

Management and conservation of natural resources in the recovery of degraded areas through ethnobotany

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ABSTRACT

An ethnobotanical study with an environmental perspective aims to recognize and understand the association between plants and nature for the conservation and recovery of degraded areas. Semistructured interviews were conducted with active members of the União do Vegetal religious community. The participants consider themselves key players in nature conservation and in valuing biological and cultural diversity. In addition, the interviews revealed that the cultivation of sacred plants can be carried out in agroforestry systems and contribute to conservation and recovery through plant management and use practices within a context of ecological self-sustainability, conceiving the sacred in nature itself and the means of connection with the spiritual. The results of the research show that management based on the perspectives of the União do Vegetal community can make a significant contribution to the conservation of natural resources, not only within the institution but also in society.

Keywords: Ayahuasca; Environmental perception; Interview; Sacred plants; União do Vegetal.

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Manejo e conservação de recursos naturais na recuperação de áreas degradadas através da Etnobotânica

RESUMO

O estudo etnobotânico com perspectiva ambiental, busca visar o reconhecimento e entendimento da associação entre planta e natureza para a conservação e recuperação de áreas degradadas. Foram conduzidas entrevistas semiestruturadas com membros ativos da comunidade religiosa União do Vegetal. Os participantes consideram-se atores-chaves para a conservação da natureza e valorização da diversidade biológica e cultural. Além disso, as entrevistas revelaram que o cultivo das plantas sagradas pode ser realizado em sistemas agroflorestais e contribuir para a conservação e recuperação por meio de práticas de manejo e uso das plantas, dentro de um contexto de autossustentabilidade ecológica, concebendo o sagrado na própria natureza e o meio de conexão com o espiritual. Os resultados da pesquisa demonstram que o manejo baseado nas perspectivas da comunidade da União do Vegetal pode contribuir significativamente para a conservação dos recursos naturais, não apenas dentro da instituição, mas também na sociedade como um todo.

Palavras-chave: Ayahuasca; Entrevista; Percepção ambiental; Plantas sagradas; União do Vegetal.

Manejo y conservación de los recursos naturales en la recuperación de áreas degradadas a través de la Etnobotánica

RESUMEN

El estudio etnobotánico con perspectiva ambiental pretende reconocer y comprender la asociación entre plantas y naturaleza para la conservación y recuperación de áreas degradadas. Se realizaron entrevistas semiestructuradas con miembros activos de la comunidad religiosa União do Vegetal. Los participantes se consideran actores claves en la conservación de la naturaleza y la valorización de la diversidad biológica y cultural. Además, las entrevistas revelaron que el cultivo de plantas sagradas puede realizarse en sistemas agroforestales y contribuir a la conservación y recuperación mediante prácticas de manejo y uso de las plantas, en un contexto de autosostenibilidad ecológica, concibiendo lo sagrado en la propia naturaleza y el medio de conexión con lo espiritual. Los resultados de la investigación muestran que la gestión basada en las perspectivas de la comunidad União do Vegetal puede contribuir significativamente a la conservación de los recursos naturales, no sólo dentro de la institución, sino también en la sociedad en su conjunto.

Palabras clave: Ayahuasca; Entrevista; Percepción ambiental; Plantas sagradas; Unión del Vegetal.

INTRODUCTION

Biodiversity is a natural resource of significant importance that provides a wide variety of benefits and ecosystem services to humans and the environment (COSTANZA, et al., 2014). Nature is a gift that comes to serve humanity, and recognizing this is fundamental to strengthening sustainable production chains and promoting human development (MACHADO, 2019). Yet, the excessive and inadequate use of natural resources can and has caused the loss of biodiversity, with impacts all over the world at different scales (Martine and Alves, 2015), affecting not only ecosystems but also people's quality of life (MINAYO and MIRANDA, 2002). Attitudes that make biodiversity conservation a fundamental issue for maintaining ecological balance and environmental sustainability (SANTOS, et al., 2021).

The search for plant resources has been explored by man since he first settled on Earth, and knowledge about plants came from man's need to understand his relationship with plants and how they could benefit him (PASA, et al., 2008). It is important to note that these uses vary according to the culture of each settlement. Ethnobotany originated at the end of the 19th century as a science that combined botany and anthropology, marking its interdisciplinary nature. This nomenclature was coined by the American J.W. Harshberger with the publication in 1896 of the article "The Purposes of Ethnobotany", in which he understood only the use of plants by the man considered "primitive" (ALBUQUERQUE and ANDRADE, 2002). According to Albuquerque and Lucena (2005), ethnobotany arises from the broader field of ethnobiology, which involves the interactions between human beings and their environment's plant, animal, and microbiological components.

Ethnobotany aims to search for knowledge and rescue traditional botanical knowledge related to the use of plant resources, where such knowledge has cooperated in the conservation of natural resources and contributed to the advancement of science (PASA, 2011a). Ethnobotany therefore involves the study of the direct interrelationship of a people, a population, strictly with the flora that surrounds them, including elements such as use, cultivation, and perception (AMOROZO, 2013). Therefore, ethnobotanical research goes beyond botany because by relating local vegetation to people, plants also have cultural and utilitarian value for the population studied (PASA and ÁVILA, 2010).

