found (*Adenocalymma validum* L.G. Lohmann) (ANUNCIAÇÃO *et al*., 2022).

Exploratory routes can influence the prevalence of certain botanical families and even specific species. Additionally, sociocultural factors, changes in usage patterns, and personal preferences can lead to a more intense exploration of particular families or species (SCIPIONI *et al*., 2012; RAMOS *et al*., 2017). Regardless of the degree of exploitation for specific species, the use of these plants provides essential raw materials for extractivists and artisans, who continuously manage these plants to integrate them into the production chain (NOGUEIRA *et al*., 2006; SOARES *et al*., 2024).

[8] Basket made of vine, bamboo or wicker to place on the back of a donkey, horse or mule when transporting food.
[9] Fishing gear.

Characterization of the phytocraft production chain

Women are more involved in the production chain, representing 76% of participants, while men account for 24%. Cognition and the sharing of ethnobotanical knowledge is marked by gender, with women having a greater repertoire about plants, being more connected and sharing more information with each other (COSTA *et al*., 2021). The female leadership in the Raiz do Engenho do Mangalô community can be attributed to the role women play in family care and, consequently, in transmitting knowledge (SOUZA *et al*., 2023). Additionally, this practice can be conducted alongside domestic responsibilities, as it allows for the collection of raw materials nearby; weaving can take place in the backyards of homes (BRUMER; ANJOS, 2008).

The low frequency of male participation may be related to other economic activities, such as family farming, construction, or providing services to local farmers (BARROSO, 2018). However, in some communities, men may take on a predominant role, as reported by Nogueira *et al*. (2006) in an extractive community in southern Brazil and by Pereira (2004) in the northern region.

In the Raiz do Engenho do Mangalô community, the absence of children and young people in the production chain is attributed to a lack of interest from those unwilling to learn the trade. Additionally, parents encourage their children to focus on their studies due to financial difficulties and limited prospects related to artisanal activity.

The younger population showed little interest in craft activities in a traditional community and the low appreciation for learning these activities is partly because they do not offer financial compensation (SILVA *et al*., 2016). The belief that education opens new possibilities for overcoming poverty, fostering personal growth, and improving living conditions is a significant factor for many families in the interior of Brazil (VIVEIROS, 2023).

However, Leoni and Marques (2008) demonstrated that, in a traditional community in the central region of the Amazon, there is an effective participation of younger individuals in various stages of the handicraft production chain. Nogueira *et al*. (2006) and Pereira (2004) also highlight the presence of young members in extractive activities in communities on the coast of Paraná and Amapá, respectively.

Thus, it is the older artisans who play a crucial role in preserving local culture and transmitting knowledge, since they have experience, mastery, techniques, and skills related to handling vines and manufacturing products.

We observed that 54% of artisans earn their income mainly from handicrafts, but diversify their activities with informal work, such as day laborers, and with government support (*Bolsa Família*), which can vary between R$100.00 and R$1,000.00 per month. While 39% declared themselves retired and have handicrafts as a source of additional income, 4% of them are included in the formal market with a monthly income of minimum wage, and 3% declared themselves retired and pensioners with an income of up to two minimum wages.

The characterization of the production chain of vine crafts includes stages ranging from locating the types of vines available in the region to the stage of commercialization of the crafts. According to the interviewees, the collection takes place in the forest areas of the region and is done individually or in groups. In most cases, the extractivists travel long distances in search

of these materials, or of a specific vine that is not easily found in the surrounding forest, such as **cipó-catitu** (*Dolichandra unguis-cati* (L.) L.G.Lohmann).

> *The catitu vine [you] must travel a long way to get it. Do you know where we can get it? In Carvalhos, near Berimbau* (Mrs B., 62 y.o.).

The collections can be carried out in places far from the community, such as: Mata dos Carvalhos (municipality of Conceição de Jacuípe); Arrancador; Capoeira and Mata Batida, which are typical areas of terra firme and secondary plant formations; and Berço do Rio, an area close to rivers and water sources, characteristic of riparian forest with heterogeneous plant formation, which includes a diverse floristic composition in climbing plants. The areas where vines occur and people go into are private properties, requiring prior authorization to access them, which often results in confrontations.

