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ETHNOPHARMACOLOGICAL STUDY OF PLANTS, IN SUBURBAN POPULATIONS OF THE MUNICIPALITY OF CAMPECHE (MEXICO), FOR THE TREATMENT OF PARASITOSIS.

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Abstract

Medicinal plants are an important resource for the health of rural residents because they live in areas where infectious diseases, particularly parasitic infections, are very frequent and the lack of health services prevents effective treatment. The objective of this study was to provide an updated critical analysis of the ethnopharmacology of medicinal plants used in the treatment of parasitic diseases in the State of Campeche, Mexico. The ethnopharmacological knowledge of five communities was studied through 247 interviews with prior consent from the informants. The survey was based on a semi-structured questionnaire with simple and flexible language to collect additional information that the residents provided. It was found that in the localities studied there is still social knowledge of the use of plants in the treatment of human parasitosis but this knowledge is at risk because there is no formal dissemination and the transgenerational transmission of knowledge is being lost.

Keywords: Public Health, Herbal Medicine, Medicinal Plants.

Introduction

According to the World Health Organization (WHO), plants are used by more than 80% of the world's population to meet their primary health care needs, especially in developing countries with an abundance of plant species. which represent a wealth of secondary metabolites with biological activities of interest[1,2]. Low-income residents with little access to public health systems incorporate medicinal plants to promote, restore and maintain their health because they are more affordable for treatment[1-3]. Furthermore, the transfer and conservation of traditional knowledge is an identity element of rural communities, which is why studies are carried out to verify the conservation of ethno-knowledge of medicinal plants, defined by the WHO as any plant species

that some of its organs can be used for therapeutic purposes or that serve as precursors of semi-synthetic drugs[3-4].

The Beijing Declaration made at the WHO Congress on traditional medicine expressed the need to ensure that medicinal plants are used appropriately to contribute to people's health; However, in many countries there has been a significant loss of knowledge about the use of medicinal plants and, furthermore, the availability of such plants has been reduced due to the degradation of biodiversity[1,2,5]. This is really worrying because medicinal plants occupy a prominent place in suburban societies due to their easy access and are, in many cases, free and easy to obtain; This makes ethnopharmacological knowledge of medicinal plants of vital interest for rural communities where infectious diseases are very frequent[3-5]. In particular, parasitic diseases, in rural areas, are very common and affect both humans and domestic animals and occur more frequently in areas of malnutrition, low economic resources and with little access to health services; For this reason, medicinal plants constitute an alternative for the control of intestinal parasites and to avoid the indiscriminate use of antiparasitic drugs that represent a threat to environmental integrity, in addition to harm to the patient, since it has been shown that antiparasitic drugs cause changes in colonizing organisms in fecal matter and can also generate toxic residues in food[6-8].

For this reason, the interest arose in cataloging the ethnomedicinal information of those floristic species that are used in the prevention and treatment of parasitosis by the inhabitants of suburban localities of the Municipality of Campeche (Mexico), to know the knowledge and serve as a basis for future research that aim to validate the biological activity of the plants whose use is reported. The objective of the present study was to provide an updated critical analysis on the ethnopharmacology of medicinal plants used in the treatment of parasitic diseases by communities in the municipality of Campeche (State of Campeche, Mexico), with the purpose of defining their therapeutic potential, stimulating a comprehensive research on its therapeutic efficacy and promote the conservation of the biodiversity of medicinal plants in the region.

Methods

Study area. The ethnopharmacological research was an observational, descriptive, cross-sectional study that was carried out in five suburban communities of the Municipality of Campeche (State of Campeche, located in the southeast of Mexico, figure 1), these localities (figure 2) have less than 3,000 inhabitants , with an illiteracy percentage greater than 10%, average schooling of 7 years, indigenous population greater than 5% who speak Mayan, more than 85% of the homes have piped water, electricity, WC and refrigerator.

Figure 1. Location of the Municipality of Campeche, Mexico (Source: modified from Google Maps).

Figure 2. Location of the five communities studied. It is marked with the location of Kobén, Imí, Castamay, Tikinmul and Nohakal (Source: Modified from Google Maps).

Methodological plan for data collection.