Ethnobotany seeks to understand the diversity of uses of plants by different societies and bring back traditional knowledge about their properties and different uses (CAMARGO, et al., 2014, DE OLIVEIRA, et al., 2009). The need to plant the species *Banisteriopsis caapi* and *Psychotria viridis* by members of the Centro Espírita Beneficente União do Vegetal (CEBUDV) for the decoction and ritualistic preparation of Hoasca tea has been related to the nonmonetary appreciation of nature. This procedure has taken place through a gradual process of sacralization, which has consequently fostered an environmental ethic and more favorable attitudes toward the environment on the part of the institution's members (LUNA, 1984). In addition to the conservation of their living environment, the procedure has also encouraged the inclusion of agroforestry system practices (Thevenin and Sambuichi, 2020) for these species, with a view to self-sustainable consumption. Based on the recognition that these species need the forest environment for better development, the study seeks to understand the relationships between plants and communities in an urban environment, and we have listed guiding questions to answer the proposed objective: 1) have the members of the União do Vegetal dedicated themselves to the cultivation of these species, looking for ways to promote the recovery of degraded areas; 2) what is the role of ethnobotany in the management and conservation processes in the areas under-recovery?

MATERIALS AND METHODS

Study area

The study was carried out in the Midwest region of Brazil, in the state of Mato Grosso, at the Administrative Unit of the União do Vegetal (UDV), Arvoredo Center, belonging to the 13th Region of the Institution, in the city of Cuiabá, at the geographical coordinates 15°35'46" S and 56°5.48" O. With the inclusion of the other centers in the region, namely, Breuzim, Luz Sublime, Maria Santíssima, Sagrada Família, Santa Luzia and a space for participants from other UDV centers in Brazil to have a broader view and different ethnobotanical perspectives.

Subjects of the research

The sample size was 32 participants. The research subjects met the following inclusion criteria: active CEBUDV members, over 18 years of age, and of both sexes. After being presented with the aim of the research, they freely and spontaneously agreed to take part in the study by signing the Free and Informed Consent Form, which will be kept on file for five years, with the approval of the Ethics Committee for Research with Human Beings (CEP - Saúde) of the Federal University of Mato Grosso (UFMT), Certificate of Submission for Ethical Appraisal (CAAE) No. 03646018.9.0000.8124.

Methodology

Semistructured interviews were conducted, combining structured and open-ended elements. This allows the interviewer to follow a predefined script with key questions while also offering flexibility to explore emerging themes and allowing interviewees to express their opinions and experiences in more detail to investigate the strategies adopted to promote the conservation of forest and environmental resources, as well as the search for self-sustainability, through the implementation of agroforestry systems. To collect the information, we conducted semistructured and open-ended interviews (Minayo and Miranda, 2002) at the institution's Arvoredo Center or the participants' homes. The population sample was diverse in terms of gender, age, schooling, hierarchical level, and length of stay at the institution to avoid bias in the information provided by the study participants. The interview script was divided into two sections. The first part included structured questions about socioeconomic information, name, gender, age, education, marital status, and number of children (Table 1).

Table 1 – Description of demo-sociocultural variables

Variable	Type	Category	Details
Name	-	-	Participant's name
Gender	Categorical - Nominal	Masculine (M)	Gender of the interviewees
		Feminine (F)	
		Prefer not to say	
Age	Categorical - Ordinal	18-20	Age of the respondents
		20-29	
		30-39	

		40-49	
		50-59	
		60-69	
		70-79	
		80-89	
		>90	
Education	Categorical - Ordinal	No formal education	Formal education of the respondents
		Primary	
		High school	
		Technical	
		Undergraduate	
		Specialization	
		Postgraduate	
Marital status	Categorical - Nominal	Single	Marital status of the participants
		Married	
		Common-law marriage	
		Widowed	
Children	Numeric - Discrete	0	Number of children for each interviewee
		1	
		2	
		3	
		4	
		5	
		6	
		7	
		8	
		9	
		10	
Location	Categorical - Nominal	Urban	Participant's place of residence
		Rural	

Source: Authors' collection. 2023.

In addition, questions were asked about the context within the União do Vegetal, such as the center of participation, length of time affiliated with the institution, hierarchical level within the UDV, plants considered sacred, area where the plants are grown and prospects for recovery through plant management (Table 2).

Table 2 –Description of the context variables within the União do Vegetal.

Variable	Type	Category	Details
Affiliate center	Categorical - Nominal	Arvoredo center	Name of the participant's affiliation center
		Breuzim center	
		Luz Sublime center	
		Maria Santíssima center	
		Sagrada Família center	
		Santa Luzia center	
		Another center	
Membership time	Numeric - Discrete	1-5 years	Years of participation within the União do Vegetal center
		6-10 years	
		11-15 years	
		16-20 years	
		21-25 years	
		26-30 years	
		31-35 years	

		35-40 years	
		41-45 years	
		46-50 years	
		> 50 years	
Hierarchical Level	Categorical - Ordinal	Master's degree	Hierarchical level of each interviewee
		Council degree	
		Instructive degree	
		Member's degree	
Sacred Plants	Categorical - Nominal	Yes	-
		No	
Names of Sacred Plants	Qualitative - Open Question	-	Vernacular names of plants considered sacred by the institution
Planting Area	Categorical - Nominal	Open area	Location of planting for the plants considered sacred
		Forested area	
Recovery Perception	Categorical - Nominal	Yes	Participant's management perspective
		Maybe	
		Little	
		No	

Source: Authors' collection. 2023.

