Research article

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Medicinal plants in the treatment of skin diseases: an ethnobotanical study in various populations of the Bolívar department, Colombia

Plantas medicinales en el tratamiento de enfermedades de la piel: un estudio etnobotánico en varias poblaciones del departamento de Bolívar, Colombia

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Abstract:

Background and Aims: Dermatological conditions are a significant source of global morbidity, as reported by the Global Burden of Disease study. In low- and middle-income countries with predominantly rural populations and limited healthcare access, traditional medicine is often the first line of treatment. In Colombia, despite the widespread use of medicinal plants to treat skin disorders, scientific documentation remains limited. This study aimed to record the plant species used by rural and semi-rural communities in the department of Bolívar for dermatological treatments.

Methods: An ethnobotanical survey was conducted in eight localities in central and northern Bolívar, Colombia. A semi-structured questionnaire, based on TRAMIL guidelines, was used to collect data on four categories of dermatological conditions. The Informant Consensus Factor (ICF) and Fidelity index (FI) were calculated to assess the consistency and specificity of plant use.

Key results: A total of 156 participants (109 women, 47 men) provided 385 use reports. The most frequently cited conditions included infections (165 reports), trauma-related injuries (136), insect bites (48), and inflammatory skin diseases (36), all associated with high ICF values. The species with the highest FI were *Gliricidia sepium* (21.01%) and *Persea americana* (20.29%) for infections, *Aristolochia anguicida* (50%) for insect bites, *Heliotropium indicum* (38.82%) and *Bixa orellana* (31.76%) for injuries, and *Malachra alceifolia* (44.44%) for inflammatory disorders. Leaves were the most frequently used plant part (72.73%), and poultices were the most common preparation method (39.74%). The data suggest a high degree of shared ethnobotanical knowledge, although a decline in intergenerational transmission was observed.

Conclusions: Traditional medicine plays a crucial role in the management of dermatological conditions in the Colombian Caribbean region, highlighting the need for phytochemical and pharmacological studies to validate the efficacy and safety of medicinal plant species.

Key words: Colombian Caribbean, ethnobotany, dermatitis, infections, inflammation.

Resumen:

Antecedentes y Objetivos: Las afecciones dermatológicas representan una causa importante de morbilidad a nivel global, según el estudio de Carga Global de Enfermedades. En países de ingresos bajos y medios, con alta proporción de población rural y acceso limitado a servicios de salud, la medicina tradicional continúa siendo la primera opción terapéutica. En Colombia a pesar del uso generalizado de plantas medicinales para tratar problemas dermatológicos, la documentación científica es limitada. Este estudio buscó registrar las especies vegetales utilizadas por las comunidades rurales y semirrurales del departamento de Bolívar para tratar afecciones dermatológicas.

Métodos: Se realizó una encuesta etnobotánica en ocho localidades del centro y norte de Bolívar, Colombia. Se aplicó un cuestionario semiestructurado basado en la metodología TRAMIL, enfocada en cuatro categorías de afecciones dermatológicas. Se calcularon el Factor de Consenso entre los Informantes (ICF) y el Índice de Fidelidad (IF) para evaluar la uniformidad y especificidad del uso de las plantas.

Resultados clave: Participaron 156 personas (109 mujeres y 47 hombres), generando 385 reportes de uso. Las afecciones más frecuentes fueron infecciones (165 reportes), lesiones traumáticas (136), picaduras de insectos (48) y enfermedades inflamatorias de la piel (36), todas con altos valores de ICF. Las especies con mayores IF fueron *Gliricidia sepium* (21.01%) y *Persea americana* (20.29%) para infecciones, *Aristolochia anguicida* (50%) para picaduras, *Heliotropium indicum* (38.82%) y *Bixa orellana* (31.76%) para lesiones, y *Malachra alceifolia* (44.44%) para trastornos inflamatorios. Las hojas fueron la parte más utilizada (72.73%) y el emplasto la forma de preparación más común (39.74%). Los resultados evidencian un conocimiento etnobotánico compartido entre comunidades, aunque se observa una disminución en la transmisión intergeneracional.

Conclusiones: La medicina tradicional es crucial en el manejo de las afecciones dermatológicas en la región Caribe colombiana, lo que resalta la necesidad de estudios fitoquímicos y farmacológicos para validar la eficacia y seguridad de las especies vegetales.

Palabras clave: Caribe Colombiano, etnobotánica, dermatitis, infecciones, inflamación.

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Introduction

The skin is the largest organ of the human body and provides a protective barrier against mechanical, thermal, and physical injuries (Walker, 2022). It shields us from infectious agents and irritating chemical substances (Baker et al., 2023). Additionally, the skin has other crucial functions, such as protecting against UV rays, preventing excessive water loss, synthesizing vitamin D, absorbing oxygen, and allowing the entry of topical medications (Maranduca et al., 2020).

Dermatological conditions and skin infections are major causes of disease worldwide. The 2019 Global Burden of Disease (GBD) study estimated approximately 4.86 million new cases of skin diseases, with most occurring in the 0-4 year age group and in low- to middle-income countries (Yakupu et al., 2023). However, in the latest 2021 GBD study, dermatological conditions were ranked as the eighth leading cause of disease across all age groups and populations, regardless of country or income level (Wu et al., 2021; Diseases and Injuries, 2024). Furthermore, skin conditions are among the most common reasons for medical consultations among healthcare workers (Finley et al., 2018) and are frequently observed among refugees and displaced populations due to war, political and economic unrest, and climate change (Dayrit et al., 2022).

In warm climates such as the Caribbean and tropical countries, the most reported skin diseases include dermatitis, psoriasis, urticaria, eczema, acne vulgaris, bacterial cellulitis, viral and fungal infections, and wound infections (Karimkhani et al., 2017). These skin conditions are also among the most frequently reported health problems in rural populations, where many people still live in areas with poor sanitation and limited access to healthcare (Valentin et al., 2022).

In tropical regions, 20-40% of primary care consultations are due to skin problems (Hay et al., 2014). In rural and semirural populations worldwide, traditional knowledge and the use of medicinal plants continue to play important roles in managing and treating various health problems (Verma et al., 2025). In Colombia, approximately 2800 plant species have been reported for medicinal use, of which 204 are endemic (Bernal and Mesa, 2022). Moreover, Colombia is the second most biodiverse country on the planet, and it is estimated that approximately 15% of its total number of plant species remain undescribed (Bernal et al., 2015).

A recent study evaluating the importance of useful plant species in Colombia revealed that medicinal use was the most common attribute across all bioregions, including the Caribbean (Bystriakova et al., 2021). However, this study highlighted a lack of research coverage in three dry bioregions: Caribbean deserts and xerophytic scrublands, as well as the dry forests of Caribe and Llanos.

Studies on medicinal plants and their traditional use in the Colombian Caribbean bioregion remain scarce (Veja and Fernández, 2010; Carbonó-Delahoz and Dib-Diazgranados, 2013; Quintana Arias, 2016; Duque et al., 2018). However, the previous study "Folk Medicine on the northern coast of Colombia: an overview" (Gómez-Estrada et al., 2011) presents the results of an ethnopharmacological survey conducted among various communities in the Bolívar department. This study reported at least 30 uses of plants in traditional medicine, with dermatological conditions being the most frequently cited ailments, followed by inflammatory diseases, respiratory tract disorders, and gastrointestinal issues. Among the 39 medicinal plant species reported, 11 were used to treat skin conditions through local applications and/or baths. The most used plant parts were leaves, and there was a high degree of consensus among informants regarding the medical indications of different species. This information provides the foundation for the present study, whose primary objective is to document the plant species traditionally used in the treatment of specific dermatological conditions and to identify those with a distinctive geographic distribution in the department of Bolívar, located on Colombia's northern Caribbean coast.

Materials and Methods

Selection of study areas

The selection of study areas was based on their location, primarily in the northern part of the Bolívar department, in rural or semirural zones. The key criteria included cultural significance (particularly among Afro-Colombian and/or indigenous populations who practice traditional medicine) access to primary healthcare services and the high biodiversity recorded in the region. The municipalities of Turbaco, Turbana, Arjona, San Juan Nepomuceno, San Jacinto,

San Cayetano, Isla Grande, and Tierra Bomba are administrative parts of the Bolívar department (Fig. 1). Bolívar is located between 7°00' and 10°00'N latitude, and between 73°30' and 75°50'W longitude. The region has a tropical climate with a dry forest ecosystem, an average annual temperature ranging from 25 to 33 °C, and an average relative humidity of 80% (IDEAM, 2024). The climate alternates between rainy and dry seasons and is influenced by northeast trade winds (IDEAM, 2024). The topography of the area is irregular, featuring a mix of beaches, plains, and mountainous regions (Arias et al., 2021).

