



Traditional use of medicinal plants from the Caatinga in the treatment of intestinal worms

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ABSTRACT. The Caatinga biome has a flora of extensive economic potential and cultural significance for local communities, which use plant species as therapeutic and health care agents. In particular, intestinal parasites affect a large part of the traditional communities living in this biome. Because of this, many regional plants are used to manage the parasitic infections they cause. This study consists of a bibliographic review aiming to synthesize scientific knowledge on the traditional use of Caatinga plants in the management of intestinal worms, identifying the most promising species and the cultural significance of the medicinal use of plants in the region. A total of 49 species were identified, distributed across 27 families, and those most cited with traditional vermifuge use were Mexican tea (*Chenopodium ambrosioides* L.), purge potato (*Operculina macrocarpa* L.), aloe vera (*Aloe vera* L.), papaya (*Carica papaya* L.), and castor bean (*Ricinus communis* L.). The main parts of the plants used were the leaves, bark, and roots, and the medicinal preparations were mainly teas, decoctions, and infusions derived from plant extracts. The review also highlights the importance of this knowledge as cultural heritage for communities in the region, particularly Indigenous people, quilombolas, and rural families, as well as the significance of public policies for preserving the Caatinga flora.

Keywords: Northeast; ethnopharmacology; parasitosis; medicinal plants; vermifuge.

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Introduction

The Caatinga is a unique and diverse biome found in the Northeastern region of Brazil, characterized by a semi-arid climate with prolonged drought periods and remarkable biodiversity in both flora and fauna. Covering approximately 10% of the national territory, this ecosystem exhibits significant forest richness, with 4,508 plant species identified within this biome. (Brasil, 2016; Silva et al., 2022b). The characteristic climate of the region is favorable to the production of secondary metabolites by local plants, which serve as the active compounds responsible for their medicinal effects (Souza et al., 2020; Almeida & Fernandez, 2024).

Traditional knowledge about medicinal plants found in the Caatinga is part of the local culture and has been passed down through generations. Thanks to this popular knowledge, many scientifically proven therapeutic properties of these plants have been identified (Sá-Filho et al., 2021; Reis et al., 2023). According to Reis et al. (2023), the botanical families most closely associated with medicinal effects in the Caatinga biome are Fabaceae, Lamiaceae, Anacardiaceae, Asteraceae, Euphorbiaceae, and Rutaceae.

Furthermore, one of the main diseases causing high morbidity and mortality in the Caatinga region is intestinal parasitic infections or worms, especially those caused by helminths. Studies indicate that local communities have a higher prevalence of parasitic infections compared to other Brazilian biomes, such as the Amazon and the Atlantic Forest, mainly due to inadequate sanitation and limited access to drinking water in rural areas (Calear et al., 2022; Souza et al., 2023; Silva et al., 2024). This situation is further aggravated by the socioeconomic conditions prevalent in the region, which contribute to the persistence of parasitic infections (Silva et al., 2024). The main worm infestation affecting these populations is schistosomiasis, caused by *Schistosoma mansoni*, which is more intensely transmitted in the Northeast region and accounts for 84.66% of the cases in Brazil between 2012 and 2021 (Brasil, 2024).

Due to the high prevalence of these diseases in the region, the local population uses timber and non-timber forest resources to manage these worm infestations, as these resources represent accessible and culturally

accepted alternatives within these communities (Lima et al., 2016; Santos et al., 2018). Therefore, it is important to conduct research on the ethnobotany of these traditionally used plants, as this information enables the preservation of knowledge about the species used and supports the development of sustainable management methods for producing phytotherapeutics (Reis et al., 2023).

Previous ethnobotanical surveys in the Caatinga biome highlight that the use of medicinal plants is deeply embedded in the cultural heritage of traditional communities, ensuring the transmission of knowledge between generations (Gomes & Bandeira, 2012; Lima et al., 2016; Santos et al., 2018; Magalhães et al., 2022). Albuquerque et al. (2007) emphasize that this relationship between biodiversity and culture makes the region a strategic reservoir of bioactive compounds. Similarly, Almeida et al. (2022) demonstrate that secondary metabolites of Caatinga plants have significant pharmacological potential, reinforcing the importance of documenting and preserving this knowledge.