For the ethnobotany of management and conservation questions, the interview methodology added an audiovisual recording of the interviewees' narratives, according to the following questions in Table 3.

Table 3 –Interpersonal ethnobotanical perspective variables used in this study.

Variable	Type	Category	Details
What does nature mean to you, especially within the institution of the União do Vegetal?	Qualitative - Open Question	Not Applicable	Ethnobotanical perspective of each participant
Why do you consider these plants sacred among those recognized by this institution?			
Do you believe there are plants with medicinal properties? Can you mention some species?			
What is the need for planting these plants in your opinion?			
What are the guidelines provided by your group for the management of planting areas, both now and in the future?			
How does the agroforestry system contribute to this?			
What have you seen or heard about the area where Arvoredo Center is located and its transformation in terms of vegetation up to now?			

Source: Authors' collection. 2023.

Quantitative analysis

The quantitative analyses included information from the interviews, field notes, images, and voice recordings, organized and recorded in an online Google Forms® form. In addition, we made audiovisual recordings of the participants for tabulation in Microsoft Office Excel software. For data analysis, we applied the statistical index level of fidelity (NF), correction factor (FC), and relative frequency of use of each species mentioned (Pcup%). These indices express the consensus on the uses of forest resources and make it possible to assess the relative importance of each species, according to Friedman et al., (1986), Phillips and Gentry (1993), and Phillips (1996).

The equation for calculating the concordance percentage (CR) is explained as the number of informants who indicated the use of a species divided by the total number of informants. In this case, NF represents the number of pieces of information that indicated the main use, and FSP is the total number of informants who cited the plant for some use.

$$NF = \text{Fid} / \text{Fsp} \times 100$$

The correction factor (CF) is necessary due to the difference in the number of informants who cited uses for each species. The correction factor is calculated by dividing the total number of informants who cited uses for the species by the number of citations of the most frequent species.

- $FC = \text{Fsp} / \text{ICEMC}$

The corrected use concordance index (Pcusp) is used to extract the importance values for the species most cited by the interviewees, calculated by multiplying the use concordance index (NF) by the correction factor (FC). This measure is represented by the following formula:

- $\text{Pcusp} = \text{NF} \times \text{FC}$

We also calculated the frequency of citation (Fid) and relative frequency of citation (RFC) of species use, and N = total number of interviewees who took part in a survey. Following the guidelines presented by Tardio and Pardo-de-Santayana (2008), this measure is represented by the following formula:

- $\text{RFC} = \text{Fid} / \text{N}$

Qualitative analysis

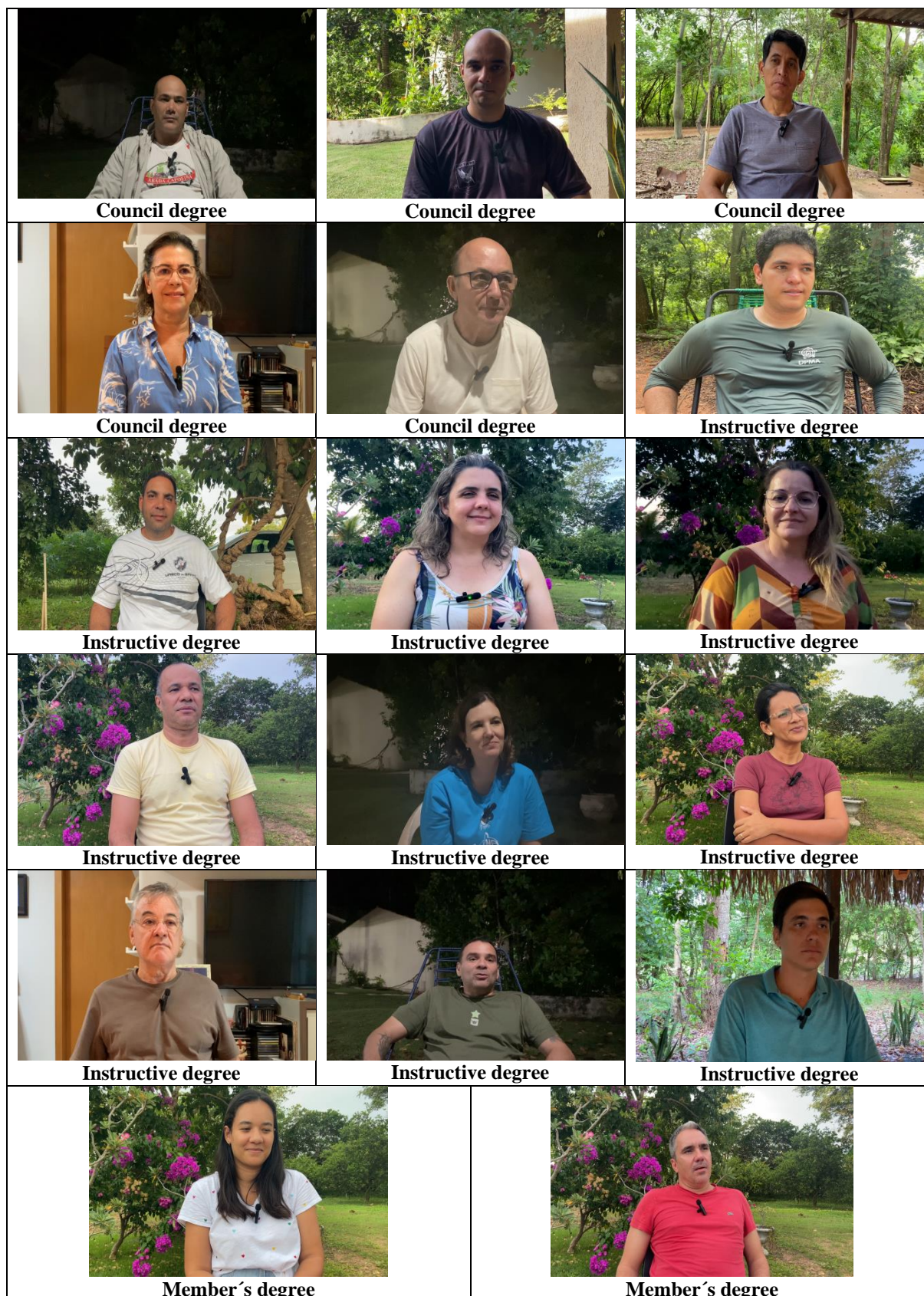
Qualitative research addresses a state of cultural reality that cannot be quantified, as it involves personal meanings, motivations, aspirations, beliefs, values, and attitudes (BRANCO, 2020). For this purpose, the participant's responses were transcribed on the interpersonal perspective variables used in this study for analysis, transcription of the interviews, and generation of the most relevant word cloud in MAXQDA Analytics Pro 2020 software version 20. 3.0 I®, which is a qualitative data analysis software that allows the analysis of data from interviews, observation, and text and can be used to analyze ethnobotanical data collected through interviews or other data collection techniques (LEDA, et al., 2017). In turn, descriptive statistics were used to analyze the informants' socioeconomic data and the relationships between people and plants in their daily lives. In this sense, care was taken to ensure that the interviewees felt comfortable with the researcher and were not interfered with by third parties, which proved to be essential for the quality of the results obtained (CAMPOS, et al., 2006).