Inclusion and exclusion criteria for participants

To ensure the quality and specificity of the data collected in this study, individuals over 18 years of age who use or have knowledge about treatments with medicinal plants and who voluntarily agreed to participate by responding to the survey were included. The exclusion criteria were individuals who did not know about the use of medicinal plants, those unable to communicate orally, and those who did not consent to participate in the study (Gonzalez, 1980; Etkin, 1993; Chashike et al., 2025).

Ethnobotanical data collection

Data collection was conducted through semistructured survey in the TRAMIL (Applied research program for Caribbean folk medicine) guide format (TRAMILoteca, 2021), which began with symptoms or health problems perceived by the communities rather than focusing on the plants themselves (Alvarado-Guzmán et al., 2009; Germosen-Robin-

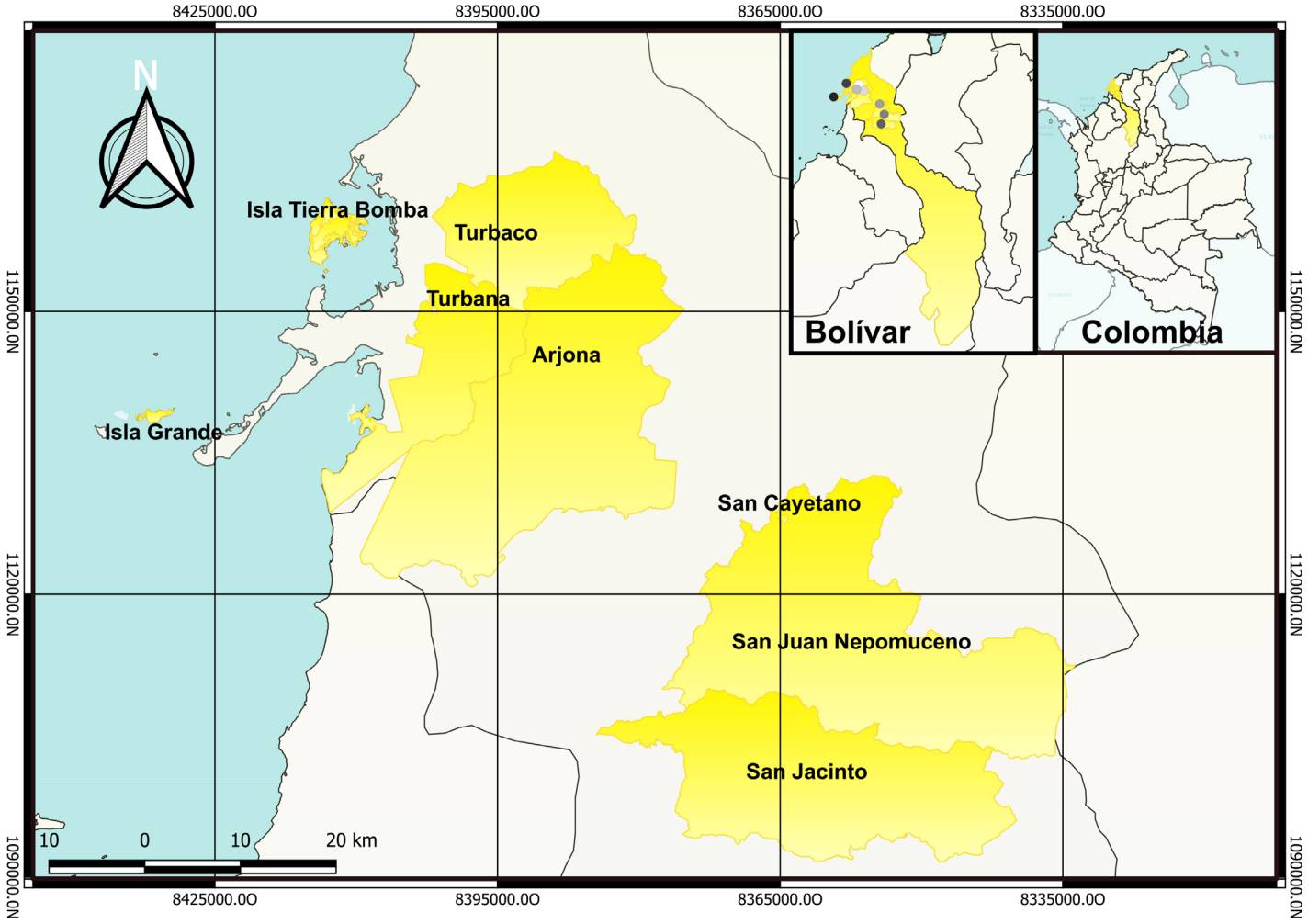

Figure 1: Map showing the location of the Bolívar department, Colombian Caribbean bioregion, highlighting the study areas located in the northern and central part of the department. ArcGIS v. 10.8 2025 (Esri, 2020).

eau, 2014). These surveys gathered information regarding the plants' popular descriptions, with an emphasis on skin conditions, associated plant resources, and details such as the part of the plant used, preparation methods, administration routes, and possible contraindications (Sharma et al., 2014). Additionally, aspects such as species location, collection conditions, personal testimonies, and other complementary data were recorded to refine the information.

Identification of medicinal plants and collection

For species identification, common names were obtained directly from the survey respondents. The participants were subsequently asked if the plants were available nearby, and with their assistance and permission, representative samples were collected, preserved in a moist state, and numbered with their respective descriptions (Sharma et al., 2014). The samples were then dried and sent to the Herbarium of the Bogotá Botanical Garden (JBB) and one specimen was deposited in the herbarium of the Faculty of Exact and Natural Sciences of the University of Cartagena (HCUC).

Data organization, processing, and analysis

The collected data were tabulated in a category matrix and analyzed via Excel© and its statistical tools, mainly frequency analysis, to relate the use of species to their popular knowledge (common name, plant part, preparation method, plant condition, administration routes, treatment outcome, precautions, contraindications, use in children, plant collection location, and informant gender). The Fidelity Index (FI) was calculated to compare the specific use of a plant among informants. Four categories of ailments were considered (infectious diseases, inflammatory diseases, trauma and insect bites). The FI evaluates the relative importance of a plant concerning a specific use within a community (Saensouk et al., 2025). It is expressed as a percentage and an FI greater than 20% was considered significant (Gomez-Estrada et al., 2011). The FI was calculated using the formula:

$$FI = (Ip/Iu) \times 100$$

Where:

Ip represents the number of informants who mention the use of a species for a specific purpose.

Iu corresponds to the total number of informants who mention the species for any purpose. An FI of 100% indicates that all informants who mentioned the plant use it for the same purpose, suggesting a high level of consensus. A low FI suggests that the plant has multiple uses and is not strongly associated with a single purpose.

To assess the degree of consensus among informants regarding the use of plant species in different categories of ailments, the Informant Consensus Factor (ICF) was calculated. This index is widely employed in quantitative ethnobotanical studies to identify categories in which there is greater uniformity in species selection by the community, which may indicate a consolidated body of traditional knowledge and/or a perceived efficacy of the plants used (Caunca and Balinado, 2021). The ICF was calculated using the following formula:

$$ICF = (Nur - Nt) / (Nur - 1)$$

Where:

Nur represents the total number of use reports for a given ailment category.

Nt corresponds to the number of distinct plant species used to treat that specific category

The ICF value ranges from 0 to 1. Values approaching 1 indicate a high degree of consensus among informants, suggesting that a few species are widely recognized for treating a particular ailment. In contrast, values near 0 reflect a high diversity of species reported by few informants, which may be interpreted as low consensus or less structured traditional knowledge.