Conflicts over access to plant resources in restricted areas occur in different socio-environmental contexts throughout the country (GRAVA *et al*., 2019). The main drivers of conflict, especially in the Amazon region, include land tenure, access to land and natural resources, identity and lifestyle transformations, State- and market-driven agendas, and illegal and criminal activities (FROESE *et al*., 2022). Territorial and environmental conflicts are a factor in the denial of the rights of traditional peoples and communities, inhibiting traditional land management activities, reducing the supply and demand of resources, and limiting ecological resilience and diversity within and outside Brazil (LONG; LAKE 2018; FROESE *et al*., 2022).

The management and selection of individuals for later processing follows several selection criteria, based on the visual characteristics of the plant, such as the color of the "threads" (green, mature), structure, size, and availability of the resource (FERREIRA; BENTES-GAMA, 2005). Some artisans indicate that to conserve the resource, only mature vines should be selected, not all the "threads" from the same plant should be removed, and the exploited area should be left fallow. All these management activities are important for the regrowth of plants and to avoid overexploitation, contributing to the maintenance of vine populations (SILVA *et al*., 2016; OLIVEIRA, 2011; TAMAIO, 2010; WALLACE; FERREIRA, 2016; SOARES *et al*., 2024).

> *We look at what is good. We take out what is good. We only take out what is smooth. We do not take out the ones that are full of knots. We do not take out the small threads. We leave the small ones to thicken, to grow. They grow and then we take them out when they are already big. We take out the big ones, the long ones, which are on the trees, climbing the trees, that we can do [crafts]. When they are good, when they are ripe. You do not take them out when they are a little green. When they are ripe, they are already gray, striped, and their skin is already thick* (Mrs H., 62 y.o.).

Some interviewees showed caution regarding collection, as they see the need to take a break for the vines to regenerate in the explored areas:

> *Be careful when going to that place. Let it grow for a few days and then go and take it somewhere else, and when you go back to the place where you took it, there is already a bunch of it* (Mrs H., 67 y.o.).

This level of understanding of the production cycle is necessary to ensure that resources are not exhausted and to ensure the maintenance of natural stocks for managed species (TAMAIO, 2006; TONICELO *et al*., 2007; SCIPIONI *et al*., 2012; FLORES; LIMA, 2013; RIUL, 2015).

The extraction method is simple, without the use of advanced technologies, using only a machete as a cutting tool. The interviewees confirmed that the vine is removed using only manual force, cutting the threads a few centimeters from the stem so as not to kill the mother plant, in a technique called "pulling". About 94% claimed that they only collect the mature, thicker, "linen" threads (without knots), leaving the green ones to renew, thus removing only what is useful. On the other hand, 6% of the collectors claimed that there is no choice and that, sometimes, they remove the entire stock.

This same management strategy for vine cutting was documented by Valente (2009) and by Vieira *et al*. (2014) in relation to the species *Philodendron corcovadense* Kunth. These authors emphasize that although the traditional method known as "coxado" provides a higher yield of vines, because the threads come out intact, this cutting strategy can cause the plant to detach from the treetops if management is not carried out carefully, resulting in the death of the vine (mother plant). Scipioni *et al*. (2012) found that this method is also potentially harmful to *Heteropsis* spp. vines, causing them to detach from the crown of the host tree and consequently die. Such records, however, contradict the perception of older extractivists who "coxam", as they attest to the effectiveness of the technique and show that the inexperience of younger collectors has led to the removal of the mother plant, resulting in the death of the resource and the misconception that traditional "coxado" management is harmful to the maintenance of natural stocks of vines (VALENTE, 2009).

As for the part of the plant used to make the objects, 91% said they used the entire vine, while the branches, wood and roots were used by 3% of those interviewed, respectively. Commonly, the root or stem are the parts used for crafts.