RESULTS

A total of thirty-two active CEBUDV members were interviewed, representing a diverse sample in terms of their profiles and roles within the institution. Table 4 shows the photographic record of the participants interviewed, together with their hierarchical position within the UDV, reflecting the diversity of roles played by members within the UDV.

Table 4 –Interpersonal ethnobotanical perspective variables used in this study.

 Master's degree	 Master's degree	 Master's degree
 Master's degree	 Master's degree	 Master's degree
 Master's degree	 Master's degree	 Master's degree
 Master's degree	 Council degree	 Council degree
 Council degree	 Council degree	 Council degree



Source: Authors' collection. 2023.

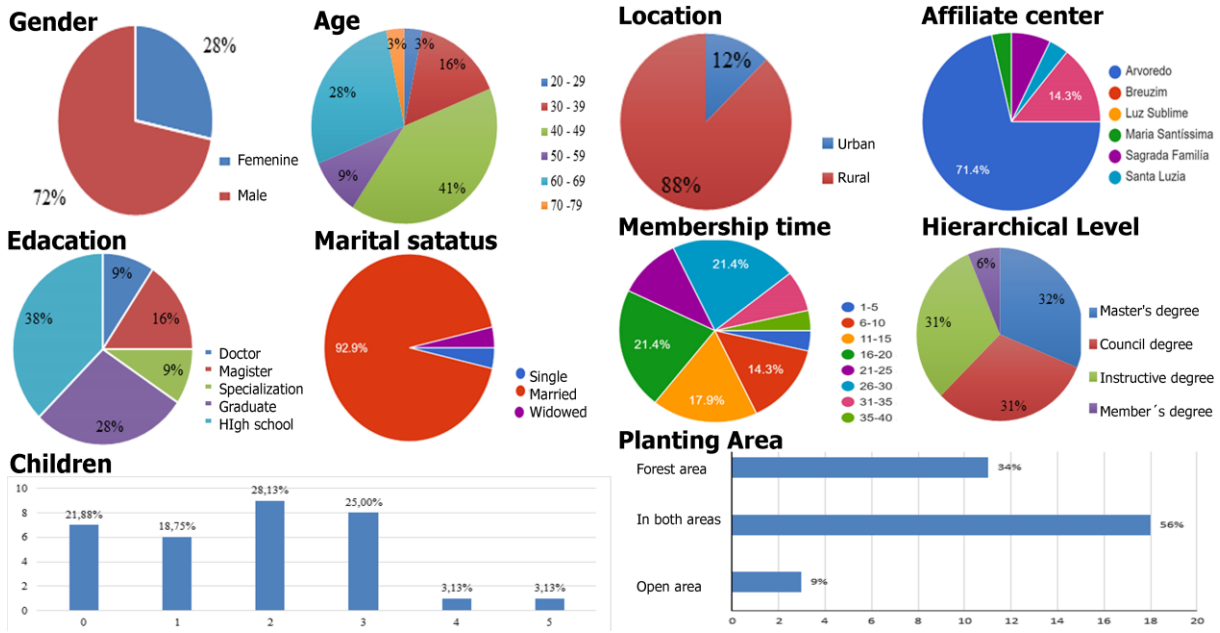
Demosociocultural variables

In absolute terms, the number of male participants is higher than the number of female participants. Thus, approximately 72% of the participants were male, and approximately 28% were female. Analysis of the age range of the participants revealed a heterogeneous distribution in terms of the age of each of the participants, with the largest proportion of those interviewed being in the 40-49 age range, representing 41% of the total. This was followed by the 60 to 69 age group with 28% of participants. The other age groups had lower proportions, ranging from 3% to 16%. We observed that most participants had a high school degree (38%) or a graduate degree (28%), while the levels of specialization (9%), master's degree (16%) and doctorate (9%) had lower proportions. Regarding the participants' marital profile, we found that most participants were married, representing approximately 94% of the total. On the other hand, only one participant was divorced (3%), and another was single (3%). The distribution shows that there is diversity in the number of children among the participants, but the majority are concentrated in the lower categories (none, 1, 2, and 3 children). We observed that many participants lived in urban areas, representing approximately 87.5% of the total. On the other hand, fewer participants lived in rural areas, representing approximately 12.5% of the total (Figure 1).

Context variables within the União do Vegetal

Regarding the center to which they belong, most participants are affiliated with the Arvoredo Center, with a total of 24 individuals. In addition, we identified participants affiliated with Maria Santíssima (1), Sagrada Família (2), Santa Luzia (1), and others, such as side geral located in Brasília and Fortaleza do Mestre located in Fortaleza Ceará, Florestal in Alta Floresta, Mato Grosso. Most participants (37.5%) had a membership of between 26 and 30 years, followed by 25% of participants with a membership of between 16 and 20 years. The other intervals of membership time have smaller representations, ranging from 3.13% to 16.67%. Members with a longer membership may have greater involvement and knowledge about the management and conservation practices adopted within the União do Vegetal, while those with more recent memberships may be in the process of learning and engaging. This equal distribution between the different hierarchical bodies indicates that the research participants participate in various roles and responsibilities within the União do Vegetal. The Master's degree, the Council degree, and the Instructive degree have the same number of participants, while the Member Body represents a smaller proportion. Our results may suggest that the participants have active and diverse participation within the organization, contributing both in terms of decision-making (Council Body) and guidance and instruction (Teaching Body) and reaching a higher level of knowledge and experience (Master Board) (Figure 1). All the participants (100%) stated that there are plants that are considered sacred within the União do Vegetal. This result suggests a strong relationship between the institution and the recognition of certain plants as sacred. The appreciation and respect for these plants may be rooted in the philosophy and beliefs of the União do Vegetal, reflecting a deep connection between the members and the natural world.