Ethical considerations

The study adhered to the ethical guidelines established in Resolution 8430 of 1993 by the Ministry of Health of Colombia (MinSalud, 1993), classifying it as minimal risk. We asked for permission from the local authorities and the people interviewed to carry out the study. Informed consent was obtained to formalize the participation of the respondents, ensuring their understanding of the study's

purpose and safeguarding confidentiality. The people interviewed were informed about the study's objectives and the eventual publication of the information gathered, and they were assured that the informants' identities would remain undisclosed. For plant collection, the necessary framework permit for the collection of wild species specimens for non-commercial scientific research was requested and was granted to the University of Cartagena by the National Environmental Licensing Authority (ANLA) under Resolution 001579 of July 25, 2024.

Results

Study areas and characteristics of the informants

The study areas are located primarily in the northern and central parts of the Bolívar department. A total of 419 households were visited, of which only 156 (37.18%) had at least one person willing to participate in the survey. The remaining 62.82% either declined to participate or reported having no knowledge of the use of medicinal plants. San Jacinto had the highest number of respondents (30), reports (72), and species (20), making it the most representative municipality. San Juan de Nepomuceno had 25 respondents, 65 reports, and 18 species, whereas Tierra Bomba and Isla Grande had the lowest values, with 29 and 39 reports, respectively, and fewer than 12 species each. The highest areas were San Jacinto at 227 m above sea level and San Cayetano at 204 m, in contrast to Tierra Bomba and Isla Grande, which are at sea level (2 m a.s.l.) (Table 1). A total of 156 participants were surveyed (109 women and 47 men), generating a total of 385 reports. The female gender contributed 210 reports (54.55%), and the male gender contributed 175 reports (45.45%). In terms of age, the age group that generated the greatest number of reports was 50-59 years, with 145 reports (37.66%) (Table 2).

Skin diseases with the highest number of reports

The Informant Consensus Factor (ICF) obtained demonstrated a high level of agreement among participants regarding the ailments that include the four categories and their treatment. The "Trauma" category yielded the highest consensus (ICF=0.978), suggesting that a limited number of plant species are consistently recognized for their medicinal use in treating such conditions, reflecting a deeply rooted and well-consolidated body of traditional knowledge. This was followed by the categories "Insect bites" (ICF=0.915) and "Infectious diseases" (ICF=0.908), both exhibiting elevated ICF values that indicate a strong collective perception of the efficacy of certain species. The "Inflammatory diseases" category, with an ICF of 0.886, also reflected an acceptable level of agreement among informants.

In the participants' local terminology, the reports of skin conditions were also classified into subcategories (Table 3). Among the total reports, within the infectious disease category, furuncles (63), abscesses (27), acne (15), foot fungus (12), and shingles (12) were the most frequently mentioned. In the trauma category, sunburns were the most common (59 reports), followed by heatstroke (33) and inflammation (18). In the insect bite category, the most

Table 1: Reports obtained from the people surveyed in each studied municipality, department Bolívar, Colombia.

Municipality or District	Population	Number of respondents	Number of reports for municipality	Number of species	Elevation (m a.s.l.)
Arjona	José María Córdoba	22	48	14	34
Isla Grande	Orika	11	39	10	2
San Cayetano	Calle Real	14	32	7	204
San Jacinto	La Campesina	30	72	20	227
San Juan de Nepomuceno	Villa Silvia	25	65	18	143
Tierra Bomba	Caño del Oro	8	29	8	2
Turbaco	Bellavista	28	58	12	200
Turbana	El Chorrito	18	42	9	80
Total		156	385		

Table 2: Distribution of reports by gender and age of participants.

Participants	Group	Number of reports	Percentage (%)
Gender	Female (109)	210	54.55
	Male (47)	175	45.45
Age Range (Years)	18-29	43	11.17
	30-39	60	15.58
	40-49	91	23.64
	50-59	145	37.66
	60-69	41	10.65
	70-79	5	1.30

Table 3: Skin disease categories and subcategories: the terminology used by communities.

Category (Diseases and injuries)	Skin Condition Subcategory
Inflammatory	Atopic dermatitis, contact dermatitis, psoriasis, seborrheic dermatitis
Infectious	Abscesses, acne, foot fungus, skin fungus, furuncles, herpes, leishmaniasis, rashes, shingles, skin spots, sores (superinfected wounds)
Insect bites	Bee sting, centipede bite, mosquito bite
Trauma	Wounds, heatstroke, heel spurs, hits, inflammation, pimples, sunburn

frequent references were mosquito bites (30), bee stings (12), and centipede bites (6). Finally, within the inflammatory disease category, atopic dermatitis had the highest number of reports (22), followed by psoriasis (6), seborrheic dermatitis (3), and contact dermatitis (3) (Fig. 2).

Traditional medicinal plants

The fidelity index was used to systematically evaluate the medicinal plants used in the traditional treatment of skin diseases within the previously defined categories and to determine if they exceeded the 20% threshold. In the category of infectious diseases, 15 species were identified, but according to the FI, only two surpassed the threshold: *Gliricidia sepium* (Jacq.) Kunth ex Walp. (Fig. 3A, B) with an FI of 21.01% (29 reports), and *Persea americana* Mill. (Fig 3C, D) with an FI of 20.29% (28 reports). *Aloe vera* L. Burm. f. (Fig. 3E, F), with an FI of 19.57% (27 reports), was very close to the threshold. Other species, such as *Azadirachta indica* A. Juss. (7.25%, 10 reports), *Momordica charantia* L. (6.52%, 9 reports), and *Bursera graveolens* (Kunth) Triana & Planch. (5.80%, 8 reports), had lower FIs (Table 4).

In the insect bite category, five species were identified, but only two surpassed the threshold: *Aristolochia anguicida* Jacq. (Fig. 3G, H) with an FI of 50% (15 reports), and *Mammea americana* L. (Fig. 3I, J) with an FI of 20% (6 reports). Other species, such as *Momordica charantia*, *Rauvolfia tetraphylla* L., and *Sida acuta* Burm. f., had an FI of 10% (3 reports each). In the category of trauma, four species were identified, three of which surpassed the threshold: *Heliotropium indicum* L. (Fig. 3K, L) with an FI of 38.82% (33 reports); *Bixa orellana* L. (Fig. 3M, N) with an FI of 31.76% (27 reports); and *Aloe vera* with an FI of 25.89% (22 reports) (Table 4).

In the category of inflammatory diseases, five species were identified but only two exceeded the threshold: *Malachra alceifolia* Jacq. (Fig. 3O, P) with an FI of 44.44% (16 reports), and *Aloe vera* with an FI of 22.22% (8 reports). Other species, such as *Gliricidia sepium* (16.67%, 6 reports), *Cucurbita maxima* Duchesne (8.33%, 3 reports), and *Momordica charantia* (8.33%, 3 reports), presented lower fidelity index values (Table 4).

Plant parts used and modes of application

The participants reported that leaves are the most frequently used plant part for treating skin ailments, accounting for 73% of all mentions (280 reports). The second most used plant structure was the whole plant (WP), accounting for 12% (45 reports), followed by roots at 6% (24 reports). Other plant parts, such as bark, fruits, exudates, stems, and flowers, were used less frequently, each with a usage rate below 3.5% (Fig 4A). With respect to the condition of the plant material (fresh, dried, or unspecified), fresh plant material was highly preferred, with 303 reports representing 78.70% of all cases. This was followed by unspecified conditions (70 reports; 18.18%), whereas dried plant material was the least commonly used material, with only 12 reports (3.12%).

