International Journal of Biology Research
www.biologyjournal.in
ISSN: 2455-6548
Received: 28-01-2026; Accepted: 27-02-2026; Published: 14-03-2026
Volume 11, Issue 1, 2026, Page No. 23-28

Ethno botanical study of traditional plant-based cosmetic practices in the mettala region of Namakkal District, Tamil Nadu, India

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Abstract
Communities living in the Eastern Ghats have traditionally depended on indigenous plant resources for healthcare and personal well-being. Among these communities, Irular tribal women possess considerable knowledge regarding the use of local plant species for cosmetic and personal care purposes. The present study aimed to document the traditional plant-based cosmetic practices followed by Irular women residing in the Mettala Hills of Namakkal District, located in the Puthupatti Reserved Forest. An ethno botanical field survey was conducted during the winter season of 2022. Data were collected from 75 female informants representing three different age groups using structured questionnaires and semi-structured interviews. The study recorded 25 plant species belonging to 16 botanical families that are traditionally used by the Irular community for various cosmetic applications. The documented plants were primarily used to treat several skin and hair-related conditions. The most commonly reported uses included the treatment of pimples and acne (17%), reduction of dark circles and anti-aging effects (13%), promotion of hair growth and improvement of skin shine (12%), treatment of facial spots (10%), management of skin rashes, infections, and irritation (10%), enhancement of skin freshness and softness (8%), skin miniaturization (8%), reduction of wrinkles and freckles (8%), correction of skin and hair pigmentation (6%), improvement of natural skin tone and glow (3%), control of body odour (3%), and removal of facial hair (2%). This study represents one of the first attempts to document the cosmetic dimension of ethno botanical knowledge in the study area. The findings highlight the rich traditional knowledge maintained by Irular women regarding plant-based cosmetic practices. Further comprehensive studies are recommended to systematically document, validate, and preserve this valuable indigenous knowledge, which may also contribute to the development of natural cosmetic products in the future.

Keywords: Ethno botany, herbal cosmetics, traditional knowledge, irular tribe, medicinal plants, eastern ghats

Introduction

According to the World Health Organization (WHO), more than 80% of the population in developing countries relies on traditional medicine to fulfil their primary healthcare needs (Shankar and Majumdar, 1998) [18]. Traditional medicinal systems, particularly those based on plant resources, play a vital role in maintaining community health in many rural and indigenous societies. The Eastern Ghats, one of the prominent hill ranges of peninsular India, are predominantly composed of geological formations such as charnockites, granite gneiss, khondalites, metamorphic gneisses, and quartzite. Structurally, the region is characterized by thrusts and strike–slip faults and is commonly described as a discontinuous range of hills (Sriramadas, 1967) [20].

Mettala village is located in the Namagiripettai Union of Namakkal district in the state of Tamil Nadu, India. This region is rich in plant biodiversity and possesses a long-standing tradition of utilizing plant resources for medicinal and cosmetic purposes. The discipline of Ethno botany integrates taxonomic, morphological, ecological, and anthropological perspectives to understand the cultural relationships between human communities and plant resources (Ali and Qaisar, 2009; Everest and Ozturk, 2005) [9, 5]. Medicinal plants are widely used worldwide for the treatment of various ailments, infections, and physiological disorders. It has been reported that nearly 70% of the population residing in the Himalayas depends on ethno medicinal practices for primary healthcare (Shaheen *et al*., 2012a) [16]. Ethno botanical practices remain widely accepted among rural populations due to the accessibility of plant resources, their therapeutic effectiveness, and relatively minimal side effects.

The origins of cosmetology are believed to date back to ancient civilizations such as Egypt and India. Historical records indicate that cosmetic substances and their applications were documented as early as 2500–1550 B.C. in the Indus Valley Civilization (Lal, 2002) [14]. Herbal cosmetics represent a significant natural resource and are regarded as valuable gifts of nature. These products are typically formulated using approved cosmetic ingredients as a base, to which one or more herbal components are incorporated to provide specific cosmetic benefits (Gediya *et al*., 2011) [8].