Figure 1 – Demo-sociocultural and context variables within the União do Vegetal



Source: Authors' collection. 2023.

Ethnobotanical variables from an interpersonal perspective

Through this analysis in MAXQDA Analytics Pro, we can see the wealth of themes and concepts addressed during the survey, emphasizing the interconnection between spirituality, nature conservation, the proper management of sacred plants, and the promotion of socioenvironmental well-being. All the participants mentioned the two predominant species of the research as sacred plants, these being Mariri and Chacrona, respectively *Banisteriopsis caapi* (Spruce ex Griseb.) Morton. and *Psychotria viridis* Ruiz e Pav. (Figure 2).

The importance for each participant is expressed through the speech of the informants below:

"... The institution I follow, the União do Vegetal, recognizes the sacred in nature, so all the plants that make up nature are considered sacred plants."

Participant of the Council degree (age 45).

"... We have Mariri and Chacrona, used for spiritual purposes, and other plants for healing the body."

Participant of the master's degree (age 65).

The majority of participants (56%) mentioned that plants are grown in both open and forested areas. A further 34% of participants said that cultivation takes place exclusively in forested areas, while only 9% mentioned cultivation in open areas. Based on the participants' responses, all of them said that there is recovery within the areas through the management and use of sacred plants.

"... There is certainly a recovery effort, and it is visible."

Participant in the Council degree (age 55).

"... Yes, there is a natural regeneration of our Cerrado".

Participant Instructional degree (age 44).

"... Because through the teachings of unity that we learn here, through these plants, it facilitates our understanding of the spiritual world, which brings us closer to God."
Participant of the master's degree (age 65).

"... Because when we come into contact with them, we feel the presence of God. The first time I saw the vegetable, I had what we call "borracheira" in our religion. In addition, I said that I felt a peace. Like I'd never felt in my life, that thing, it was a fantastic experience".
Participant of the Council degree (age 62).

"... Because they are teaching plants, they allow us to access ancestral archives that are recorded in the very book of nature as a whole."
Participant of the master's degree (age 46).

"... It is because we use them to perform a sacred ritual of ours, we drink the tea made from these plants. In addition, we examine the effect of mental concentration. In addition, for me it is sacred, it is the moment to have a connection with nature itself and the higher. That is why I consider these plants sacred because it allows me to have a deeper access to spirituality."
Participant of the Council degree (age 46).

The participants' accounts emphasize the need to plant and care for sacred plants within União do Vegetal. These plants are considered fundamental for carrying out the rituals and spiritual practices of the institution, as well as for the process of spiritual evolution of the members. In addition, they emphasize the importance of planting as a commitment and responsibility to meet the needs of members who do not have access to these plants in the other center.