With respect to preparation methods, participants cited the common plant name alongside its mode of application. The most frequently reported preparation was poul-

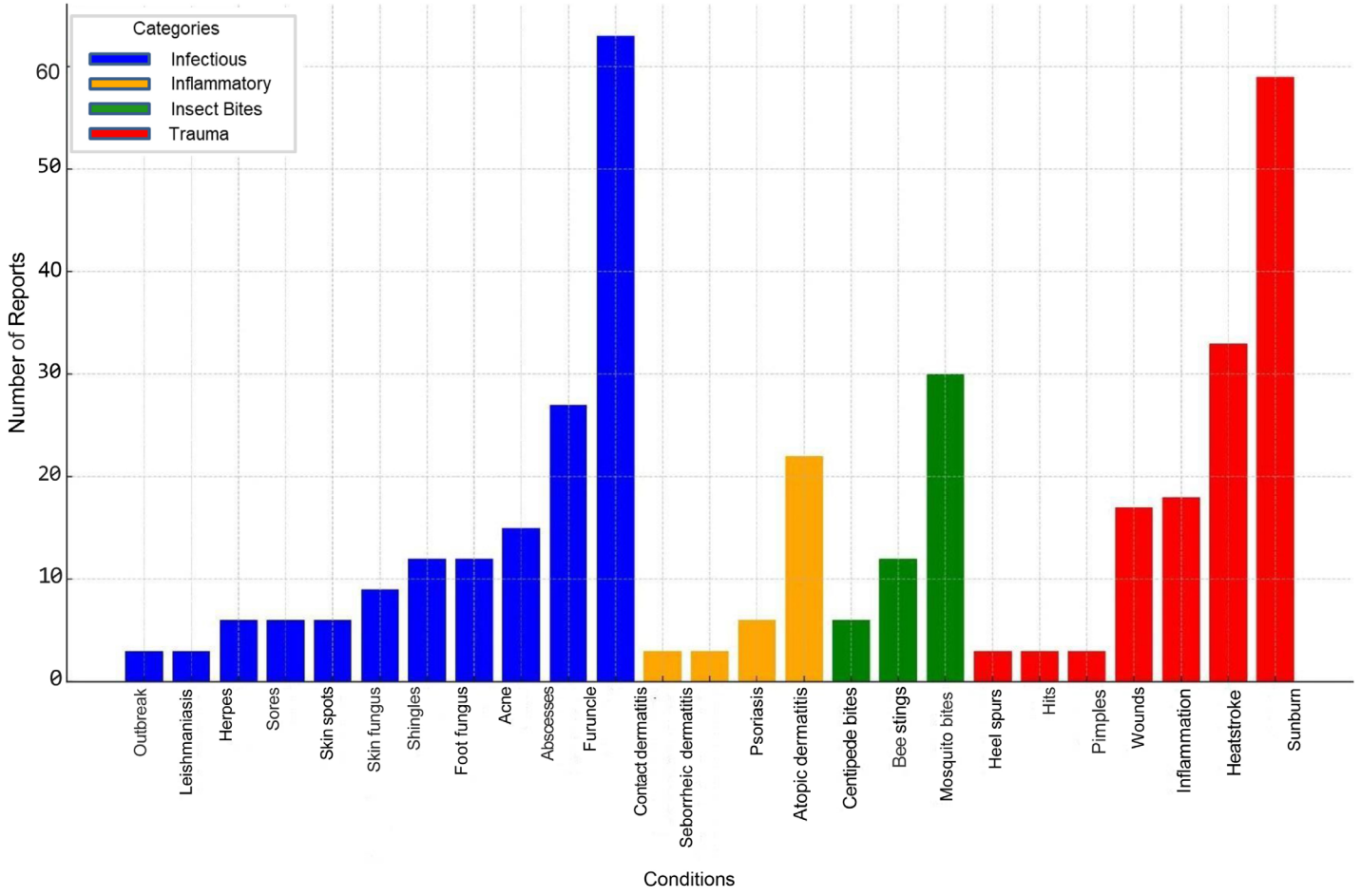

Figure 2: Number of skin conditions reported by category and subcategory.

tice, mentioned in 153 reports (40%). This was followed by decoction, with 103 reports (27%), and direct application of the plant part (such as placing a leaf over a wound), recorded in 77 reports (20%). Less commonly reported methods include cold maceration (7%), hydroalcoholic extracts (5%), and infusions (1%) (Fig 4B). The most common mode of administration was once daily, reported in 165 cases (42.86%), followed by twice daily (76 reports; 19.74%) and three times daily (72 reports; 18.70%). Higher frequencies, exceeding three applications per day, accounted for 7.01%, whereas an unspecified frequency was mentioned in 5.97% of the cases. The specific use of baths, either once or multiple times per day, was reported in only 2% of cases (Appendix).

Importantly, in 268 reports (69.9%), informants stated that plant remedies could be used in children, whereas in 117 reports (30.39%), they recommended their use in this population. The most frequently mentioned source of plant material was the field, which was cited in 195 reports (50.65%). This was followed by home gardens or surrounding areas, reported in 178 cases (46.23%), whereas the market was the least common source, with only 12 reports (3.12%). These findings highlight a clear preference for medicinal plants obtained from natural environments and domestic settings over those purchased in markets.

Discussion

Particularities of the department of Bolivar and its population

The department of Bolívar is in northern Colombia and is one of the eight departments that make up the Caribbean Region of the country. Approximately 40.4% of its population lives in vast rural areas. According to our results and observations, medicinal plant use and traditional knowl-

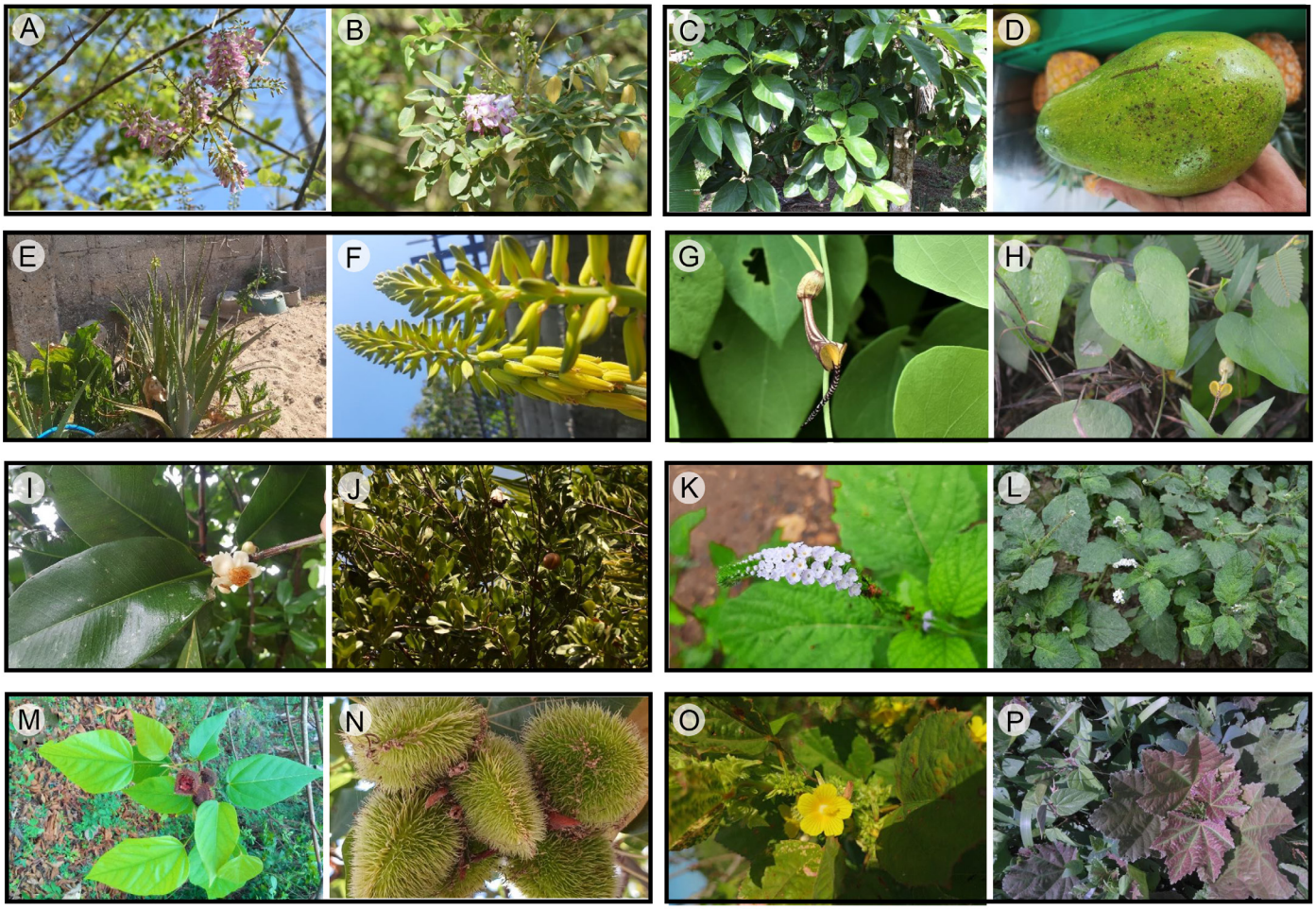

Figure 3: Species with the highest fidelity index in the study: medicinal plants used in the treatment of skin diseases. A, B. *Gliricidia sepium* (Jacq.) Kunth ex Walp. (Matarratón); C, D. *Persea americana* Mill. (Aguacate-Avocado); E, F. *Aloe vera* L. Burm. f. (Sábila); G, H. *Aristolochia anguicida* Jacq. (Curarina-contra); I, J. *Mammea americana* L. (Mamey); K, L. *Heliotropium indicum* L. (Verbena); M, N. *Bixa orellana* L. (Achiote); O, P. *Malachra alceifolia* Jacq. (Malva).

edge regarding skin conditions were highly consistent across the eight surveyed localities. Similarly, the popular terminology used to describe skin ailments and plant species was uniform, likely due to the geographical proximity of these communities, all of which belong to the northern, Dique, and Montes de María subregions (Gobernación de Bolívar, 2024).

