



Ethnobotanical Survey of Ornamental and Cosmetic Plants Used by Women in the Abyan Delta Region, Yemen

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ABSTRACT

This study aimed to document the traditional use of plants and their products for cosmetic and dermatological purposes in Abyan, Yemen. A total of 22 plant species belonging to 17 families were recorded, with Malvaceae and Asteraceae being the most represented. Leaves were the most frequently utilised plant part, followed by fruits, while seeds, oils, flowers, and bark were used less commonly. The recorded applications included hair care, skin care, health-related cosmetic benefits, and ornamental or aromatic uses. Regional comparisons with Northeastern Ethiopia and Egypt revealed similarities in preferred species and cosmetic functions, reflecting a shared ethnobotanical heritage and the cultural and biological significance of these plants. The findings indicate that the people of the Abyan Delta possess a well-developed traditional knowledge system integrating plants into cosmetic, cultural, and medicinal practices, highlighting their potential as candidates for the development of safe and effective natural cosmetic products. The study also emphasises the need for future phytochemical and pharmacological investigations to validate bioactive compounds and to explore their applications in modern cosmetic and pharmaceutical industries.

توثيق الاستخدام الشعبي لنباتات الزينة والتجميل التي تستخدمها النساء في دلتا أبين، اليمن

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الكلمات المفتاحية:

أبين.
اليمن.
النباتات التجميلية.
الإثنوبوتانيات.
العناية بالشعر.
المنتجات الطبيعية.
العناية بالبشرة.
المعرفة التقليدية.

الملخص

هدفت هذه الدراسة إلى توثيق الاستخدام التقليدي للنباتات ومنتجاتها للأغراض التجميلية والجلدية في أبين، اليمن. تم تسجيل ما مجموعه 22 نوعاً نباتياً تنتمي إلى 17 فصيلة، حيث كانت الفصيلة الخبازية (Malvaceae) المركبة (Asteraceae) الأكثر تمثيلاً. وكانت الأوراق أكثر الأجزاء النباتية استخداماً، تلتها الثمار، في حين استخدمت البذور والزيت والزهار واللحاء بشكل أقل شيوعاً. شملت التطبيقات المسجلة العناية بالشعر، والعناية بالبشرة، والفوائد التجميلية المتعلقة بالصحة، والاستخدامات الزينة أو العطرية. وأظهرت المقارنات الإقليمية مع شمال شرق إثيوبيا والقاهرة، مصر، وجود تشابه في الأنواع المفضلة ووظائفها التجميلية، مما يعكس تراثاً إثنوبوتانياً مشتركاً والأهمية الثقافية والبيولوجية لهذه النباتات. وتشير النتائج إلى أن سكان دلتا أبين يمتلكون نظام معرفة تقليدية متطوراً يدمج النباتات في الممارسات التجميلية والثقافية والطبية، مما يبرز إمكاناتها لتطوير منتجات تجميلية طبيعية آمنة وفعالة. كما تؤكد الدراسة على الحاجة لإجراء بحوث كيميائية دوائية وفيزيولوجية مستقبلية للتحقق من المركبات الفعالة واستكشاف تطبيقاتها في الصناعات التجميلية والصيدلانية الحديثة.

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1. Introduction

Since ancient times, plants and perfumes have constituted an integral part of women's adornment and beauty practices. In ancient Egypt, Queen Hatshepsut dispatched a fleet to the Land of Punt (modern-day Somalia) to import seeds and seedlings of aromatic and food plants. Grain and cedar wood were also imported from Phoenicia (modern-day Syria and Lebanon), and special attention was paid to their cultivation and maintenance. Phoenician specialists were employed to ensure their successful growth and adaptation [1].

During the reign of Cleopatra, the art of cosmetics flourished significantly, encompassing a wide range of preparations including moisturisers, cleansers, facial powders, and kohl used for eye adornment. Women also utilised depilatory pastes, nail polishes and removers, in addition to mouth and dental cleansing preparations [2]. With the rise of Islamic civilisation, this accumulated knowledge was translated, assimilated, and further developed. Botanical science and skincare practices were documented in Islamic medical literature, where essential oils and aromatic substances were widely employed for therapeutic purposes. Cosmetic preparations also became widespread within royal courts, as women devoted considerable care to beauty and personal grooming [3].

Yemeni women have likewise maintained a close and enduring relationship with plants since ancient times. They have traditionally derived from plants both body and hair adornments as well as natural preparations used for personal care. This practice reflects the strong connection between the local environment and the social and cultural identity of Yemeni women.

To document this plant-related cultural heritage, the present study aims to record plant species used for adornment and beauty by women in the Abyan Delta region. This documentation contributes to preserving intangible cultural heritage that integrates aesthetic practices with traditional botanical knowledge.