"... Need is the main thing for our institution for us, so these plants, we need them, because without them, basically our religion is not. It does not materialize. It does not materialize. So the importance for me is always to plant more, always to have more, always to be able to take care of and help the brothers."
Participant Instructional degree (age 40).

"... Well, first of all, we depend on them. For us to be able to do our rituals, we need these Mariri and Chacrona plants. In addition, we here also have this commitment and this responsibility to plant to help our brothers and sisters who do not live in places where they can plant".
Participant of the Council degree (age 62).

In addition, the care and planting of sacred plants is also seen as a way of preserving and passing on the traditional knowledge associated with these plants.

"... Planting care is the continuity of the União do Vegetal for future generations."
Participant Instructional degree (age 38).

Do total de 32 espécies florestais, an importância relativa para o concessão de usos acima de 50% foi expressiva para duas espécies (Chacrona e Mariri), que obtiveram 100% para a categoria de uso exclusivamente mística religiosa. Outras espécies, como *Protium heptaphyllum* (Breuzinho), *Piper aleyreanum* (João Brandinho) e *Ficus insipida* (Apuí), também foram citadas pelos adeptos desta religião. Essas espécies apresentaram um índice de concordância de uso variando entre 38% e 50%, e uma frequência relativa de citação entre 6,01% e 10,94%. (Tabela 4).

Table 14. Statistical index of informant consensus for the species under study 2023.

#	Family	Scientific name	Common name	Fsp	Fid	NF	FC	Pcusp %
1	Malpighiaceae	<i>Banisteriopsis caapi</i> (Spruce ex Griseb.) Morton.	Mariri	32	32	100	1,00	100,00
2	Rubiaceae	<i>Psychotria viridis</i> Ruiz e Pav.	Chacrona	32	32	100	1,00	100,00
3	Burseraceae	<i>Protium heptaphyllum</i> (Aubl.) Marchand	Breuzinho	14	7	50	0,44	21,88
4	Piperaceae	<i>Piper aleyreanum</i> C.DC.	João Brandinho	13	7	54	0,41	21,88
5	Moraceae	<i>Ficus insipida</i> Willd.	Apuí	13	5	38	0,41	15,63
6	Malvaceae	<i>Ceiba pentandra</i> (L.) Gaertn.	Samaúma	10	5	50	0,31	15,63
7	Fabaceae	<i>Amburana cearensis</i> (Allemão) A.C.Sm.	Imburana de cheiro	10	5	50	0,31	15,63
8	Rubiaceae	<i>Calycophyllum spruceanum</i> (Benth.) K.Schum.	Mulateiro	10	4	40	0,31	12,50
9	Apocynaceae	<i>Aspidosderma carapanauba</i> Pichon	Carapanaúba	10	3	30	0,31	9,38
10	Bignoniaceae	<i>Handroanthus impetiginosus</i> Mart. ex DC.) Mattos	Pau d'Arco	8	3	38	0,25	9,38
11	Lecythidaceae	<i>Bertholletia excelsa</i> Bonpl.	Castanheira	8	2	25	0,25	6,25
12	Anacardiaceae	<i>Anacardium occidentale</i> L.	Cajueiro	6	2	33	0,19	6,25
13	Sapotaceae	<i>Manilkara huberi</i> (Ducke) A.Chev.	Maçaranduba	6	2	33	0,19	6,25
14	Fabaceae	<i>Copaifera langsdorffii</i> Desf.	Copaíba	5	2	40	0,16	6,25
15	Fabaceae	<i>Hymenaea courbaril</i> L.	Jatobá	3	2	67	0,09	6,25
16	Lamiaceae	<i>Mentha spicata</i> L.	Hortelã	3	1	33	0,09	3,13
17	Lamiaceae	<i>Peumus boldus</i> (Molina) Looser	Bóldo	3	1	33	0,09	3,13
18	Lamiaceae	<i>Melissa officinalis</i> L.	Cidreira	3	1	33	0,09	3,13
19	Rutaceae	<i>Citrus × sinensis</i>	Laranja	2	1	50	0,06	3,13
20	Asteraceae	<i>Solidago chilensis</i> Meyen	Arnica	1	1	100	0,03	3,13
21	Adoxaceae	<i>Sambucus nigra</i> L.	Sabugueiro branco	1	1	100	0,03	3,13
22	Rutaceae	<i>Ruta graveolens</i> L.	Arruda	1	1	100	0,03	3,13
23	Lauraceae	<i>Cinnamomum verum</i> J.Presl	Canela	1	1	100	0,03	3,13
24	Urticaceae	<i>Cecropia</i> Spp. Loefl.	Embaúba	1	1	100	0,03	3,13
25	Arecaceae	<i>Copernicia prunifera</i> (Mill.) H.E.Moore	Carnaúba	1	1	100	0,03	3,13
26	Rubiaceae	<i>Cinchona amazonica</i> Standl.	Quina	1	1	100	0,03	3,13
27	Fabaceae	<i>Pterodon emarginatus</i> Vogel	Sucupira	1	1	100	0,03	3,13
28	Fabaceae	<i>Stryphnodendron adstringens</i> (Mart.) Coville	Barbatimão	1	1	100	0,03	3,13
29	Rutaceae	<i>Citrus limon</i> Osbeck	Limão	1	1	100	0,03	3,13
30	Liliaceae	<i>Allium sativum</i> L.	Alho	1	1	100	0,03	3,13
31	Amaranthaceae	<i>Beta vulgaris</i> L.	Beterraba	1	1	100	0,03	3,13
32	Musaceae	<i>Musa</i> Spp. L.	Banana	1	1	100	0,03	3,13

Note: Fid = (citation frequency), Fsp = (total citation frequency), NF = (usage concordance index), FC = (correction factor), Pcusp = (corrected usage concordance index).