However, there is a lack of a comprehensive scientific compilations addressing the specificities of the ethnobotany of natural products used by Caatinga populations in the management of worm infestations. Therefore, this study consists of a bibliographic review aiming to synthesize scientific knowledge on the traditional use of Caatinga plants in the management of intestinal worms, identifying the most promising species and the cultural significance of the medicinal use of plants in the region.

Materials and methods

This study is based on a bibliographic review, which involves gathering and synthesizing scientific articles on the use of medicinal plants for managing worm infestations reported in ethnobotanical studies conducted in the Caatinga region. The search was carried out in the SciELO (Scientific Electronic Library Online) and PubMed (Public Medline) databases, using the following descriptors (in Portuguese or English): 'botany', 'ethnobotany', 'medicinal plants', 'caatinga', 'Brazilian northeast', 'northeast of Brazil', combined with the Boolean operators 'AND' and 'OR', in the title or abstract fields. There was no time restriction.

Ethnobotanical studies conducted in the Northeast/Caatinga region that reported the traditional use of plants for treating worms and that included the identification of plant species, plant parts used, and forms of use were included in this review. Review articles, studies conducted outside the region of interest, and those that did not present complete information were excluded. The data were synthesized and tabulated in a table containing information on species, popular name, plant part used, and method of use, using Microsoft Excel software. The data were also presented in graphs for better visualization.

Locations in the Caatinga where traditional plants used against worm infestations are distributed

Ethnobotanical studies of medicinal plants reinforce the importance of traditional knowledge maintained in quilombola, Indigenous and rural communities, such as those presented in this review (Agra et al., 2007; Oliveira et al., 2010; Roque et al., 2010; Silva & Freire, 2010; Marinho et al., 2011; Gomes & Bandeira, 2012; Baptiste et al., 2014; Rodrigues & Andrade, 2014; Pereira et al., 2015; Silva et al., 2015; Silva et al., 2015; Lima et al., 2016; Santos et al., 2018; Magalhães et al., 2022). The rich biodiversity of the Caatinga biome, combined with tradition and empirical practices, highlights the role of these communities in preserving and transmitting knowledge that is often undervalued by public policies and conventional medicine.

The reviewed studies were conducted in communities across all Northeastern states (Figure 1), with the majority located in the states of Bahia and Piauí, each with four studies, followed by Paraíba and Rio Grande do Norte, with three occurrences per state. In particular, the information collected includes knowledge from the Kantaruré Indigenous community and the Casinhas quilombola community in Bahia (Gomes & Bandeira, 2012; Lima et al., 2016; Santos et al., 2018), and the Pau D'Arco quilombola community in Alagoas (Magalhães et al., 2022). Ceará and Alagoas appear next, with two studies each, while Sergipe and Maranhão had a single study each.

The state of Maranhão showed a lower number of studies compared to the other states, which is an unexpected result. Historically, Maranhão has had a significant presence of quilombola and Indigenous communities, which play an essential role in the preservation and transmission of ethnobotanical knowledge. It is estimated that there are 467 certified quilombola communities distributed across 69 municipalities of Maranhão, which represents 31.8% of the state's territory (Varga & Batista, 2016). These populations maintain traditional practices related to the use of medicinal plants and natural resources, contributing to a rich body of knowledge associated with local biodiversity (Varga & Batista, 2016; Mbelebele et al., 2024).