In each locality, the objectives of the research were presented to the corresponding authorities and permission was requested to carry out the ethnopharmacological survey; Subsequently, a reconnaissance of the study area was carried out to observe their daily life, customs and attitudes. The interviews were carried out with prior consent from the informants, the face-to-face interview was carried out voluntarily and it was explained that the data management would be anonymous, the survey was based on a semi-structured questionnaire with simple and flexible language to collect additional information that the residents provided. In total, 247 interviews were carried out (Castamay 46, Nohakal 48, Tinkinmul 53, Kobén 52 and Imí 48) during visits to homes in the localities and at the end of the surveys, the residents were subsequently asked to show the places where they got the plants. and photographs and specimens of them were taken to be transferred to the laboratory for taxonomic identification and to carry out corresponding phytochemical studies[9-12].

Bioethical aspects.

In the present study, bioethical principles were respected, because the resident had the freedom to decide whether or not to participate in the study, responding freely and according to his criteria and with confidentiality (autonomy), the benefits of recovering knowledge were explained to him. and promoting the safe use of medicinal plants (beneficence), no physical, emotional or psychological aggression was coerced or allowed to the residents during the interview (non-maleficence) and equal treatment was provided to all interviewees and the results of the interview. research will be public and disseminated among the same communities as retribution (justice). Likewise, we acted with ethics and environmental responsibility to respect the flora and fauna of the localities because no damage was caused to the plant species[1,12-16].

Statistic analysis.

The data obtained during the interviews were analyzed with descriptive statistical methods to summarize them in figures and graphs for exploratory analysis; The ethnopharmacological information provided by the residents was converted into a Microsoft Excel® book to constitute a database[1,4,16].

Results and discussion

The attitudes of the respondents regarding the ethnopharmacological use of plants with antiparasitic activity are shown in Figure 3, individually and the last bar of each group corresponds to the average of all respondents; In terms of knowledge, these communities still conserve a large part of their ethnopharmacological uses and customs (more than 76% of those surveyed claimed to know medicinal plants with antiparasitic activity). However, a tendency to decrease this knowledge can be observed as the localities interact with cities such as the state capital, the town of Imí is very close to the city; The other towns closest to the state capital are Kobén and Castamay; but Kobén has greater connectivity and urban interaction because it is a town frequented by tourists.

Access to health services can be an important factor in the conservation of ethnopharmacological knowledge, since the most isolated populations consider the use of medicinal plants to be more necessary; In the towns of Kobén and Imí, the interviewees commented that health brigades frequently attend to deworm them with allopathic medications, while in the rest of the communities they mentioned that there are deworming programs for humans (not so frequent because they are annual) but not for animals that They tend to roam freely throughout the town and defecate their feces in public spaces such as sports fields and parks.

These data are important because currently there is a loss of traditional knowledge of societies and also an increase in the loss of biodiversity[1,15-18]; For this reason, it is important to know how to disseminate that knowledge and translate it; In this sense, the attitudes of "know, identify, prepare and use" are still preserved, but those of "recommend and teach" are, alarmingly, impractical and these two actions are involved in the dissemination and preservation of knowledge. The action of "cultivating" is related to guaranteeing both access and preserving the plant resource from

deforestation. This activity is diminished because the lands are generally occupied for productive activities; But the cultivation of medicinal plants is also an important factor because it guarantees not only the identity of the plant species but also the quality of the metabolites it produces, which is why domestic gardens are cultivation systems where herbs and trees are associated and managed familiarly with agroecological and biological functions that allow pest management, nutrient recycling, and nutrient conservation that translate into higher quality plant material from a pharmacognostic point of view[16-18].