In recent decades, however, traditional ethno botanical knowledge, particularly concerning cosmetic applications, has been rapidly declining. One of the major challenges of the modern era is the gradual loss of indigenous knowledge systems due to cultural transitions and modernization. Younger generations often prefer allopathic medicines and commercially manufactured cosmetic products, leading to a reduced transmission of traditional practices (Uninal *et al*., 2006). The conservation and documentation of ethno botanical knowledge are therefore essential and largely depend on indigenous communities who have preserved and transmitted this knowledge across generations (Shrestha and Dhillion, 2003) [19]. Although significant research has been conducted in the field of ethno botany, the cosmetic applications of plants in this region have received comparatively limited attention. Hence, the present study aims to document and analyse the cosmetic value of plant species used by local communities and to create awareness among younger generations regarding the importance of traditional plant-based cosmetic practices.

Materials and Method

Study Area

The present investigation was conducted in the Mettala region. Mettala is situated within Karkudalpatti village, particularly in the Puthupatti Reserved Forest area of Namakkal district in the state of Tamil Nadu, India. Geographically, the area is positioned at a latitude of 11.229592 and a longitude of 78.171158, with an average elevation of approximately 1125 meters above sea level. The elevation of the Mettala hills ranges from about 800 to 1200 meters. The region is characterized by moderately dense forest vegetation covering an area of nearly 217 square kilometres. The annual rainfall in this region varies between approximately 15.6 mm and 64.4 mm.

The Mettala hills support a wide variety of herbal plant species that are traditionally used by local communities. The estimated population of the Eastern Ghats region is about 1.5 million people, with an average population density of around 48 individuals per square kilometre. Many local inhabitants are engaged in the collection and sale of herbal plant materials such as leaves, roots, and tubers. From a floristic perspective, the study area falls within the Eastern Ghats moist temperate province (Shaheen *et al*., 2012b) [17], which is known for its rich plant diversity and ethno botanical significance.

Data Collection

An ethno botanical field investigation was undertaken during the winter season of 2022 in the Mettala region of Namakkal District. For the purpose of the study, seventy-five informants were selected and grouped into three age categories to examine the distribution of traditional knowledge among different generations. The first category consisted of twenty-five children below 10 years of age, representing the pre-reproductive stage. The second group included twenty-five individuals aged between 14 and 24 years, representing the reproductive stage. The third category comprised twenty-five adults aged between 25 and 45 years, representing the post-reproductive stage.

Information related to ethno botanical practices and demographic characteristics was collected through semi-structured interviews using open-ended questionnaires. This method enabled respondents to freely share their traditional knowledge regarding cosmetic herbs. The questionnaire was designed to obtain detailed information on the collection, preparation, and utilization of medicinal plants for cosmetic purposes. Special attention was given to documenting plants used in the treatment of common skin infections and other dermatological conditions.

In addition, data regarding the vernacular names of plants, their natural distribution, and the procedures involved in preparing and applying herbal cosmetic formulations were systematically recorded from the informants. The study primarily aimed to document and evaluate the traditional cosmetic applications of medicinal plants used by local communities in the Mettala region of the Puthupatti Reserved Forest.

Plant species mentioned by the respondents were identified and authenticated with the help of standard taxonomic literature, including the works of Gamble and Fischer (1935) [7], Bor (1960) [3], Henry *et al*. (1987, 1989) [9, 10], and Matthew (1991) [15]. The collected information was then organized according to the taxonomic classification of the recorded plant species along with their local names and ethno botanical uses. Furthermore, the dataset was analysed to understand patterns related to the respondents' age and gender, preferences in plant usage, the specific plant parts utilized, and the different methods of preparation and application employed in traditional cosmetic practices.

Result

This study provides information on the indigenous uses of 25 important plants belonging to 16 families by the local women for various cosmetic purposes (Table1,2).

Table1. Cosmetic ethno botanical applications recorded from Mettala Hills.