When discussing traditional management techniques, it is worth highlighting the lack of widespread recognition of the part of the plant that is exploited – the root. While some studies point to the collection of roots (TAMAIO, 2006; FLORES; LIMA, 2013; VALENTE; NEGRELLE, 2013; RAMOS *et al*., 2017), there are well-documented records that show the extraction of the stem as the vegetative part in common use (GUADAGNIN; GRAVATO, 2013; SILVA *et al*., 2016).

In general, the lack of accurate understanding of the biology and ecology of vines, coupled with the little-studied traditional management technique, is worrying, as these are factors that can lead people to exploit the resource in a predatory manner and lead to its exhaustion (VIEIRA *et al*., 2014; RAMOS *et al*., 2017). This perception can be reinforced based on the testimonies of two extractivists:

> *We go there and cut the vine in a certain way and leave a good part on the ground, planted there, right? To renew, to give birth to children, to sprout. There is [...] we already have the technique, right? We see the vine, we go there and cut it, we pull it, but we cut it with awareness, because there is one that remains. We have the knife, we do not even think much about how to cut the vine* (Mr V., 46 y.o.).

> *We have a tool called a machete, right? We take it and go into the forest. When we get there, we start looking for it and we take it out and put it down, and we leave it there, cleaning up its leaves and its hairs. We cut the base of the vine where it grows, because it grows from the ground, but it grows. We cut it off a little bit from the base and pull it out* (Mrs A., 70 y.o.).

Beliefs related to vine collection

According to 85% of those interviewed, vines are the most found in the rainy season, as they recognize that there is more regrowth. Only 6% of collectors said they found vines all year round, and 9% did not know how to answer. For artisans, the moon has a strong influence on the quality and abundance of vines, with 94% of those interviewed indicating the "dark" moon as the best time to cut them, because they believe that the vines are stronger, lusher and, consequently, of higher quality to produce artisanal objects because they do not "get worms". They avoid cutting during the "light" phase, which is considered inappropriate, because they believe that the vine is weak, which could lead to the death of the individuals being managed and interfere with the quality of the material produced, since, for them, the products "get wormy" and do not last very long. Even though vine collection is carried out daily, there is a consensus on the implication of the lunar phases in vine extraction and management, as observed in the excerpts below:

> *If you take the vine [...]. We take it out in the daylight (full moon), but it is not okay because the vine breaks and rots. It is like the wood in a house, if you take it out in the daylight (full moon), the wood gets all wormy. That is how it is with the vine. If you take the vine out in the daylight, even when we are putting the basket away, the basket gets wormy. It goes around once and the vine breaks. It goes around again and the vine breaks. It does not get wormy in the dark (new moon)* (Mrs N., 62 y.o.).

> *It is because there is a time when the vine is good to remove. We remove it, but it is not good to remove it, so it gets all weedy. There is a time when the moon is waning. The vine does not get weedy much in the dark when the moon is dark and heading towards full. When it is dark, then that vine does not get weedy like that. In the new and waning moons, the vine gets weedy a lot* (Mrs M., 67 y.o.).

The influence of the Moon in determining the most suitable time for collection is corroborated in the study developed by Valente (2009), as residents said that the Waxing Moon is considered the best time for cutting, while during the Waning Moon period they generally avoid collection because they believe that the vine will take a long time to regenerate. Knowledge about lunar phases and their influence on crops has been recorded since ancient times, and their contribution continues to be significant in determining planting and harvesting patterns in many cultural traditions (MENIN *et al*., 2014; CREPALDE; CARVALHO, 2021).

For 88% of those interviewed, the best time to collect is summer due to the more favorable conditions for accessing forest areas, although 6% of collectors said they collect vines all year round. The increase in extractive activity occurs in the months of June (June festivals), November and December (Christmas and New Year) due to market demand for manufactured products. Another important factor is the relationship between floristic composition and temporal availability of resources, which is important for understanding the dynamics of

resource use. In dry forests, part of the species is annual, being available only during certain seasons (SHARMA; SHARMA, 1997; ALBUQUERQUE, 2005).