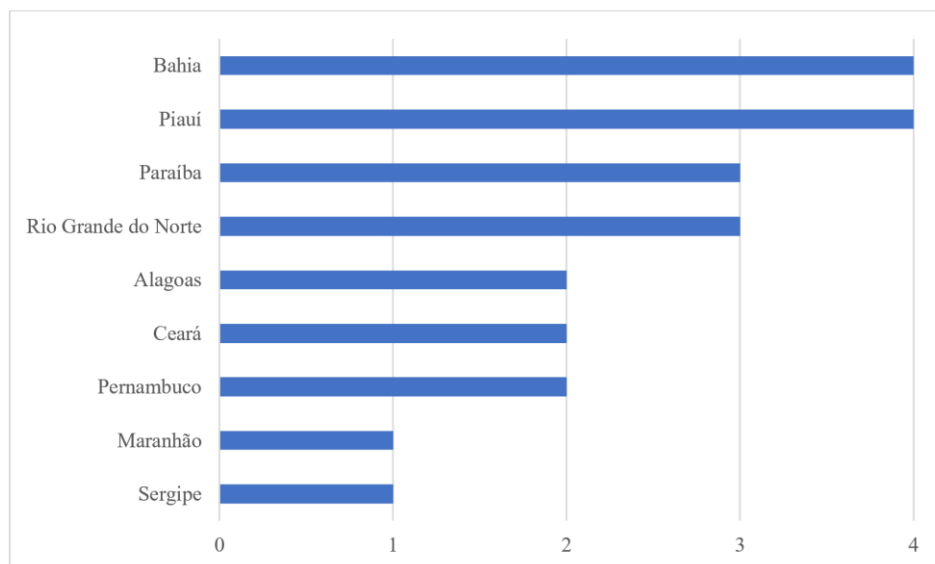


Figure 1. Locations in the Caatinga that presented plants traditionally used against worm infestations.

Prepared by the authors (2025).

In this context, the observed discrepancy may not fully reflect the reality of ethnobotanical knowledge in the state. Factors such as underreporting and limited formal documentation may have influenced these results (Silva et al., 2022a). This scenario highlights a potential methodological gap that could be addressed in future studies.

The Caatinga regions of the Brazilian Northeast share similar climate and soil characteristics, and therefore also share some native and introduced species in the biome, such as Mexican tea, which is traditionally used as a vermifuge in different states and is commonly found in backyards in the region (Agra et al., 2007; Oliveira et al., 2010; Gomes & Bandeira, 2012; Baptistel et al., 2014; Rodrigues & Andrade, 2014; Lima et al., 2016).

The authors report that most of the plants were used for intestinal parasitic conditions, such as worm infestations, due to the high incidence of these diseases, which reflect socioeconomic challenges and inadequate sanitation in these communities (Gomes & Bandeira 2012; Rodrigues & Andrade, 2014; Lima et al., 2016; Santos et al., 2018). Epidemiological data corroborate this report and show a high prevalence of intestinal parasites in the Northeast region (Souza et al., 2023; Santos et al., 2023).

Families and species traditionally used against worm infestations: The reviewed studies demonstrate a great diversity of plants used in the management of worm infestations, in which 49 species were identified distributed in 27 families (Figure 2). The families that had the highest number of species used against worm infestations were Lamiaceae (6 spp.), Euphorbiaceae (5 spp.), and Amaranthaceae (4 spp.). These results differ from the study by Agnes et al. (2023), who identified Fabaceae and Asteraceae as the families most correlated with traditional use as anthelmintics.

The species most correlated with vermifuge action was Mexican tea (*Chenopodium ambrosioides* L.), which was cited in six studies (Agra et al., 2007; Oliveira et al., 2010; Gomes & Bandeira, 2012; Baptistel et al., 2014; Rodrigues & Andrade, 2014; Lima et al., 2016), with the leaves or the whole plant being used as juice, tea, infusion, decoction, or even as juice mixed with milk. Purge potato (*Operculina macrocarpa* L.) and aloe vera (*Aloe vera* L.) were also strongly associated with medicinal use against worm infestations in the Caatinga region (Roque et al., 2010; Silva & Freire, 2010; Oliveira et al., 2010; Gomes & Bandeira, 2012; Baptistel et al., 2014; Silva et al., 2015; Lima et al., 2016; Santos et al., 2018). In addition, papaya (*Carica papaya* L.) and castor bean (*Ricinus communis* L.) were cited in three studies.

In the ethnobotanical review by Agnes et al. (2023), Mexican tea was also the most reported species, highlighting the influence of African and European cultures on the tradition of Brazilian folk medicine, as this plant is exotic to Brazil. Aloe vera, papaya, and the castor oil plant, which are widely used as medicinal plants, are also exotic. Studies conducted in other Brazilian biomes likewise report a high number of exotic species being traditionally used by local communities because they are easily found in home gardens and markets (Gross et al., 2019).