S.No	Botanical Name	Local Name	Plant Part used	Uses
1.	*Senna auriculata*	Avaram poo	Flowers	Cleanses the skin and removes black marks and dark circles under the eyes.
2.	*Glycyrrhiza glabra*	Athimathuram	Bark	Skin whitening and reduces dark spots.
3.	*Kapoor kachri*	Poolankilangu	Rhizome	Anti- bacterial properties and a good remedy for acne.
4.	*Chrysopogon zizanioides*	Vetiver	Root	Skin cell regeneration and boosting the growth of new cells.
5.	*Acorus calamus*	Vasambu	Rhizome	Prevent premature aging, detoxifies the skin and remove dirt from the pores.
6.	*Psoralea corylifolia*	Karboga arisi	Seeds	Curing several skin condition and other acute ailments such as Vitiligo, Psoriasis, Leucoderma and Leprosy.
7.	*Cyperus rotundus*	Korai kilangu	Roots	It helps to even out skin tone and acts as a natural astringent.
8.	*Curcuma aromatica*	Kasthuri manjal	Rhizome	Improves skin tone and naturally glowing skin.
9.	*Trigonella foenum*	Venthayam	Seeds	Reduces blemishes and dark circles. Anti-Aging property.
10.	*Vingna radiate*	Green gram	Seeds	Naturally exfoliate the skin and clear of dead cells making the skin brighter and supple.
11.	*Terminalia catappa*	Patham paruppu	Seeds	It is a good source of copper, which plays a role in skin and hair pigmentation.
12.	*Hibiscus rosa-sinensis*	Sembaruthi	Flowers	Makes hair smooth and silky, prevent baldness, delays premature grey hairs.
13.	*Gloriosa superba*	Malligai poo	Flowers	Prevents dry skin and skin moisturizer.
14.	*Ixora coccinea*	Idly poo	Flowers	Flower oil is helpful in conditions like scabies, eczema, and other skin infections.
15.	*Mentha spicata*	Pudina	Leaves	Mint oil is used to cure irritation and itchiness on skin and scalp.
16.	*Azadirachta indica*	Veppamaram	Leaves	Treats acne, reduces blemishes and fights signs of ageing.
17.	*Rosa indica*	Rose	Flowers	It has cooling, soothing and Moisturizing properties. It helps to maintain your skin's PH balance.
18.	*Citrus limon*	Lemon	Fruit	Fight dark circles and sun damage due to its cooling effects on the skin.
19.	*Artemisia pallens*	Marikolunthu	Leaves	Excellent moisturizer for scalp and skin.
20.	*Camphora officinarum*	Pachai	Leaves	Treat acne and soothe skin Rashes.

		karpooram		
21.	*Ocimum tenuiflorum*	Tulsi	Leaves	Preventing black heads, acne and relieves skin infections.
22.	*Santalum album*	Sandalwood	Bark	It helps in the removal of tan and dullness because of its cooling properties.
23.	*Curcuma longa*	Manjal	Rhizome	It treats oxidative free radicle damage and other skin woes.
24.	*Nelumbo nucifera*	Thamarai	Leaves	To maintain skin healthy and clean.
25.	*Tagetes erecta*	Samanthi poo	Flowers	Slow aging and Treat chronic skin Diseases.

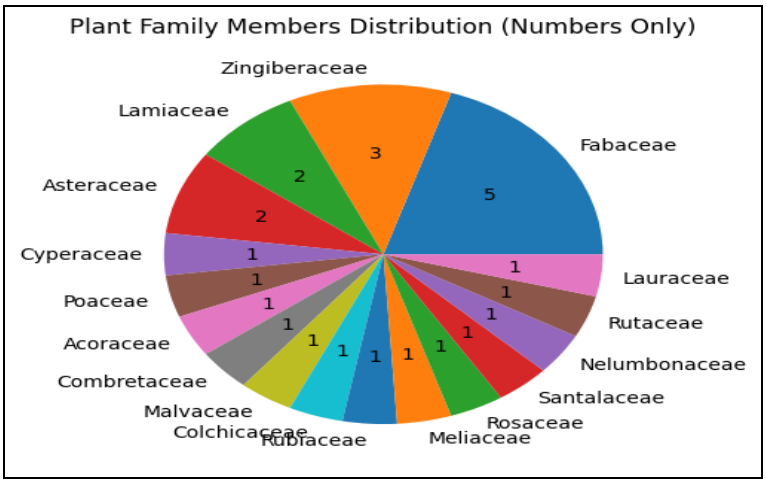
Predominant family Fabaceae 5 members and *Zingiberacea 3, Lamiaceae*, Astraceae each two members. Cyperaceae, Poaceae, Acoraceae, Comberetaceae, Mlavaceae, Colchicaceae, Rubiaceae, Meliaceae, Rosaceae, Santalaceae, Nelumbonaceae, Rutaceae, Lauraceae had 1 member each (Figure 1; Table 2).