One key finding is that the greatest number of plant species was reported in populations located at higher elevations. For example, in San Jacinto, 20 out of 25 species were documented, aligning with ecological trends, indicating that biodiversity tends to increase with elevation in tropical dry forests (Alcázar et al., 2021; Instituto Humboldt, 2023).

Conversely, in Isla Grande and Tierra Bomba, despite having the lowest number of reports and informants, the expected low diversity of medicinal plants for dermatological conditions was confirmed. Both islands have undergone significant environmental transformation. Under original conditions, their vegetation cover consisted of approximately 75% tropical dry forest, but this percentage has been reduced to 45% and 17%, respectively (Romero and Niño, 2014). Among the most representative species found on both islands is *Gliricidia sepium* ("Matarratón"), which is used for the treatment of acne, fungus infections, abscesses, furuncles, and atopic/seborrheic dermatitis. This species presented an FI of 21.01% in the infectious disease category, which was consistent across all surveyed localities. However, for inflammatory skin conditions such as dermatitis, the FI was 16.67%.

The municipalities of Turbaco, Turbana, and Arjona, which are closely connected to urban and rural systems located within 10 km of each other, reported the highest number

Table 4: Number of species reports by category and subcategory, Informant Consensus Factor (ICF) and Fidelity Index (FI) values.

Category	Subcategory	Scientific Name	Reports	FI (%)
Infectious ICF:0.908	Acne, skin fungus, boils, and furuncles	*Gliricidia sepium* (Jacq.) Kunth ex Walp.	29	21.01
	Furuncles, skin fungus, abscesses	*Persea americana* Mill.	28	20.29
	Foot fungus, furuncles, skin fungus, and infected wounds	*Aloe vera* (L.) Burm. f.	27	19.57
	Skin spots, abscesses, infected wounds	*Azadirachta indica* A. Juss.	10	7.25
	Acne, foot fungus, abscesses, and infected wounds	*Momordica charantia* L.	9	6.52
	Foot fungus, skin spots, and abscesses	*Bursera graveolens* (Kunth) Triana	8	5.80
	Acne, foot fungus, and skin fungus	*Aspidosperma polyneuron* Müll. Arg.	4	2.90
	Skin fungus, skin spots, abscesses, and sores	*Cucurbita maxima* Duchesne	4	2.90
	Acne, foot fungus, skin fungus and spots on the skin	*Ricinus communis* L.	4	2.90
	Acne, abscesses, and sores	*Arnica montana* L.	3	2.17
	Skin fungus and boils	*Capsicum annuum* L.	3	2.17
	Sores and leishmaniasis	*Euphorbia tithymaloides* L.	3	2.17
	Acne, foot fungus, skin fungus, rashes	*Calendula officinalis* L.	2	1.45
	Acne, leishmaniasis	*Heliotropium indicum* L.	2	1.45
	Skin spots, abscesses	*Solanum americanum* Mill.	2	1.45
Inflammatory diseases ICF: 0.886	Psoriasis, atopic dermatitis, seborrheic dermatitis	*Malachra alceifolia* Jacq.	16	44.44
	Psoriasis	*Aloe vera* (L.) Burm. f.	8	22.22
	Atopic dermatitis, seborrheic dermatitis	*Gliricidia sepium* (Jacq.) Kunth ex Walp.	6	16.67
	Atopic dermatitis	*Cucurbita maxima* Duchesne	3	8.33
	Contact dermatitis	*Momordica charantia* L.	3	8.33
Insect bites ICF: 0.915	Mosquito bites, centipede bites, and bee stings	*Aristolochia anguicida* Jacq.	15	50.00
	Mosquito bites and bee stings	*Mammea americana* L.	6	20.00
	Mosquito bites, centipede bites	*Momordica charantia* L.	3	10.00
	Mosquito bites	*Rauvolfia tetraphylla* L.	3	10.00
	Mosquito bites, centipede bites	*Sida acuta* Burm. f.	3	10.00
Trauma ICF: 0.915	Wounds, inflammation, and hits	*Heliotropium indicum* L.	33	38.82
	Hits, pimples, sunburn, and heel spurs	*Bixa orellana* L.	27	31.76
	Heatstroke, hits, pimples, sunburn, and heel spurs	*Aloe vera* (L.) Burm. f.	22	25.89
	Heel spurs	*Opuntia caracassana* Salm-Dyck	3	3.54

of medicinal plant uses. These locations also showed a high level of consensus regarding the species used, particularly *Aloe vera*, *Gliricidia sepium*, *Persea americana*, *Aristolochia anguicida*, *Heliotropium indicum,* and *Malachra alceifolia*, similar to findings from Gómez-Estrada et al. (2011). Considering that 62 plant species belonging to 34 families have been recorded in these municipalities (Londoño-Lemos et al., 2022), the documentation of 17 species specifically used for skin conditions represents 27.4% of the reported flora. This underscores the significant role and cultural importance of traditional medicine in the Caribbean region of Colombia.

In the department of Bolívar, 50.9% of the population is male, and 49.1% is female (DANE, 2023). However, in this study, many participants were women, which could introduce sampling bias, as data collection took place during working hours, when men are typically engaged in labor activities. Despite this, a significant proportion (45.45%) of the reports came from male informants, indicating that traditional knowledge of medicinal plants is not strictly confined to gender roles. This finding aligns with Alberti-Manzanares (2006) study, who highlighted the crucial contributions of rural women to medicinal plant knowledge in Mexico. In

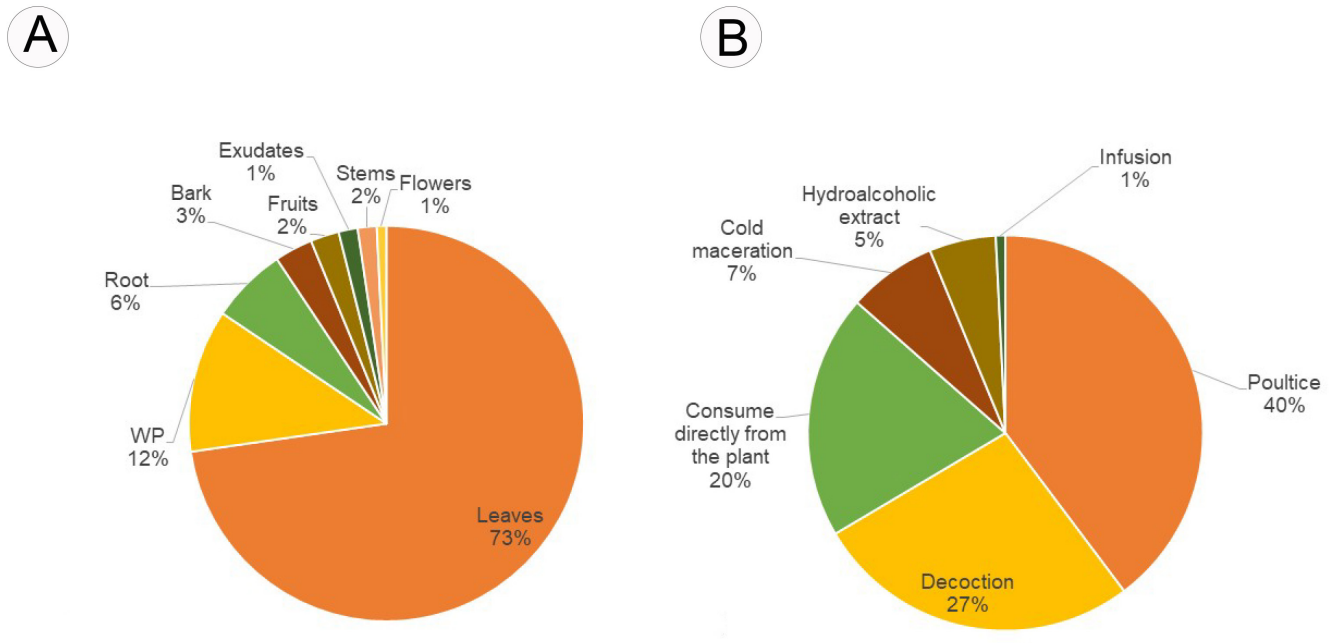

Figure 4: A. plant parts used; B. preparation methods.