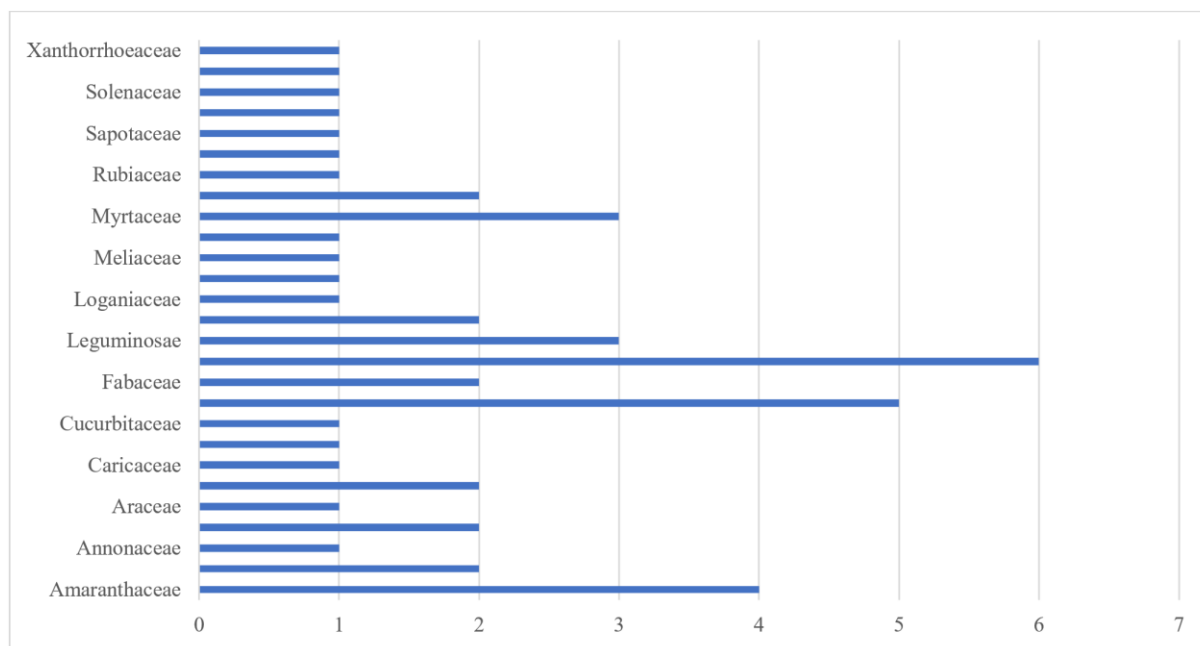


Figure 2. Plant families traditionally used against helminthiasis.

Prepared by the authors (2025).

Purge potato is a native plant of Brazil that is very common in the Northeast region and is one of the plants most traditionally used against worms in the region. This shows that native species are also widely used and have great cultural significance, as they are used especially by more traditional communities, such as quilombolas and Indigenous peoples, who have knowledge and use plant resources for their care and healing practices (Roque et al., 2010; Silva & Freire, 2010; Gomes & Bandeira, 2012; Baptistel et al., 2014; Silva et al., 2015; Lima et al., 2016; Santos et al., 2018).

Other species reported with vermifuge action were Cashew tree (*Anacardium occidentale* L.), Brazilian pepper tree (*Myracrodruon urundeuva*), araticum (*Annona gabral.*), velaminho (*Croton tenuifolius* Pax & K. Hoffm.), caçatinga (*Croton argyrophyllus* Kunth), abre-caminho (*Centrosema brasilianum* (L.) Benth), mulungu (*Erythrina velutina* Willd.), caçatinga (*Poincianella microphylla* (Mart. ex G. Don) L.P. Queiroz), jatobá-manso (*Hymenaea courbaril* L.), Surinam cherry tree (*Eugenia uniflora* L.), guava tree (*Psidium guajava* L.), quixabeira (*Sideroxylon obtusifolium* (Roem. & Schult.) T.D. Penn.), rosemary (*Lippia thymoides* Mart. & Schauer), and candeia (*Gochnatia oligocephala* (Gardner)).

Most of the plant species used are native to the regions studied, due to their high availability in these communities. According to Santos et al. (2018), this is explained by the hypothesis of utilitarian redundancy, which ensures the permanence of the system and contributes to the conservation of local flora.