Source: Authors' collection. 2023.

The guidelines given by the members of the União do Vegetal (UDV) community for the management of planting areas aim to guarantee self-sufficiency, environmental conservation, the preservation of plant genetics, and the expansion of spiritual awareness. These guidelines are fundamental to promoting the sustainable cultivation and appreciation of sacred plants, both for the present and for future generations.

"... Planting what we consume and developing a forest so that it provides the conditions for the plants to grow. Preserving the genetic database of these plants. This guideline is very important for us to have these sacred plants, for us, and future generations."

Participant of the Council degree (age 65).

"... Our main guideline today, within the direction of the União do Vegetal, is the formation of agroforestry systems."

Participant of the master's degree (age 63).

"... The União do Vegetal's project is to conserve the environment, especially for planting. The main thing is that it is always done without any kind of external chemical addition. So we do not accept the use of pesticides of any kind; they have to be for planting and conservation. Plant care should be as natural as possible."

Participant of the Council degree (age 48).

Through the implementation of the agroforestry system, the União do Vegetal demonstrates its commitment to seeking sustainable solutions for the recovery and proper management of sacred plants. This approach contributes to the conservation of biodiversity, the restoration of ecosystems, and the promotion of self-sustainability within the institution.

"... The agroforestry system contributes because it establishes a balance within nature. It is a system that is copied from nature itself. We learn about the succession of trees in the environment. In addition, then you see how important it is, to be able to have a balance, with this balance we can have better productivity from nature."

Participant of the master's degree (age 36).

"... We are planting and reproducing as faithfully as possible the way nature itself looks after these plants, in other words, how nature looks after itself, so we are recomposing a system of natural balance in which the plants can grow, can develop. The natural cycle of birth, growth, and decay of these plants allows these other plants to reappear in the same place. So completing a cycle with the resurgence of plants in the natural environment."

Participant of the master's degree (age 65).

The participants' accounts highlight the transformation of the Arvoredo center area over the years and the recovery of the vegetation. Initially, it was described as a degraded area, with little vegetation and soil that was not conducive to the establishment of plants. Today, the area has an abundance of vegetation, including tall trees and a diversity of species. This is an integrating process for all the participants within the center and is strengthened as environmental education processes, which contribute to the recovery of degraded areas.

"... I did not know it at the time, but I heard that it was a very degraded area, with lots of rocks, and the soil was not prepared for the establishment of plants. Then, I heard that the site was reclaimed, and the first plants began to be planted, and today we already have a good number of species in the Arvoredo center area."

Participant Instructional degree (age 41).

"... I see prosperity. Because it used to be an area that was just a grass field. In addition, over the years, precisely because we have the sacred plants, the need for trees from the forest, the area is recovering."

Participant of the master's degree (age 48).

"... From the time I arrived here, the transformation has been very great, when it started, there was nothing, a desert, very bad land, hard land. Today, it is very different, we have even made an agroforest, something I did not believe in, everything that can change, if man wants, nature knows, it can transform the soil like this, in a way that we still have no idea about."

Participant Instructional degree (age 46).

Figure 3 – União do Vegetal



Source: Authors' collection. 2023.

DISCUSSION

Through ethnobotanical knowledge, local knowledge and heritage techniques are expressed, demonstrating a symbolic relationship between human beings and nature (DIEGUES, 2019). The analysis of demo-sociocultural variables provides a comprehensive view of the profile of the participants involved in the research. This diversity can be beneficial, as it brings a variety of knowledge, skills, and points of view to discussions and decision-making related to the conservation of natural resources and recovery of degraded areas. The age of the participants can provide insights into the perspectives and experiences of different age groups about natural resource conservation management and the importance of valuing the traditional wisdom of elders and involving young people in conservation discussions,

recognizing the crucial role that each age group plays in maintaining biodiversity and promoting sustainability (CUNNINGHAM, 1993). On the other hand, the relationship between academic knowledge and traditional knowledge in addressing conservation issues highlights the need to integrate these diverse types of knowledge for effective solutions (PRANCE, 1991).

Our results may suggest that participants have active and diverse participation within the organization, contributing both in terms of decision-making (Council degree) and guidance and instruction (Instructive degree) and reaching a higher level of knowledge and experience (Master Board). Furthermore, the inclusive approach in the União do Vegetal hierarchical structure, with equitable representation in different degrees, suggests participatory governance, in which all members can contribute to environmental management practices. These participatory approaches promote collective decision-making, the sharing of traditional knowledge, and the strengthening of community relations (GOULART, 2004).

The perception of sacred plants within the União do Vegetal is consistent with studies that highlight the importance of plants in religious and spiritual practices, where certain species are considered sacred and have symbolic significance (MCKENNA, et al., 1984, 1998). Several studies mention Mariri and Chacrona as plants that are native to the Amazon rainforest and have been used for centuries by indigenous peoples in traditional practices, including religious rituals and sacred ceremonies (NEVES, 2017). In the context of the União do Vegetal, these plants play a central role in spiritual practices and are valued as elements of connection with the divine and expansion of consciousness (Durkheim, 1989), which falls in line with the participants' reports.