contrast, in the study on the use of medicinal plants by the Nasa ethnic group in the Colombian Andes, most of the information was provided by older men (Paz-Perafán and Montenegro-Paz, 2024). Also, Duque et al. (2018) reported that women, particularly mothers and grandmothers, play a dominant role in the identification and preparation of herbal remedies in the semirural community of La Rosita, Puerto Colombia (Atlántico, Colombia).

Many studies report that older adults hold the most extensive knowledge regarding the medicinal uses of plants; however, this knowledge is gradually being lost, primarily due to migration to urban areas, where healthcare services and prescription medications are more accessible (Husain-Talero, 2021; Suárez Román and Coronado-Peña, 2022). Unfortunately, in this study, there were only two informants over the age of 70, with five reports from this age group. Nevertheless, the age group distribution of reports was consistent with recent ethnobotanical studies in other regions where the 50-59 age group generated the greatest number of reports (Addi et al., 2024). For the Colombian Caribbean, further research is needed to explore how ethnobotanical knowledge is transmitted across generations and the factors influencing this process. For example, a study in San Rafael, Puebla, Mexico, revealed that residence stability was more critical than age in the preservation of traditional knowledge (Canales Martínez et al., 2006). This suggests that cultural continuity and community ties may play crucial roles in maintaining traditional plant-based medicine in rural and semirural settings.

Categories and subcategories of skin conditions

Gómez-Estrada et al. (2011) described skin conditions as the most frequently reported health problems in northern Bolívar; however, their study did not subcategorize the types of conditions. The present study establishes specific categories, using causality as the primary classification criterion. Subcategories were created based on survey responses and aligned with TRAMIL recommendations from the "*Farmacopea vegetal caribeña*" (Germosen-Robineau, 2014). Skin conditions vary significantly between communities, depending on local terminology and cultural perceptions (Picking et al., 2015).

The ICF values obtained in this study reveal a high degree of agreement among participants regarding the use of medicinal plants for the treatment of ailments in each category, reflecting a consolidated dataset of traditional

knowledge. The highest consensus was recorded in the "Trauma" category (ICF=0.978), indicating that although the number of species is limited, they are well-recognized for the treatment of physical injuries. This finding is consistent with studies showing that common conditions in rural contexts tend to generate a strong consensus on the use of plants. Likewise, the categories of "Insect bites" (FCI=0.915) and "Infectious diseases" (FCI=0.908) also presented high values, possibly due to the relevance of these conditions in the rural context and the perception of effectiveness of specific plant species for their management. Although the "Inflammatory Diseases" category showed a slightly lower ICF (0.886), the value reflects considerable consensus, likely related to the broader and less specific nature of inflammatory symptoms, which tend to be treated with a wider variety of plants (Bazán-Castillo et al., 2023). Overall, these results demonstrate the cultural and functional importance of certain species within the local traditional medical system. Categories with higher ICF values could be considered priorities for future ethnopharmacological research, as a way of validating the therapeutic efficacy of empirical knowledge (Caunca and Balinado, 2021).

Unlike other ethnobotanical studies in which individualized ICF calculations are performed for each specific skin condition (Malik et al., 2019; Saising et al., 2022; Singhal and Dobhal, 2025), we categorized taking into account common causes. For example, within the category of inflammatory diseases, only those conditions that clearly have immunological components were included, while in the trauma category all those that the respondents could relate to a specific external cause or clear signs of infections were incorporated. Additionally, our study included the category of insect bites which we did not find in the cited studies, but that in the context of rurality represents an important cause of reports and that can subsequently trigger other problems such as superinfection or allergies.

Plant species most used for skin conditions

Among the most commonly used plant species to treat skin infections are *Gliricidia sepium*, known as "Matarratón" and *Persea americana*, known as "Avocado." *Gliricidia sepium* is traditionally used in the form of poultices or infusions, and its ethanolic extract has demonstrated antimicrobial activity against Gram-positive and Gram-negative bacteria, including *Staphylococcus aureus* Rosenbach 1884, *Enterococcus faecalis* Schleifer & Kilpper-Balz 1984, *Escherichia coli* (Migula 1895) Castellani & Chalmers 1919, *Proteus vulgaris* Hauser 1885, *Klebsiella pneumoniae* (Schroeter 1886) Trevisan 1887, and certain fungi (Juanico et al., 2023). Although *Gliricidia sepium* has also been reported in the category of inflammatory diseases, with common use in the treatment of dermatitis, very few studies have specifically addressed this application (Nison and Shrikumar, 2023). Nevertheless, recent studies have shown that treating wounds with the leaf extract significantly reduces the number of inflammatory cells and the expression of inflammatory markers such as IL-1β and IL-6 in an *in vivo* model of wound healing, possibly due to the high content of flavonoids, saponins and tannins, which act as anti-inflammatory agents and also promote wound healing (Aulanni'am et al., 2021; Wafaey et al., 2025).

On the other hand, the antibacterial and antifungal properties of *Persea americana*, particularly its leaf extracts, are strongly supported (Makopa et al., 2020), even against aminoglycoside-resistant *Klebsiella pneumoniae* strains (Kızılyıldırım et al., 2024). Notably, these two species had the highest FI in this category, highlighting their significant role within the studied communities. Furthermore, it has been shown that polyphenols present in methanolic extracts of *Persea americana* fruit help eliminate free radicals *in vitro* and n-hexane extracts of exocarps and seeds possess strong antityrosinase activity (Onyedikachi et al., 2024). It has been proposed that they may be useful compounds in the treatment of inflammatory skin diseases, considering that oxidative damage caused by UV rays and the activation of tyrosine kinases are triggers, such as conditions such as dermatitis, eczema, hyperpigmentation and premature aging (Hürkul et al., 2021).

Aloe vera or "Sábila" was reported for use in three of the four categories (infectious, inflammatory, and traumatic diseases). The gel extracted from its leaves is primarily applied as poultice, with an IF of 19.57 in the infectious disease category, 22.22 in the inflammatory disease category, and 25.89 for trauma management. This is not surprising, as its antibacterial properties have been widely demonstrated against skin infection-causing species, including

Staphylococcus aureus (Arbab et al., 2021), Additionally, its anti-inflammatory activity has been confirmed *in vitro* (Iosageanu et al., 2023), *in vivo* in atopic dermatitis models (Finberg et al., 2015) and in clinical trials as a wound-healing enhancer (Hekmatpou et al., 2019).

Azadirachta indica, commonly known as the "Neem tree", has been reported for use in the treatment of infected wounds. Recent studies highlight the ability of neem extracts and compounds to act against antibiotic-resistant and biofilm-forming organisms, as well as certain pathogenic microorganisms for which treatment options are limited (Wylie and Merrell, 2022). Considering that this plant is native to India and has a long history of traditional use, it is noteworthy that a review on the dermatological applications of neem found that its topical preparations are attributed with anti-inflammatory, antibacterial, analgesic, antiviral, antifungal, and immunomodulatory properties (Singh et al., 2021).