Table 2: List of plants species having cosmetic applications in Mettala Hills

S.NO	Botanical Name	Local Name	Family
1.	*Senna auriculata (L).*	Avaram poo	Fabaceae
2.	*Glycyrrhiza glabra (Licorice)*	Athimathuram	Fabaceae
3.	*Kapoor kachri*	Poolankilangu	Zingiberaceae
4.	*Chrysopogon zizanioides L.*	Vetiver	Poaceae
5.	*Acorus calamus L.*	Vasambu	Acoraceae
6.	*Psoralea corylifolia Linn.*	Karboga arisi	Fabaceae
7.	*Cyperus rothundus L.*	Korai kilangu	Cyperaceae
8.	*Curcuma aromatica*	Kasthuri manjal	Zingiberaceae
9.	*Trigonella foenum L.*	Venthayam	Fabaceae
10.	*Vinga radiata (L.)R.Wilczek.*	Green gram	Fabaceae
11.	*Terminalia catappa L.,*	Patham paruppu	Combretaceae
12.	*Hibiscus rosa-sinensis L.,*	Sembaruthi	Malvaceae
13.	*Gloriosa superba L.,*	Malligai poo	Colchicaceae
14.	*Ixora coccinea L.*	Idly poo	Rubiaceae
15.	*Mentha spicata L.*	Pudina	Lamiaceae
16.	*Azadirachta indica A.Juss.*	Veppamaram	Meliaceae
17.	*Rosa indica L.*	Rose	Rosaceae
18.	*Citrus limon L.*	Lemon	Rutaceae
19.	*Artemisia pallens Wall.ex Dc*	Marikolunthu	Astraceae
20.	*Camphora officinarum Nees, PI. Asiat. Rar.*	Pachai karpooram	Lauraceae
21.	*Ocimum tenuiflorum Linn.*	Tulsi	Lamiaceae
22.	*Santalum album (L).*	Sandal wood	Santalaceae
23.	*Curcuma longa L.*	Manjal	Zingiberaceae
24.	*Nelumbo nucifera*	Thamarai	Nelumbonaceae
25.	*Tagetes erecta L.*	Samanthi poo	Asteraceae

The local women were using the plants for various cosmetic purpose in 25 different uses (Table1). The prominent problems were pimples, acne (17%); Hair growth, skin shine (12%); Anti-aging and dark circles (13%); Facial spots (10%); skin Rashes, skin infection and irritation (10%); skin freshness and softening (8%); skin moisturizing (8%); Wrinkles and Freckles (8%); skin and hair pigmentation (6%); skin tone and naturally glowing (3%); body smell (3%); and Facial hair (2%); (Table 1, Figure2).The major plant parts utilized in herbal cosmetic uses included flowers (30.8%), Leaves (25.2%), seeds (14.4%) roots (5.9%), rhizomes (8.9%), bark (6.9%) and stem (5.9%)Fruit (2.0%)[Figure 3].