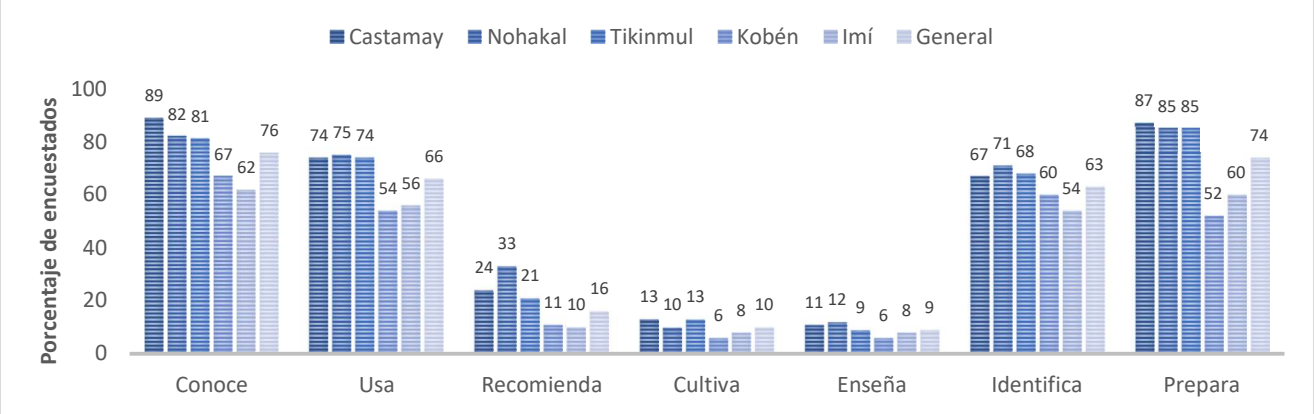

Figure 3. Attitudes of the respondents regarding medicinal plants for the treatment of parasitosis (Source: Own elaboration).

Figure 4 shows the results of the plants known to the interviewees for the treatment of parasitosis and figure 5 shows some photographs of plants found during the interviews; The best known plant and used in the communities is epazote (*Dysphania ambrosioides*) followed by Coconut (*Cocos nucifera*); Epazote is mainly used in the form of a herbal tea obtained by infusion or decoction, while coconut water is drunk once extracted from the fruit. It should be noted that the vast majority of plants reported as antiparasitic are consumed as food (tamarind, pumpkin, coconut, guava, papaya, lemon) or as condiments (epazote, garlic, pepper, oregano); This ethnobotanical use is well spread and practiced within the communities evaluated and is an aspect that contributes to the conservation of plant species.

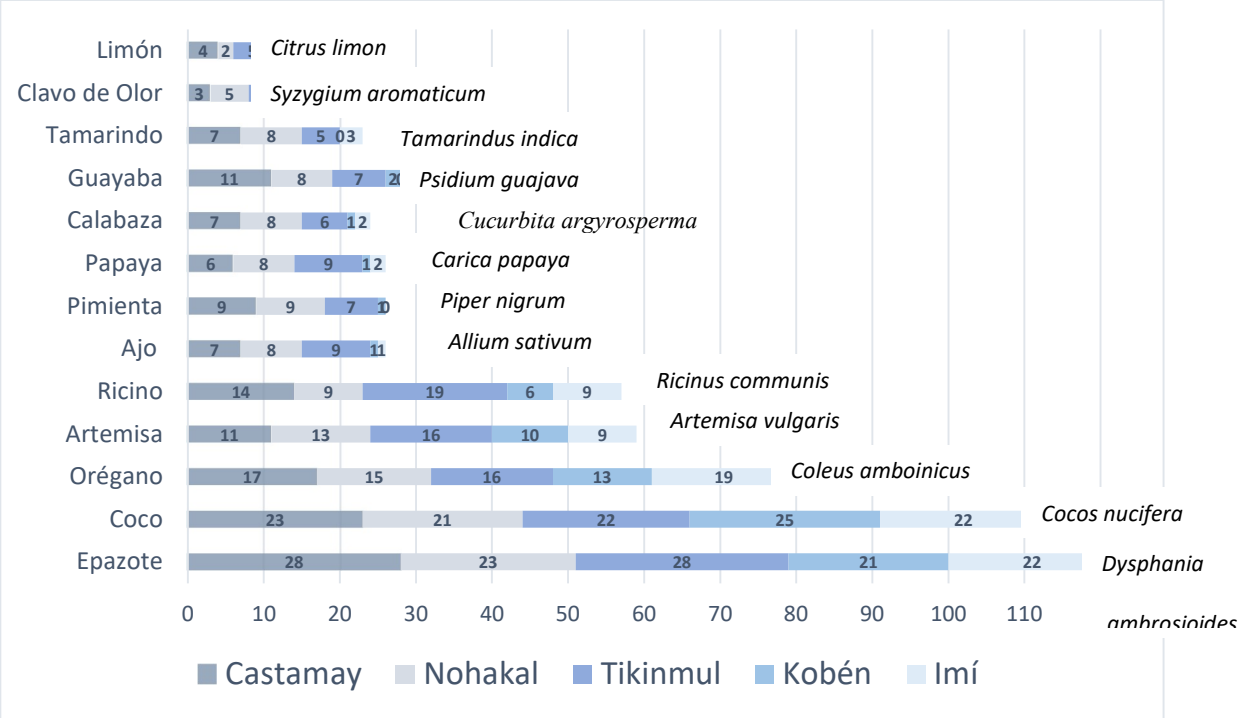

Figure 4. Mentions of antiparasitic plants according to the localities studied (Source: own elaboration).