This illustrates how seasonal and cultural factors intertwine and shape consumer preferences, demonstrating the utilitarian versatility of objects for storing fruit, such as baskets, or decorative (rustic) value, such as mandalas, chandeliers, and tulips (GUADAGNIN; GRAVATO, 2013). There are also pieces that perform both functions at the same time, such as trays, wastebaskets, baskets, plate and pan rests, becoming more attractive and desirable during certain times of the year (FLORES; LIMA, 2013; VALENTE; NEGRELLE, 2013; RAMOS *et al*., 2017).

Regarding beliefs associating the supernatural with the practice of extracting vines, 73% of those interviewed believe in the existence of Caipora, while 27% of them do not believe or have never heard of such an entity. The relationship with Caipora is independent of religion, even though most residents are evangelical. Belief in this entity is deeply rooted in popular culture and tends to shape the behavior and perception of artisans in relation to the ways in which they interact with the environment and resources (AGUIAR *et al*., 2023). Most of the time, they make offerings, perform blessings, and use garlic before entering the forests so that the collection of vines occurs without problems. For them, Caipora tends to punish or play some kind of "trick". One of the interviewees described Caipora as a "little bird" that has magical powers to deceive people. Another supernatural entity mentioned was the Zombie, which can hinder people while removing vines.

> *This scum has caught me twice in about twenty years. Me, well, about eight people, all of us with a circle of vines on our heads. You are in the middle of the path, but you do not know where you are. The path is here. The elders say that you have to take your clothes or shoes and wear them inside out. Caipora takes a toll on the person who spends the whole day lost, even the vine gets lost. The Caipora is a little bird this size [...] like a sparrow. It flies from one corner, flies from another. When we are like this, we need to bless ourselves. The Caipora is a little red bird, now it looks like a sparrow. When it is not like this, it is Zumbi who starts whistling. Sometimes I even see him whistling at night around here. I see him whistling too much, we say: 'Go baptize yourself, go baptize yourself!'. Say it three times, then he shuts up, stays quiet* (Mrs M., 67 y.o.).

> *The Caipora really gets in the way. The thing is walking along the path [...] here, the path is here, and we are disturbed, varied and keep throwing it this way. Then, instead of going to the side of the path, the path closes, and we go deeper into the woods. I like to go out with a clove of garlic or then I take my shirt and put it inside out. When I finish, I stay like that for about ten minutes, then I go out this way, then when I think I will not, then I find the path. Because it makes you dizzy. I will tell you, there are times when it seems like it already marks someone to bother* (Mrs A., 70 y.o.).

These findings are consistent with those found by Aguiar *et al*. (2023) with groups of hunters, gatherers and extractivists in the Serra da Jiboia region (Recôncavo Sul in the state of Bahia). These authors express a strong relationship between widespread belief in Caipora and other nature entities within a symbolic context and how they influence people's perception and behavior regarding biodiversity conservation (COSTA NETO; LINS, 2022). Such supernatural beings manifest themselves in diverse ways, transforming into an animal or assuming a human

appearance. They are perceived as apparitions (visions, figures) or vocal expressions, such as screams and whistles, or both at the same time (COSTA NETO *et al*., 2023). This notion leads many people to respect the forest and, consequently, its resources, which contributes to the formation of sustainable extractivist values and practices (ZENT; ZENT, 2022). Furthermore, these beliefs become relevant for the continuity of the intangible cultural heritage of communities, which should not be disregarded (CAMARGO, 2022).

Processing and trade of vines

The cleaning process begins in the forest, at the same time as the vine is cut (removed from the leaves). When the collectors return home, the process continues with the cleaning of the "tombos"[10] to make the material uniform, separating it by the size of the threads. The material is kept in a shaded place to prevent it from drying out. Only 3% of the collectors said they peel the vine, such as the **cipó-imbé** (Araceae).