Predominant Plant Families



Cosmetic Ethno botany of Mettala Hills

Fig 1: Predominant plant families utilized in cosmetic ethno botany in Mettala hills

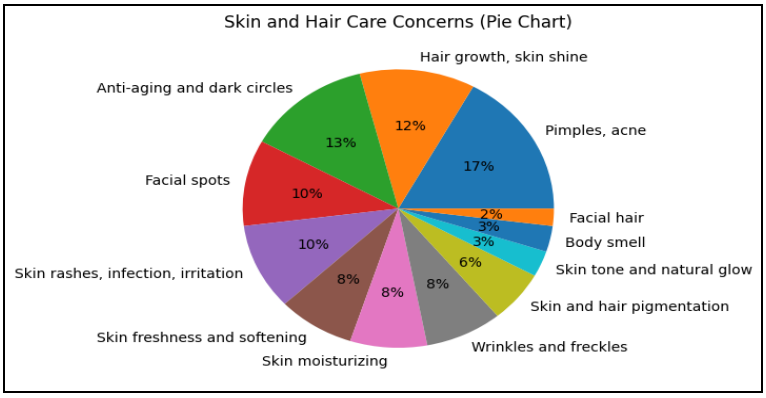


Fig 2: Major applications of cosmetic herbs among the locals in the Mettala Hills

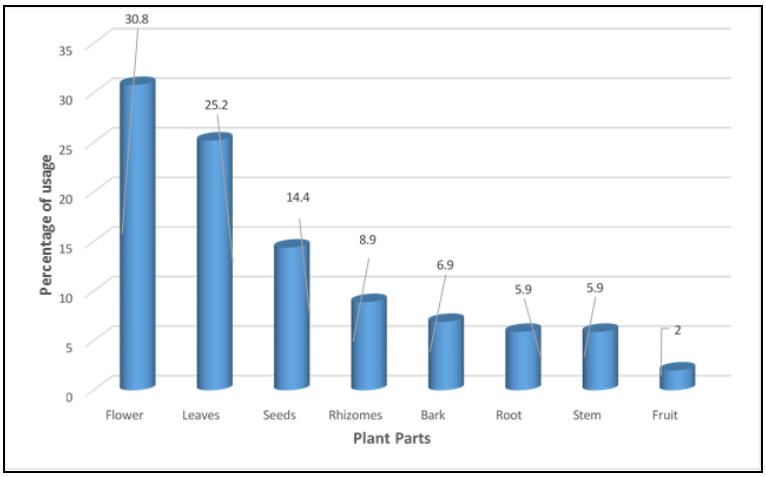


Fig 3: Proportion of herbal parts used in cosmetic uses

Discussion

The present study highlights the significant role of medicinal plants in the treatment and management of various skin-related disorders. The findings emphasize that herbal remedies continue to serve as an important component of primary healthcare among rural and indigenous communities. Traditional plant-based treatments are widely practiced due to their accessibility, cultural acceptance, and relatively low cost. Previous studies have indicated that nearly 80% of the population in India depends on herbal medicine for the treatment of various ailments (Farnsworth, 1993) [6]. This widespread reliance reflects the deep-rooted relationship between local communities and plant resources, particularly in regions where modern healthcare facilities are limited.

The results of this investigation further demonstrate that women possess extensive knowledge regarding the identification, preparation, and application of medicinal plants used for cosmetic and dermatological purposes. Their understanding includes details such as the plant parts utilized, preparation techniques, dosage, and methods of application. Women often play a central role in the preservation and transmission of ethno botanical knowledge within families and communities. Earlier research has also highlighted there reliability and importance of such indigenous knowledge systems in traditional healthcare practices (Kapur, 1991) [11]. The credibility of the information provided by the respondents in the present study suggests that local communities maintain a well-developed understanding of plant-based cosmetic remedies.

This study represents an important step toward documenting the cosmetic applications of medicinal plants in the Mettala region of the Puthupatti Reserved Forest. Although ethno botanical studies have been conducted in various parts of India, limited research has specifically focused on herbal cosmetic practices in the Eastern Ghats. Therefore, the present investigation contributes valuable baseline information regarding the diversity and utilization of cosmetic herbs in the region. However, further systematic and multidisciplinary studies involving pharmacological, phytochemical, and clinical investigations are necessary to scientifically validate the therapeutic potential of these traditional cosmetic formulations.

The findings also indicate that rapid socio-economic development and cultural transformations are influencing traditional knowledge systems in the Eastern Ghats. Increasing urbanization, modernization, and changes in lifestyle have gradually altered the interaction between local communities and plant resources (Khan *et al*., 2011) [13]. As a result, the transmission of indigenous knowledge from older generations to younger individuals is declining. The present study observed that younger informants possessed comparatively less knowledge about medicinal and cosmetic plants, indicating a gradual erosion of traditional ethno botanical practices.