Method of use and parts of plants from the Caatinga biome traditionally used in the management of worm infestations

As observed in Figure 3, the most commonly used plant parts among the studied communities were the leaves ($n = 26$), bark ($n = 17$), and roots ($n = 13$). This finding differs from the study by Agnes et al. (2023), which showed that bark is more commonly used in biomes such as the Caatinga due to the low availability of leaves. However, the present study is broader and focuses specifically on the Caatinga biome and therefore may be more representative than the aforementioned study.

Other studies have also shown that leaves, barks, and roots of several plant species are widely used in folk medicine in different regions, as they possess a variety of bioactive compounds and pharmacological properties that justify their traditional use (Tamta et al., 2021; Manville et al., 2022; Nyirenda & Chipuwa, 2024). Furthermore, healing preparations also made use of flowers ($n = 11$), fruit ($n = 9$), seeds ($n = 7$), and latex ($n = 3$).

Several preparation methods have been identified for the use of these plant resources, with emphasis on tea, decoction, and infusion prepared with products extracted from the plants (Figure 4). Maceration and the preparation of juices with natural products were also reported. These data corroborate those of previous ethnobotanical studies, which highlight these forms of use due to their ease of preparation (Agnes et al., 2023; Benyahya et al., 2023; Long et al., 2023).

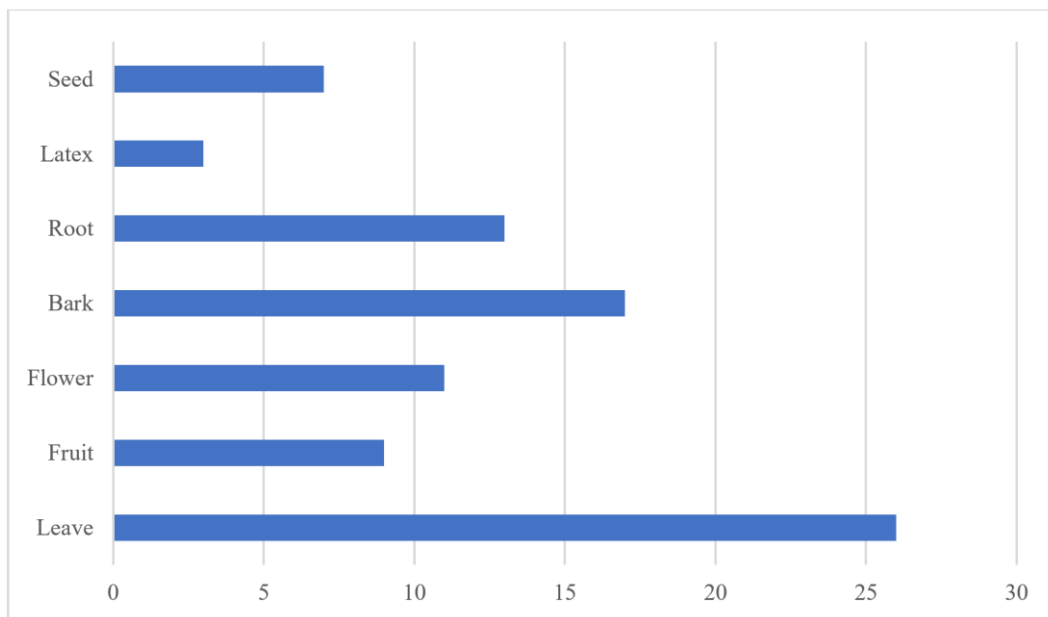


Figure 3. Parts of plants traditionally used in the management of worm infestations.
Prepared by the authors (2024).