Figure 5. Photographs of medicinal plants with antiparasitic activity. A) Epazote dried to be used for food, B) Oregano plant grown in the backyard, C) tamarind tree planted in the patio for ornamental purposes and to eat its fruits., D) cultivated guava tree (Source: own photographic collection).

During the interviews and talks with the residents, it was observed that the antiparasitic use of the reported plants is secondary. The main ethnobotanical uses that the residents give to these species are mainly edible and ornamental, except for epazote, which, although it is used for Cooking the bean has been well identified as being useful for "bugs" or intestinal parasites. Mugwort and castor bean are also specifically used in the treatment of parasites and castor bean is used as a purge periodically to disinfect the stomach, according to reports. of the residents. In the case of coconut, tamarind and guava are planted to take advantage of their fruit and shade and to promote a cooler environment.

This shared knowledge enriches ethnopharmacological research because it is not only about obtaining inventories of medicinal plants potentially useful as drugs but also about studying the social and environmental relationships of man with the community and its vegetation; That is why identifying what uses are given to plants apart from using them as medicine helps to better understand ecological interactions and the needs related to their cultivation and conservation; Furthermore, the medicinal use of plants is an ethnographic distinctive of the communities; Thus, plant species have a use for each community that transcends the medicinal aspect and is an expression of several sociocultural, environmental and economic dimensions[19-22].

The five communities studied retain common knowledge regarding the medicinal use of plants against parasites, although the communities closest (in distance and connectivity) to the capital city showed signs of an early loss of knowledge of some species such as lemon (Citrus limon). and cloves (Syzygium aromaticum); In general, all the communities agreed on the importance of antiparasitic plants. Figure 6 shows the percentage of mentions that the residents made regarding each species; the most popular (epazote, coconut, oregano, mugwort and castor) make up 71% of the mentions, the rest (garlic, pepper, papaya, pumpkin, tamarind, cloves and lemon) had less than 5% (except for the guava that had 5%).

In this regard, it is important to understand that most parasitic infections are zoonoses, which is why domestic animals or animals that roam in public spaces must also be dewormed; It stands out that only 13 interviewed in the communities alluded to this fact and mentioned that when they have puppy dogs they are also given epazote, especially when they show signs of a bulge in their stomach. Antiparasitic plants can also be useful in the treatment of pets and livestock as a public health strategy to control parasites and to avoid reinfections[7,23,24].