Similar observations have been reported in ethno botanical studies conducted in other regions of the world. Investigations carried out in Ethiopia (Bekalo *et al*., 2009) [2], Turkey (Everest and Ozturk, 2005) [5], and Himachal Pradesh, India (Uniyal *et al*., 2006) [21] also documented the widespread use of medicinal plants for dermatological

treatments and highlighted the importance of preserving indigenous knowledge. The declining trend of traditional knowledge, particularly among younger generations, appears to be a common phenomenon in many rural societies undergoing socio-cultural transition.

Furthermore, several scholars have emphasized the urgent need to document and conserve indigenous plant knowledge before it disappears completely (Ali and Qaisar, 2009; Bor, 1960; Matthew, 1991) [1, 2, 3, 15]. The loss of such knowledge not only threatens cultural heritage but may also lead to the disappearance of valuable medicinal resources that have potential applications in modern pharmacology and cosmetic industries. Therefore, initiatives should be undertaken to promote awareness among younger generations regarding the importance of traditional plant knowledge. Educational programs, community participation, and documentation projects can play a crucial role in safeguarding this knowledge.

In addition, sustainable harvesting practices and the domestication of valuable cosmetic plants should be encouraged to ensure their long-term conservation. Cultivation of important medicinal species could reduce pressure on wild populations while also providing economic opportunities for local communities. Integrating traditional knowledge with scientific research may further contribute to the development of safe and effective herbal cosmetic products. Such efforts would not only support biodiversity conservation but also strengthen the socio-economic well-being of rural populations dependent on plant-based resources.

Conclusion

This study documented the diversity of plant species used for cosmetic purposes in the Mettala Hills of Namakkal District and highlighted their traditional uses among the Irular tribal community. The research represents one of the first ethno botanical investigations specifically focusing on traditional cosmetic practices among Irular women in this region. A total of 25 plant species belonging to 16 families were recorded as being used in the preparation of traditional cosmetics. Among these, eight species were frequently reported by a large proportion of informants and were considered the most commonly used cosmetic plants.

The results revealed that traditional cosmetic preparations are mainly used for facial care and beautification, followed by applications related to hair and skin care. Leaves were identified as the most commonly utilized plant part in cosmetic preparations, while bark and stem wood were used less frequently. Different preparation techniques were observed, including maceration and decoction, which help extract useful substances from plant materials. In some cases, smoking was also mentioned as a traditional method associated with cosmetic practices.

The study further demonstrated the rich plant diversity and strong traditional knowledge possessed by Irular women regarding cosmetic plant use. The information provided by the respondents was found to be reliable and reflected a long-standing tradition of plant-based personal care practices. Traditional cosmetics play an important role in maintaining cultural identity, as the use of particular plant species is closely connected with local customs, beliefs, and cultural traditions. For Irular women, these practices not only serve personal care needs but also strengthen their cultural ties and heritage.

In addition, the preparation and use of natural cosmetic products contribute to women's sense of confidence and independence. Knowledge of plant resources and traditional preparation methods provides women with a sense of pride and control over their personal care practices. However, these traditions are gradually declining due to the increasing influence of commercial cosmetic products promoted through modern media and advertising.

Therefore, it is important to encourage awareness among younger generations about the cultural significance of traditional cosmetic knowledge. Community-based programs aimed at revitalizing traditional practices could play a key role in preserving this heritage. At the same time, careful management of plant resources is necessary, since excessive harvesting of cosmetic plants may lead to environmental damage and loss of biodiversity. Promoting sustainable harvesting methods will help ensure that these valuable plant resources remain available for future generations.

Although the present study mainly focused on the cosmetic uses of plants, many of the recorded species may also have medicinal importance. Further research is therefore recommended to explore their broader ethno botanical value, including their therapeutic properties and multiple uses. This study provides a preliminary foundation for future investigations and contributes to a better understanding of traditional plant knowledge in the study area.

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