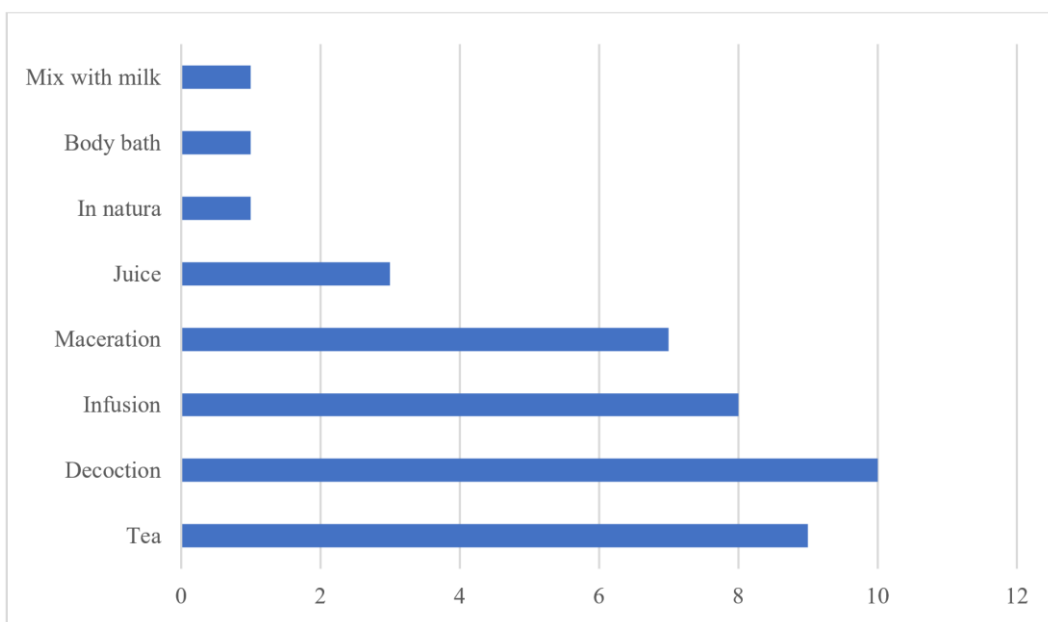


Figure 4. Preparation methods of plant resources for therapeutic use.
Prepared by the authors (2024).

This consistency in preparation methods across different ethnobotanical studies highlights the practical nature of these techniques in traditional medicine systems around the world. This review also found unconventional ways of using medicinal herbs, such as that reported in the study by Roque, Rocha, and Loiola (2010), in which the studied population consumed a sweet made with the root of the purge potato. Other unusual preparation methods include mixing the plant part with milk or plum (Santos et al., 2018; Magalhães et al., 2022).

Cultural significance of the medicinal use of Caatinga plants

The traditional medicinal use of the plants identified has great cultural significance for local communities (Lima et al., 2016; Derso et al., 2024). Thus, ethnobotanical studies are of great importance for understanding traditional communities and their use of medicinal plants. Documenting these practices helps preserve their culture and supports the planning of public policies aimed at the conservation of the Caatinga flora (Gomes & Bandeira, 2012; Baptistel et al., 2014; Lima et al., 2016).

According to Silva et al. (2015), the use of these plants to obtain healing effects is the first choice among rural populations, who seek homemade medicines at the 'Living Pharmacy', because they would otherwise need to travel to large urban centers to obtain conventional medicine. Another example of this preference for local natural products is the case of the Quilombo de Casinhas, which relies on these medicinal practices for cultural and economic reasons and because of difficulties accessing conventional treatments (Gomes & Bandeira, 2012).

Interestingly, a statistical relationship was found between the relative importance of species and their endemic status, indicating that native plants play a prominent role in traditional pharmacopoeia (Albuquerque et al., 2007). This highlights the close relationship between the Caatinga biodiversity and the cultural heritage associated with the medicinal use of its plants. This not only contributes to regional identity but also represents a valuable resource for the discovery of new therapeutic agents, underscoring the importance of conserving both biodiversity and traditional knowledge (Santos et al., 2018; Almeida et al., 2022).

Conclusion

This review emphasizes the strong link between the medicinal use of Caatinga plants and the region's cultural heritage. Ethnobotanical studies show that Indigenous, quilombola, and rural communities use various species to treat worm infestations, particularly *Chenopodium ambrosioides*, *Operculina macrocarpa*, *Carica papaya*, and *Ricinus communis*. Leaves are the most commonly used plant parts. The oral transmission of traditional knowledge sustains phytotherapeutic practices and cultural identity. Beyond therapeutic importance, the Caatinga flora offers economic and environmental potential for phytomedicine and biodiversity conservation. Yet, deforestation, desertification, and human pressures threaten this heritage, demanding sustainable public policies for preservation and use.

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