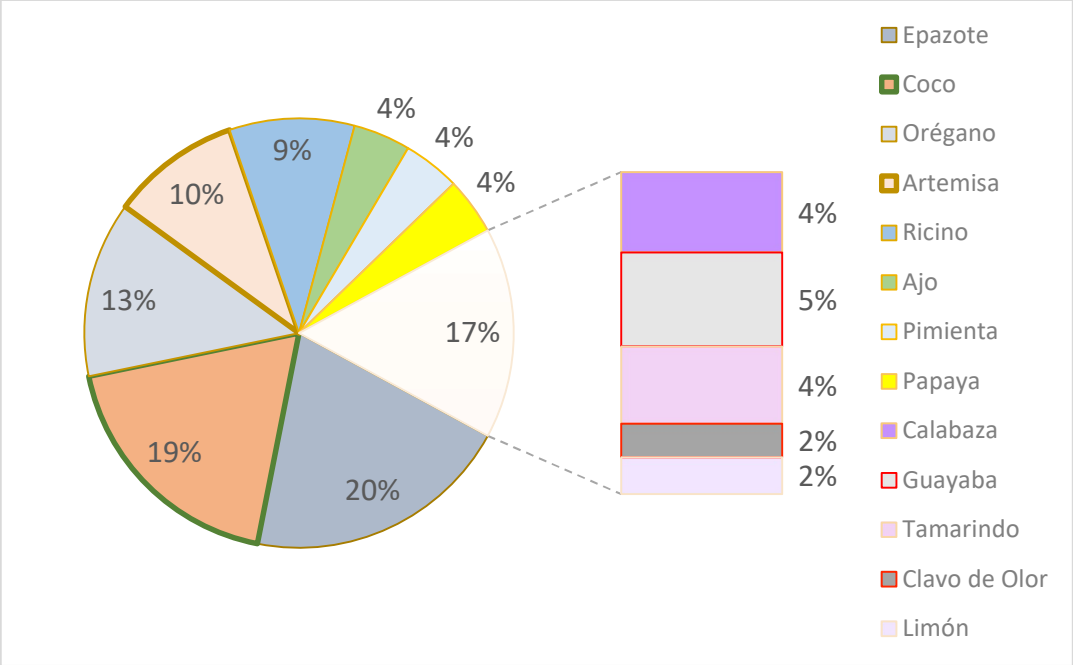

Figure 6. General percentage of mentions of plants used in the treatment of parasitosis (Source: own elaboration).

In the analysis of the importance of each species as an antiparasitic medicine, the relative frequency (RFB) of the mentions of each plant was calculated. This data was obtained by dividing the number of mentions by the total number of interviewees (figure 7) and It was corrected to estimate the relative importance of the species with respect to the rest of the mentioned plants, in the corrected value (RFC) only those surveyed who knew at least one antiparasitic plant are considered (figure 8).

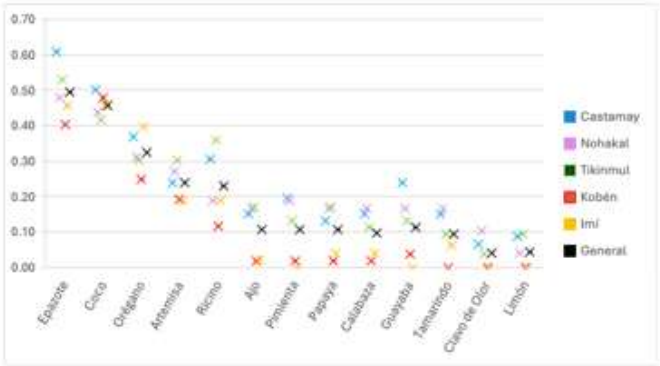

Figure 7. Relative frequency of mentions of antiparasitic plants (Source: Own elaboration).

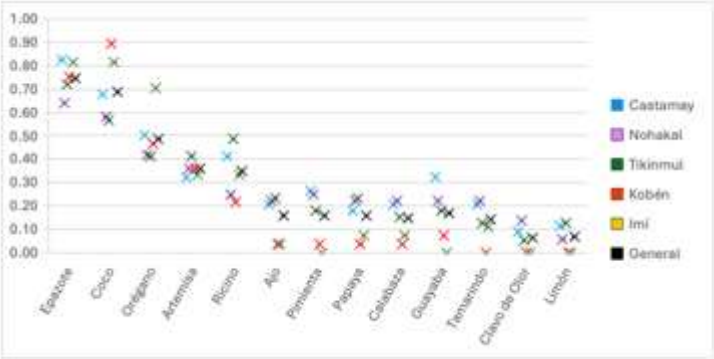

Figure 8. Corrected relative frequency (considering only people who knew a plant) of mentions of antiparasitic plants (Source: Own elaboration).

The calculation of RFB and RFC allows us to estimate that the populations of Imí and Kobén present an early loss of knowledge on this topic; If the frequencies of each locality are compared with the general frequency, the RFB shows how these two localities have a lower value with respect to the general average, which indicates that a smaller number of residents know the ethnomedicinal use of a particular plant. While the RFC allows us to know the value that each community gives to a particular plant, for example, the coconut, although it was not the most popular in the communities, stands out because in the collective imagination of the residents, it has an important role in the treatment of parasitic infections.

Likewise, the plant knowledge index (CI) was calculated (figure 9) by the ratio between the number of total mentions among respondents who mentioned at least one plant with antiparasitic activity; With this index, it can be deduced that not only were fewer residents of Imí and Kobén aware of the medicinal use of plants, but also that those who are knowledgeable have less cultural vagueness because the CI indicates that frequently each respondent mentioned between two and three antiparasitic plants, while that in Castamay, Tikinmul and Nohakal generally mentioned four plants and was higher than the general CI.