Approximately 91% of those interviewed use only vine, while 9% incorporate other plants, such as palm oil fibers (*Elaeis guineensis* Jacq., Arecaceae), as complements in crafting objects. This is the only non-native species in the entire production chain, but one with great significance, as *Elaeis guineensis* is a species that represents Afro-Brazilian culture, originating from centuries of resistance by the Afro-descendant population (BOMFIM *et al*., 2024). This reflects the knowledge and creativity artisans possess in combining and transforming natural resources into useful crafts. The integration of vines with other natural materials, like palm oil fiber, as well as industrial materials such as ropes, nails, and nylon, to create a variety of artisanal products has also been observed among artisans in the Mamanguape River region of Paraíba (RIUL, 2015).

Weaving is considered a simple activity, but it requires skill and creativity from the artisans. Although the pieces are made using the same weaving technique, in some cases, depending on the object, the degree of complexity increases, as is the case with "caçuá", which requires greater skill from the artisans and, for this reason, not everyone is willing to make it.

To make and assemble the pieces, the artisans use only a knife as a tool, a piece of wood to adjust the threads and their hands to cut, finish and weave. Generally, the vine fibers go through a selection process and are cut according to the size of the pieces to be produced; these pieces are called "vine legs" and will form the main base of everyday utensils, both from a functional and purely aesthetic point of view, or with both functions at the same time, such as basket (utilitarian), trash can (aesthetic and utilitarian), and bottles or mandalas (decorative) (FERREIRA; BENTES-GAMA, 2005).

The initial assembly stage involves intertwining the "vine legs" to form the structural base of the object, followed by the insertion of vine fibers to form the product. However, the product can be manufactured using a single type of vine or several species combined into a single piece. In some cases, the fibers need to be peeled, but this is not very common. In general, the finishing process does not require the addition of industrial products, such as paint or varnish.

[10] These are the knots of the vines, that is, the irregular, prominent parts of the vine (SCIPIONI *et al*., 2012).

This same pattern of making vine-based crafts was recorded by Riul (2015), reflecting the resilience of the techniques used by ancestors and the appreciation of knowledge that passes through generations, which is maintained in some traditional cultures.

Some artisans invest time in creating unique pieces, because although innovation is not widely disseminated, it can be an increase in the appreciation of the craft and strengthening of tradition, in addition to adding value to the production chain. Among the diversity of items produced, the following stand out: trays and trash cans (68%), baskets and lamps (66%), hampers and mandalas (63%), bottles (58%), mussuás (50%), tulips (32%), hats (29%), and chicken coop ties (18%) (see Table 1).

Marketing in the Mangalô community is carried out exclusively in the form of handicrafts, unlike other traditional communities where the sale of vines occurs both in their raw form, as is the case for *Philodendron corcovadense* and *Heteropsis flexuosa*, and in the form of manufactured pieces (VALENTE, 2009; VIEIRA, 2011; SOARES *et al*., 2024).

Handcrafted products are sold on demand in several nearby municipalities (Pedrão, Berimbau, and Irará). However, most of the production is sold to middlemen at very low prices to supply the handicraft trade in the city of Feira de Santana, where the items are resold at inflated prices to the final consumer. This situation has led to a devaluation of the products, with most of the profit going to the middlemen. This dynamic is common in artisan communities (NOGUEIRA *et al*., 2006; RIUL, 2015; RAMOS *et al*., 2017; SOARES *et al*., 2024).

Despite the existence of a community association, the economy surrounding handicrafts reflects a lack of organization in establishing prices for products, leaving it up to each artisan to set their own prices. This results in price variations for the same item, creating competition among artisans and preventing fair financial returns. Therefore, greater collaborative investment in the local economy is needed to promote actions that lead to price standardization and avoid the concentration of profits in the hands of middlemen (VALENTE, 2009; VIEIRA, 2011; RAMOS *et al*., 2017; SOARES *et al*., 2024).