Momordica charantia, known in the Colombian Caribbean as "Balsamina," has also been reported as a medicinal plant used in three categories: infectious, inflammatory, and insect bite-related conditions. In Brazil, it is commonly referred to as bitter melon or "melão de São Caetano" (Bezerra and Medeiros-Bandeira, 2025). Studies have validated the antibacterial activity of its ethanolic leaf extract and some purified flavone glycosides against pathogenic bacteria such as *Proteus mirabilis* Hauser, 1885 and *Klebsiella pneumoniae* (Muribeca et al., 2022). A recent study reported that various compounds extracted from the fruit exhibit antibacterial activity against *Escherichia coli* and *Staphylococcus aureus*, antifungal effects against *Candida albicans* (Robin) Berkhout, and antiviral properties, including potent inhibition of HIV-1 reverse transcriptase (Aldholmi et al., 2024).

Additionally, research supports its anti-inflammatory properties (Bortolotti et al., 2019). *In vitro* treatment with hydroethanolic extracts from fruits and seeds attenuated TNF-α production in human lymphocytes stimulated with LPS (Fischer et al., 2022). However, some phytoconstituents of *M. charantia* may be cytotoxic. A study isolating four triterpenoids—momordicins I, II, IV, and (23E) 3β,7β,25-trihydroxycucurbita-5,23-dien-19-al (TCD)—from triterpenoid-rich fractions of fruit and leaf extracts found that momordicins I and II exhibited cytotoxicity (Zhang et al., 2012). Although momordicin IV and TCD did not affect cell viability, they altered the normal function of several intracellular pathways in murine peritoneal macrophage RAW 264.7 cells (Chou et al., 2022). In contrast, purified compounds such as momordicoside A, momordicoside L, karaviloside VI, karaviloside VIII, and charantoside XV reduced the expression of inflammasome-related genes upon LPS stimulation in the same RAW 264.7 macrophage cell line, specifically affecting IL-1β, NF-κB, NLRP3, Pycard, Casp1, HMGB1, and HMOX-1 expression (Perez et al., 2021). These apparently contradictory findings make it difficult to determine with certainty whether this plant possesses definitive anti-inflammatory properties.

Bursera graveolens, commonly known as "Palo Santo" was reported exclusively in the category of infectious diseases. Some studies indicate that its essential oil exhibits moderate antimicrobial activity against both extracellular and intracellular bacteria, including *Staphylococcus aureus, Bacillus cereus* Frankland & Frankland, 1887*, Listeria monocytogenes* (Murray, Webb & Swann 1926) Pirie 1940*, Clostridium perfringens* (Veillon & Zuber 1898) Hauduroy et al. 1937*, Escherichia coli*, and *Salmonella choleraesuis* (Smith, 1894) Weldin, 1927*,* as well as the fungus *Candida albicans* (Sotelo-Méndez et al., 2017). Additionally, it has been suggested that the oil may be active against *Salmonella enterica* (ex Kauffmann and Edwards 1952) Le Minor and Popoff 1987 and *Salmonella enteritidis* (Gaertner, 1888) Castellani & Chalmers*,* 1919 (Sánchez-Recillas et al., 2020). However, the available information remains scarce and inconclusive. It has been reported that the essential oil extracted from *Bursera simaruba* (L.) Sarg., commonly known as "Indio desnudo" or "Resbalamono" and traditionally used in folk medicine, exhibits antioxidant activity (BAH-Moustapha et al., 2014). A recent study also reported the antioxidant effects of *Bursera simaruba*, highlighting the need for further research to validate and better understand its ethnopharmacological uses—especially considering that this species has been reported to be widely distributed throughout the tropical dry forests of the Colombian Caribbean (Ravelo Martínez et al., 2024).

In the insect bite category, *Aristolochia anguicida*, known locally as "La contra," has been traditionally used in

the Colombian Caribbean. The infusion of its root achieved an FI of 50 for treating snake bites and was also reported to alleviate labor pain and act as an antiseptic and pain-relieving poultice for insect stings. Importantly, *A. anguicida* is considered a native species and was originally described based on samples collected in the surroundings of Cartagena, Bolívar, Colombia (González and Pabón-Mora, 2024).

Although information on the phytoconstituents, biological properties, and validation of the traditional use of *A. anguicida* is limited, an interesting study on the species *Aristolochia triangularis* Cham. from Brazil reported that both purified terpenoids and methanolic extracts and essential oils exhibited significant antimicrobial and antimycobacterial activity (Dalcol et al., 2021). For instance, the fractions containing kaur-16-en-19-oic acid and kaur-16-en-19-al acid demonstrated potent bactericidal activity against *Shigella sonnei* (Levine 1920) Weldi, 1927 and moderate-to-high activity against *Klebsiella aerogenes* (Hormaeche & Edwards, 1960) Tindall et al. 2017, *Salmonella enterica* serovar Typhimurium, *Pseudomonas aeruginosa* Carle Gessard 1882, *Staphylococcus aureus*, *Bacillus cereus* Frankland & Frankland 1887, and *Shigella flexneri* Castellani & Chalmers 1919. Additionally, other compounds inhibited the growth of *Candida krusei* (Castellani) Berkhout, and all tested extracts and fractions exhibited promising antimycobacterial activity, particularly against *Mycobacterium abscessus* (Moore & Frerichs 1953) Gupta et al. 2018, with nerolidol showing the highest antimycobacterial activity (Pereira et al., 2018). These findings suggest that *A. anguicida* may also be a source of highly bioactive compounds, highlighting the need to focus research efforts on this plant, which is native to the Colombian Caribbean region.

Mammea americana, commonly known as "Mamey" is a plant whose fruit has exceptionally high nutritional value (United States Department of Agriculture, 2018). Additionally, various parts of the plant are traditionally used by communities to prepare remedies for skin diseases, fever, inflammation, and as an insect repellent (Mosquera-Chaverra et al., 2022). It is well-established that pulverized seeds exhibit high toxicity against a wide range of insects (Lemus et al., 2021). In Colombia and the Caribbean islands, seed decoctions are used as a topical insecticide in animals to eliminate fleas and scabies mites (Boulogne et al., 2012). The same preparation or an aqueous infusion of the leaves is applied to the human scalp to treat lice infestations; other medicinal uses include bark decoctions such as cough suppressants and leaf infusions for reducing blood pressure (Germosen-Robineau, 2014). This study reports the traditional use of *M. americana* for alleviating skin discomfort caused by mosquitoes and bee stings. As shown in Appendix, the macerated bark and root are applied directly to the skin; however, no experimental studies have validated this use.

The trauma category, which included wounds, burns, and post trauma inflammation, featured *Heliotropium indicum* as the most frequently reported species (Table 4). The macerated leaf extract is applied to wounds, skin ulcers, boils, and conjunctivitis, overlapping with reports in the infectious disease category (Appendix). Despite its widespread medicinal use, *H. indicum* is often considered a weed owing to its common growth along roadsides (Cervantes-Ceballos et al., 2017). However, this species contains numerous bioactive phytochemicals, and studies have reported its antioxidant, analgesic, antimicrobial, anticancer, wound-healing, anti-inflammatory, and antiallergic properties, among others (Sarkar et al., 2021). Nevertheless, further rigorous studies in cellular, animal, and clinical models are needed to establish solid ethnopharmacological evidence, particularly for specific isolated compounds.

Similarly, *Bixa orellana*, commonly known as "Achiote," is a widely distributed species native to intertropical regions of the Americas. It is extensively used as a natural dye and for food seasoning (Rivera-Madrid et al., 2016). Strong evidence supports its analgesic, antioxidant, and antimicrobial effects (Coelho Dos Santos et al., 2022). Both species, *B. orellana* and *H. indicum*, were reported in the study about traditional medicine in the community of San Basilio de Palenque, observing consensus regarding the conditions to be treated, method of preparation and administration (Quintana Arias, 2016).

For the inflammatory disease category, *Malachra alceifolia,* known as "Malva," was the most reported species, particularly for the treatment of psoriasis and dermatitis (Table 4). Both conditions are immune disorders involving the production of proinflammatory cytokines (Schäbitz et al., 2021). However, information on the anti-inflamma-

tory properties of *M. alceifolia* remains scarce. In 2011, Gómez-Estrada studied the anti-inflammatory activity of this plant in a model of inflammation induced by LPS in the macrophage cell line RAW 264.7, finding that nitric oxide production was decreased (Gómez Estrada, 2011). Additionally, a 2022 systematic review on the phytochemical and medicinal properties of the genus *Malachra* L. described its use in community-based traditional medicine to treat various health conditions, including inflammatory diseases (Cervantes-Ceballos et al., 2022). However, specific studies focusing on the plant's active compounds and detailed mechanism-of-action analyses are still needed.