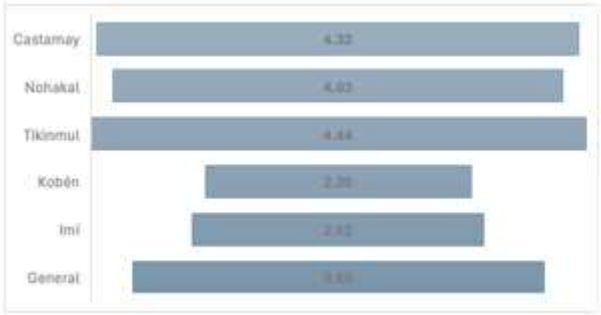

Figure 9. Knowledge index of antiparasitic plants that expresses how many plants were mentioned per respondent (Source: Own elaboration).

The CI is an average value of all respondents; However, as it can increase due to respondents who have mentioned more plants compared to the rest of the participating residents, figure 10 reports, individually, the frequency values of the number of plants mentioned according to their location. This graph reports that In reality there are residents in all localities who know up to five plants (six in the case of Castamay), the average (X) correlates better with the CI (X for Castamay 4.29, Nohakal 3.80, Tikinmul 3.87, Kobén 2.89 and Imí 3.30); In Castamay, Kobén and Imí there was a resident who only mentioned one plant, this represents a cultural erosion in this regard and must be taken into account in the planning of the conservation strategy and dissemination of knowledge of medicinal plants.

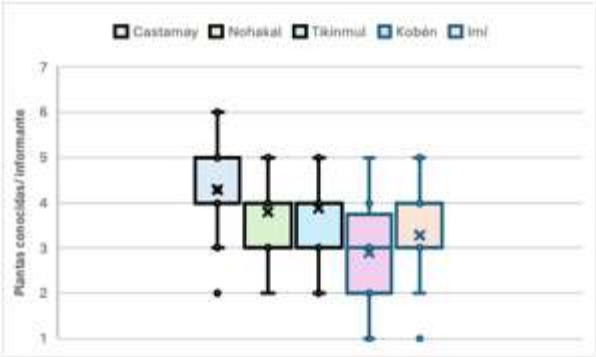

Figure 10. Number of plants known by each of the residents of the communities studied, X represents the average (Source: own elaboration).

Rural communities have a link between traditional knowledge and the perception that residents have about medicinal plants, this is important for the conservation of biodiversity that prevents the degradation of natural habitats and in the preservation of traditional knowledge; Ethnopharmacological studies promote the conservation of species by disseminating knowledge to revalue them and are the basis of functional models of sustainable use and management of these natural resources that favor their protection and cultivation[25,26].

The diversity of medicinal plants used in each locality is favored by the appreciation and use of its inhabitants, since for the most part, the inhabitants obtain the specimens as wild plants and when they cultivate them it is for purposes other than medicinal, mainly as edible, timber or ornamental; Therefore, by disseminating the medicinal properties of plants, the community revalues them and tends to conserve them as a heritage asset and in addition to conserving them, the agroecology of farmers enriches the expression of metabolites that improves the quality and pharmacological efficacy of the plants[27- 30].

The erosion of knowledge related to the use of medicinal plants is one of the factors that contributes to deforestation and environmental degradation and this threatens sustainability; hence the urgency of rescuing knowledge and disseminating it; Culture influences the valuation of natural resources and contributes to generating strategies to achieve health through the safe use of medicinal plants[30-32]. Likewise, this traditional knowledge provides important elements of

scientific, cultural and technological interest in the field of health and natural sciences, in favor of the development of products that benefit human beings and must be rewarded to the communities that guard this knowledge to that translates into actions that benefit them and direct them towards sustainable development[12-14,32].

Conclusion

In the present study, it was found that suburban communities still retain knowledge related to the treatment of parasitosis with medicinal plants; But there is a need to preserve the ethnopharmacological knowledge of the communities studied to avoid cultural erosion and the loss of ethnobotanical knowledge that was evident especially in the communities closest to urbanized populations.

Although the residents know which plants can be useful in the prevention and treatment of parasitosis, a smaller number of them use them and, even fewer, cultivate them and spread their knowledge; In this sense, ethnopharmacological research on medicinal plants is relevant to avoid the loss of traditional knowledge since an interdisciplinary approach to this problem allows us to propose strategies for the conservation of plant species and their related knowledge, based on socio-environmental and socio-cultural factors. and socioeconomic factors that impact access to wild plants and domestic cultivation; Furthermore, these strategies must have a direct and tangible benefit for the communities that guard and preserve them.

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