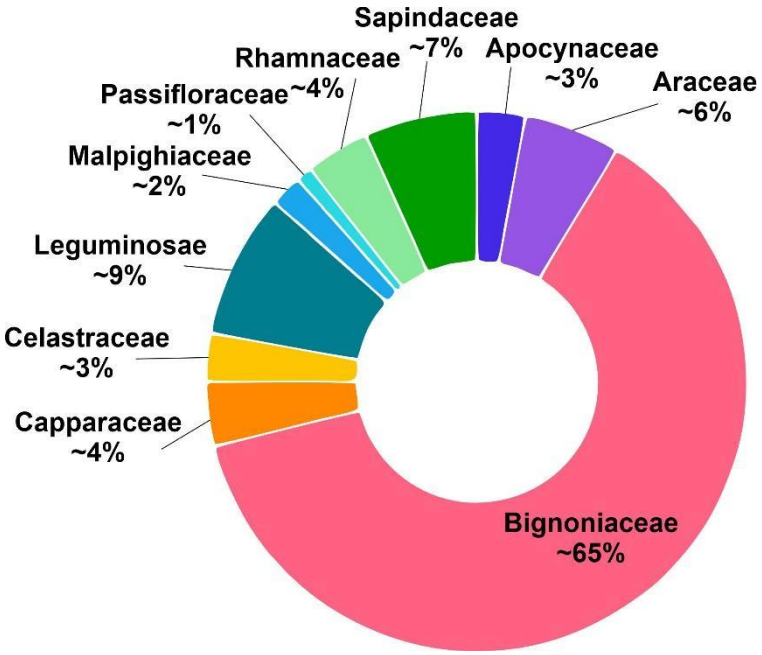
The tradition of liana extraction presents various challenges that span the stages of collection, production, and commercialization. Artisans from the Raiz do Engenho do Mangalô community consider it a labor-intensive activity due to difficulties related to the areas accessed, which are often distant, and the lack of adequate personal protective equipment to guard against bites from venomous animals such as snakes, spiders, and scorpions. The absence of suitable means for transporting the collected material has posed a significant challenge, as the community lacks vehicles for this purpose, forcing artisans to carry the material on their shoulders or rely on alternatives like using donkeys or renting cars and motorcycles to transport the raw materials. This situation not only overloads the artisans but often limits their ability to collect the necessary quantity to meet daily demand.

Moreover, the lack of community organization and infrastructure, such as a storage and weaving shed, often results in the loss of collected material due to exposure to weather conditions (sun and rain) that can dry out or rot the material, affecting the quality of the produced items (NOGUEIRA *et al*., 2016).

Resource use and collection implications

Bignoniaceae stands out by presenting the highest number of species usage citations (n = 163), giving this family relative importance of 64.68%. It is followed by Leguminosae, which has a relative importance of 9.52% (24 citations), and Sapindaceae with 6.74% (24 citations). In contrast, other botanical families exhibited lower relative importance: Araceae (5.95%), Capparaceae and Rhamnaceae (3.17% each), Apocynaceae and Celastraceae (1.98% each), Malpighiaceae (1.58%), and Passifloraceae (1.19%) (Figure 3).

Figure 3 – Relative importance of use of the main botanical families found.



Although extraction in the Raiz do Engenho do Mangalô community is practiced opportunistically and randomly, the greater exploitation of Bignoniaceae likely occurs because it is a group that is more easily noticed in the accessed areas due to its morphology and high abundance of liana species (FLORA E FUNGA DO BRASIL, 2024), including dry forests. Additionally, it is possible that artisans collect vines based on both abundance and their preference for using a particular species within the same botanical family. *Adenocalymma* cf. *marginatum*, known locally as **cipó-branco**, was the species with the highest prevalence in terms of relative importance and usage (28 citations), followed by *Anemopaegma hilarianum* (18 citations), *Anemopaegma laeve* (17 citations), and *Fridericia pubescens* (15 citations). These species represent 17.17%, 11.04%, 10.4%, and 9.2% of the relative importance of use, respectively.

The predominance of Bignoniaceae can be justified by their generalist habit, which allows their representatives to occupy more diverse forest ecosystems, particularly in tropical and subtropical regions where they exhibit greater richness and diversity (GENTRY, 1992; SOUZA *et al*., 2010; PUTZ, 2011). On the other hand, this occupation may be related to the high ontogenetic capacity of Bignoniaceae to respond effectively to environmental changes

through various strategies, making them diverse and easily recognized taxonomically (ROSSATTO; KOLB, 2011; ROWE, 2018).