The predominant use of leaves and their application in the form of poultices reflect common trends in the region's traditional medicine, which are likely influenced by resource availability and the perceived effectiveness of these preparations. However, while some of the identified species have scientific support regarding their antimicrobial, anti-inflammatory, and wound-healing activities, it is crucial to conduct detailed phytochemical and pharmacological studies to validate their safety and efficacy, particularly those species that have a native distribution in the Colombian Caribbean.

Conclusions

In conclusion, this study highlights the importance of ethnobotanical knowledge in rural and semirural communities of the department Bolívar, where medicinal plants remain a fundamental therapeutic option for treating skin diseases. The results of this study contribute to the documentation of ethnobotanical knowledge in the Colombian Caribbean and highlight the need to preserve and value these traditional practices from both cultural and scientific perspectives.

The identification of species with high fidelity indices, such as *Gliricidia sepium*, *Persea americana*, *Heliotropium indicum*, *Bixa orellana*, *Mammea americana*, *Aloe vera* and *Malachra alceifolia* (Fig. 3), demonstrates strong uniformity in traditional knowledge, suggesting stable transmission of practices within these communities. Despite this uniformity, a decline in the intergenerational transmission of knowledge is observed, posing a risk to the continuity of these practices. Factors such as migration, access to conventional medicine, and sociocultural changes may contribute to this loss of traditional knowledge.

The strengthening of educational programs and initiatives aimed at preserving ethnobotanical knowledge in these communities, as well as integrating this knowledge into public health strategies, is recommended. Additionally, future research should focus on the biochemical characterization of the most used species and the evaluation of their therapeutic potential through clinical trials.

Author contributions

Conceptualization: SC, HG; Methodology: JS, MQ; Writing, review & editing: SC, JS; Investigation: SC, JS, MQ; Formal analysis: SC, JS; Resources: SC, JS; Validation: JS; Writing original draft: SC, JS; Supervision HG; Funding acquisition: SC, HG.

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Data availability statement

The data collected in this study were obtained by applying the "Ethnopharmacological Survey Form – Commitment Act No. 031 of 2021", and processing the data from the "da-

tabase" available at https://doi.org/10.48331/SCIELODATA.RADQTD

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Appendix: Plants, uses and preparations according to the categories and subcategories of skin diseases. WP= Whole plant.

Family	Plant species, "common name" and voucher (specimen number)	Category	Subcategory	Used part of the plant	State of the plant	Preparation	Administration
Apocynaceae	*Aspidosperma polyneuron* Müll. Arg. "Bolandero" (JBB33929)	Infectious	Acne, foot fungus, skin fungus and rashes	Plant bark	Fresh	Decoction	Topical use
Apocynaceae	*Rauvolfia tetraphylla* L. "Café de monte" (JBB33032)	Insect bites	Mosquito bites	Leaves	Fresh	Cold maceration	Oral
Aristolochiaceae	*Aristolochia anguicida* Jacq. "Curarina o contra" (COL000214178)	Insect bites	Mosquito bites, centipede bites, and bee stings	Root and WP	Indistinctly fresh or dried	Hydroalcoholic extracts, cold maceration	Oral, topical use
Asphodelaceae	*Aloe vera* (L.) Burm. f. "Sábila" (COL000214179)	Infectious, inflammatory and trauma	Abscesses, foot fungus, skin fungus; sores, psoriasis, burns, bruises, pimples, sunburn, heel spurs	Leaves	Fresh collection	Cold maceration, consumption of the plant	Oral, topical use
Asteraceae	*Arnica montana* L. "Árnica" (COL000214179)	Infectious	Acne, abscesses and sores	Leaves	Indistinctly fresh or dried	Poultice and decoction	Topical use
Asteraceae	*Calendula officinalis* L. "Calendula" (COL000229433)	Infectious	Acne and foot fungus	Leaves	Dried	Decoction	Topical use
Bixaceae	*Bixa orellana* L. "Achiote" (COL000430185)	Trauma	Bumps, pimples, heatstroke, sunburn and heel spurs	Leaves	Fresh	Decoction, poultice, take and put part of the plant directly	Topical use
Boraginaceae	*Heliotropium indicum* L. "Verbena" (JBB37104)	Infectious and trauma	Acne and leishmaniasis wounds, inflammation, and bruises	Leaves	Fresh	Poultice	Topical use
Burseraceae	*Bursera graveolens* (Kunth) Triana "Caraña" (JBB39814)	Infectious	Foot fungus, skin spots, and boils	Plant exudate and leaves	Fresh	Poultice, take and put part of the plant directly	Topical use
Cactaceae	*Opuntia caracassana* Salm-Dyck "Cardón" COL000161075)	Trauma	Heel spurns	Stem	Fresh or dried	Maceration, take and put part of the plant directly	Topical use

Appendix: Continuation.

Family	Plant species, "common name" and voucher (specimen number)	Category	Subcategory	Used part of the plant	State of the plant	Preparation	Administration
Calophyllaceae	*Mammea americana* L. "Mamey" (COL000117875)	Insect bites	Mosquito bites, centipede bites, and bee stings	Bark and root	Fresh or dried	Hydroalcoholic extracts, cold maceration, take and put part of the plant directly	Topical use
Cucurbitaceae	*Cucurbita maxima* Duchesne "Ahuyama" (COL000032668)	Infectious and inflammatory	Atopic dermatitis; skin fungus, spots on the skin, abscesses and sores	Leaves	Fresh	Poultice and cold maceration	Topical use
Cucurbitaceae	*Momordica charantia* L. "Balsamina" (JBB31412)	Infectious, inflammatory and insect bites	Acne, skin fungus, boils and sores, contact dermatitis, mosquito bites and centipede bites	Leaves and WP	Fresh or dried	Decoction and poultice	Topical use
Euphorbiaceae	*Euphorbia tithymaloides* L. "Bañol" (COL000453081)	Infectious	Sores and leishmaniasis	Leaves	Fresh	Take and put part of the plant directly	Topical use
Euphorbiaceae	*Ricinus communis* L. "Huiguereta" (COL000359635)	Infectious	Acne, foot fungus, skin fungus and spots on the skin	Leaves	Fresh	Poultice, take and put part of the plant directly	Topical use
Fabaceae	*Gliricidia sepium* (Jacq.) Kunth ex Walp. "Matarratón" (COL000431834)	Infectious and inflammatory	Acne, foot fungus, skin fungus and spots on the skin, atopic dermatitis and seborrheic dermatitis	Leaves WP	Fresh or dried	Decoction, poultice, take and put part of the plant directly	Topical use
Lauraceae	*Persea americana* Mill. "Aguacate-avocado" (COL000632202)	Infectious	Skin fungus and abscesses	Leaves WP	Indistinctly, fresh or dried	Decoction, poultice, and cold maceration	Topical use
Malvaceae	*Malachra alceifolia* Jacq. "Malva" (JBB37103)	Inflammatory	Psoriasis, atopic and seborrheic dermatitis	Leaves	Fresh or dried	Decoction and poultice	Topical use
Malvaceae	*Sida acuta* Burm. f. "Escobilla" (COL000140679)	Insect bites	Mosquito bites, centipede bites	Leaves and WP	Indistinctly, fresh or dried	Decoction and poultice	Topical use
Malvaceae	*Solanum americanum* Mill. "Yerbamora" (COL000359639)	Infectious	Skin spots, abscesses, and sores	WP	Indistinctly, fresh or dried	Decoction	Oral

Appendix: Continuation.

Family	Plant species, "common name" and voucher (specimen number)	Category	Subcategory	Used part of the plant	State of the plant	Preparation	Administration
Meliaceae	*Azadirachta indica* A. Juss. "Nim or Neem" (COL000452970)	Infectious	Spots on the skin, abscesses and sores	Leaves and WP	Fresh	Poultice and decoction	Topical use
Solanaceae	*Capsicum annuum* L. "Ají" (COL000032668)	Infectious	Skin fungus and abscesses	Leaves	Fresh	Poultice, take and put part of the plant directly	Topical use