The application of the level of fidelity method made it possible to identify the most relevant plants within the context of the União do Vegetal. This method combines the frequency of citation with the degree of agreement between informants, providing a comprehensive measure of the value and importance of plants to this community. Asteraceae is one of the largest angiosperm families and is widely distributed throughout the world. It is very well represented in Brazil, especially in open environments such as the Cerrado (HATTORI and NAKAJIMA 2008; SOUZA, et al., 2018). Lamiaceae is present in all Brazilian biomes (LEWIS, et al., 2005; SOUZA, et al., 2018). Both botanical families have extraordinary medicinal and gastronomic potential, as they are widely used in traditional rural or urban communities due to the cultural trajectory of occupation between the Old and New Worlds. It is interesting to note that several of the species mentioned belong to the Fabaceae family, such as *Amburana cearensis* (imburana-de-cheiro), *Calycophyllum spruceanum* (mulateiro) and *Hymenaea courbaril* (jatobá). This family is known for its diversity of species with medicinal and ritual properties, highlighting its importance in traditional culture (SILVA, 2009).

The perception of sacred plants as facilitators of understanding the spiritual world and closeness to God is in line with spiritual and shamanic approaches found in various traditions around the world. In many cultures, certain plants are considered sacred due to their

psychoactive properties, which are used in religious rituals to induce altered states of consciousness and promote experiences of spiritual transcendence (SCHULTES and HOFFMANN, 1980, SANGIRARD, 1989). These experiences with plants are often described as mystical or sacred, involving a sense of unity with the cosmos or a divine presence (NEVES, 2017). In addition, the care and planting of sacred plants is also seen as a way of preserving and passing on the traditional knowledge associated with these plants. Maintaining these cultural and spiritual practices is essential for preserving the cultural identity of communities and strengthening ties between generations (CARLESSI, 2015). These perceptions are in line with studies and reflections on the relationship between nature and spirituality. Various religious and spiritual traditions around the world recognize the importance of nature to connect with the divine and as a tangible expression of God's presence (OLIVEIRA, 2011). This referential view of nature can lead to a greater appreciation and care for the environment.

The agroforestry system is described as a way of avoiding degradation and promoting plant care, reproducing the natural balance found in nature (LUNDGREN, 1982). The participants in our research emphasize that the agroforestry system allows the environment to be restored in the most natural way possible, based on the guidelines developed by Ernst Götsch, whose method of implementation and management is based on the process of natural succession, presenting interesting results about the recovery of degraded areas, the development of sustainable agroforestry production systems, and the revegetation process (GÖTSCH, 1995). Interviewees suggest a preference for reproducing the growing conditions found in the natural habitat of these species to preserve their specific characteristics and properties (LIRA, 2021). In addition, the expansion of plantations under sustainable agriculture principles reflects the strategies adopted by the UDV aimed at material sustainability through the connection with the knowledge of the forest, considered sacred territory, where the spiritual nutrients of good living flourish (MONTELES, 2020).

Ethnobotanical studies have been expressive of sociobiodiversity interactions, which take on scientific relevance because they help visualize the interface between communities and plant genetic resources (PASA, 2020). For Clément (1998), biological diversity is not simply a concept belonging to the natural world but a cultural and social construction where species are objects of knowledge, domestication, and use, a source of inspiration for myths and rituals in traditional or nontraditional societies and, finally, merchandise in modern societies. The species *Banisteriopsis caapi* and *Psychotria viridis* are two plant species commonly used in ritual practices (Labate, 2020), are popularly known as ayahuasca, have been used for centuries in various regions of Latin America (Boschetti, 2019), and have gained increasing prominence as objects of scientific study. In recent years, the use of *Banisteriopsis caapi* and *Psychotria viridis* has attracted growing interest from the scientific community due to their potential therapeutic application in various conditions, such as depression, anxiety, addictions, and emotional trauma (FRECSKA, et al., 2016, RIBA, et al., 2004). In addition to the recognition of these plants about

profound experiences of spiritual connection (Goulart, 2004) and their use in forest conservation practices in fragmented landscapes in Brazil (THEVENIN and PIROLI, 2017).

FINAL CONSIDERATIONS

The União do Vegetal members are dedicated to cultivating *Banisteriopsis caapi* and *Psychotria viridis* plants to promote the recovery of impacted areas, seeking to restore biodiversity and local ecosystems. In this context, ethnobotany plays a significant role in helping to understand the traditional uses of plants and their relationship with culture and spirituality and in providing valuable information for biodiversity conservation. The approach adopted by the UDV, combining ancestral practices and scientific knowledge, demonstrates the importance of establishing a harmonious connection between human beings and nature. These plants play a fundamental role in the culture and traditions of the UDV, which go beyond the ritualistic and spiritual way they are used and achieve objectives for nature conservation from an ethnobotanical perspective. The practices adopted by the CEBUDV community demonstrate an effective commitment to environmental preservation and the recovery of degraded areas. UDV members promote the conservation of forest and environmental resources and seek self-sustainability within their religious worldview. The analysis of the data collected in the interviews revealed the importance of these plants not only within the UDV institution but also for society in general.

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