Among the Leguminosae, the species *Cratylia hypargyrea*, known as **cipó-amarelinho**, stands out with 62.5% of the importance of use and 15 citations (Figure 4). The significant agreement on its usage suggests that it is likely an abundant species in the accessed areas, as well as having specific characteristics that attract artisans, such as flexibility, strength, durability, and versatility in the production of artifacts.

Most of the 33 participants do collect more than one type of vine, showing no selectivity in their choice. According to the interviewees, 15 vines are more abundant, with *A. coriaceum* reported by the majority (63%, n = 21). This species accounts for 31.8% of all the vines cited by collectors as the most abundant. It is followed by *A. laeve* and *F. pubescens*, each with 11.5%. Together, these three represent 55% of all citations for the most abundant vines. However, contrary to what was claimed, the extractivists do not collect according to perceived abundance ($p = 0.022$). Examples are *D. unguis-cati* and *A. coriaceum*, which are collected with the same frequency, and together representing 65.6% of the collected species (Figure 5).

These results indicate that extractivists/artisans perceive and identify certain species of vines as "less or more abundant" based on their experience and factors such as accessed areas, duration of stay, collection frequency, and personal preference. This behavioral pattern is concerning because it reflects a situation like that of **cipó-titica** (*Heteropsis flexuosa*), which has experienced intense collection, leading to its overexploitation (SCIPIONI *et al*., 2012). Similarly, the belief that a particular vine is more abundant than others may result in disproportionate collection of that vine, compromising the stocks of its populations and ultimately leading to a status of vulnerability (PEREIRA *et al*., 2013).

Figure 4 – Percentage of popular agreement and use value by citation frequency of botanical family.

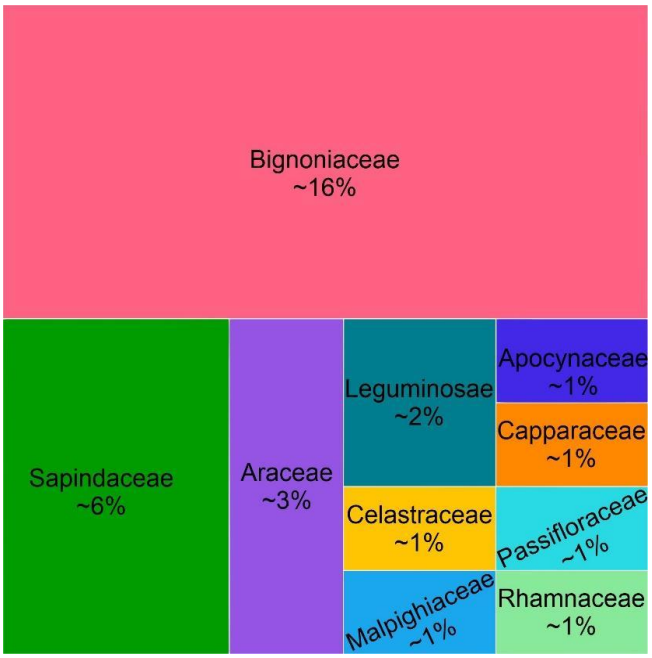
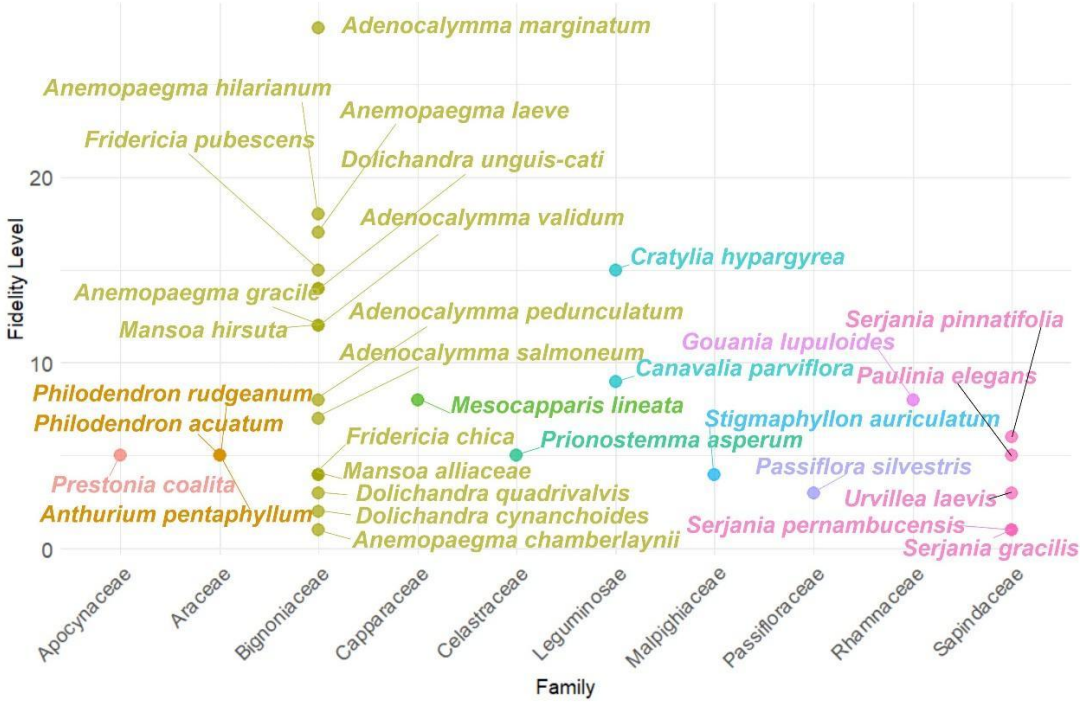


Figure 5 – Relative importance of use by botanical species.



Moreover, the preference for a specific type of liana, combined with the fact that it is exclusively sourced from forested areas, can lead to over-exploitation. This is due to the lack of knowledge among the majority of extractivists and artisans (73%) and the absence of incentive plans aimed at both ex situ and in situ cultivation and management, which may compromise certain liana populations (VALENTE; NEGRELLE 2013; OLIVEIRA, 2021; OLIVEIRA, 2011; BENTES-GAMA, 2005).

The presence of multiple common names for the same species can lead gatherers to over-collect certain species or underestimate the abundance of specific taxa (VENDRUSCOLO *et al*., 2005). This diversity of names assigned to a particular species, or to different species within the same or different families, can confuse botanical identification by researchers, requiring the collection of fertile material, which is not always feasible (SANTOS *et al*., 2014).

Additionally, forest degradation may interfere with the perception of the abundance of plant resources and the frequency of collection (SHANLEY; LUZ, 2003).

CONCLUSION

Lianas are crucial for the quilombola community of Engenho da Raiz do Mangalô, not only for the economic contributions of the pieces produced and sold but also for the continuation of their biocultural tradition, which is deeply connected to these plants.

Among the botanical families, Bignoniaceae emerged as the most representative in terms of relative importance and consensus of popular use (CUP), as well as in the diversity of

useful species for the phytocraft production chain, with *Adenocalymma* cf. *marginatum* being particularly notable.

Although the extraction practices employ techniques that promote the maintenance of liana populations, the management does not occur with the expected frequency, suggesting unsustainable exploitation. Additionally, the lack of planting management, combined with factors such as experience, seasonality, personal preferences, and environmental degradation, can lead to resource depletion and misconceptions about abundance, prompting predatory harvesting practices. However, the species identified in the quilombola community are not listed as threatened.

In the artisan production chain, a lack of community organization and infrastructure was noted, leading to price variations for the same product and resulting in competition among community members and a devaluation of the products. Therefore, the development of government policies in collaboration with the community is essential for sustainable management. This should be complemented by studies focusing on phenology and phytosociology to estimate the richness and abundance of lianas, ensuring sustainability and preventing overexploitation of managed resources. Additionally, incentives are needed to improve infrastructure and community organization in the artisan sector to enhance market value and strengthen local identity and culture.

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