Plants have been used for cosmetic and personal care purposes for centuries, and several regional and international studies have documented this ethnobotanical heritage. In northeastern Ethiopia, X et al. [4] recorded plant species traditionally used for hair and skin care. In Egypt, X et al. [5] documented the use of 42 plant species for cosmetic applications, highlighting the continued importance of plant-based beauty practices.

In Yemen, studies have largely focused on medicinal uses of plants, with limited attention to cosmetic applications. One of the most relevant studies is that of X et al. [6], conducted in five coastal areas of Hadramout Governorate (Mukalla, Ghail Bawazir, Al-Shihr, Al-Dis, and Qusai'r). The study documented 51 plant species used for cosmetic and ornamental purposes, including *Lawsonia inermis* (henna), *Ziziphus spina-christi* (sidr), *Aloe inermis* (aloe), *Boswellia sacra* (frankincense), *Cocos nucifera* (coconut), and *Sesamum indicum* (sesame).

The study also described preparation methods for hair care, skin care, bridal beautification, postpartum care, perfuming, henna decoration, and fumigation. Regional variation was observed, with Ghail Bawazir recording the highest frequency of plant use. The researcher recommended conserving threatened species such as frankincense and sidr and establishing a research centre for the preservation of cosmetic ethnobotanical heritage in Hadramout.

Despite this rich cultural heritage, there is a clear lack of scientific documentation on ornamental and cosmetic plants used specifically by women in the Abyan Delta region. Previous studies have not sufficiently examined plant types, parts used, or their cultural significance. This study therefore addresses a major research gap by providing the first systematic ethnobotanical documentation of cosmetic and ornamental plants in this region. Documenting these practices is essential for preserving intangible cultural heritage, particularly as traditional knowledge is increasingly threatened by modernisation. Furthermore, identifying commonly used plants may contribute to the development of safe, accessible, and culturally relevant natural cosmetic products.

This study aims to:

- Document plants used in the Abyan Delta for cosmetic, hair, and skin care purposes.
- Identify the most commonly used plant parts and their applications.

- Compare traditional knowledge with other regions to highlight shared ethnobotanical heritage.
- Assess the potential of these plants for natural cosmetic product development.

2. Materials and Methods

2.1. Study Area

The Abyan Delta is located in Abyan Governorate in southern Yemen and represents one of the most important agricultural regions in the country. The delta is a triangular alluvial plain formed by the branching of the main wadi channel into the deltas of Wadi Bana and Wadi Hussin [7]. It lies between latitudes 13°13' N and longitudes 45°10'–45°30' E, extending southwards to the Gulf of Aden, while the northern mountainous chains form the foothills of the Yemeni Highlands from which Wadi Bana originates [8]. Fig. 1.

The delta is bordered by Wadi Bana to the west and Wadi Hussin to the east and stretches from the northern areas of Batis and surrounding villages to the coastal plain of the Gulf of Aden. It has an approximate width of 4 km and a length of about 19 km. The total area of the delta is estimated at around 134,000 hectares, of which approximately 24,000 hectares are cultivated using flood irrigation systems [7].

The Abyan Delta was selected as the study area due to its high plant diversity and its long history of traditional agricultural practices. The region is also well known for preserving traditional knowledge related to plant based cosmetic and medicinal uses, particularly among local women.

2.2 Methodology

This study was conducted in the Abyan Delta during the 2025 growing season with the aim of documenting plant diversity and traditional cosmetic uses among local communities. The research followed a descriptive exploratory ethnobotanical approach to investigate the relationship between plant species and their traditional cosmetic applications.

Plant samples were collected from different habitats across the delta using a stratified random sampling method to ensure representation of the main ecological zones. Various plant parts, including leaves, stems, seeds, and flowers, were collected according to their reported traditional uses.

Species identification was carried out using standard botanical references, particularly Flora of Yemen [9,10]. Voucher specimens were prepared and preserved as reference materials to confirm the taxonomic identification of the recorded species.



Fig. 1: Study area of the Abyan Delta, Yemen [11]

Ethnobotanical information was obtained through semi structured interviews with 50 local informants from different communities in the Abyan Delta. The majority of the participants were women (40 participants, 80%), particularly elderly women and experienced household practitioners who possess traditional knowledge related to cosmetic plant uses. The remaining 10 participants (20%) consisted of local farmers and community elders who were consulted to provide complementary information regarding plant availability and traditional practices in the region. The interviews documented

information related to local plant names, preparation methods, modes of application, and perceived cosmetic benefits. The collected data were analyzed descriptively using Microsoft Excel to determine species frequency, plant parts used, and types of traditional cosmetic applications. The results were presented in tables and charts to facilitate interpretation and comparison Fig. 2.

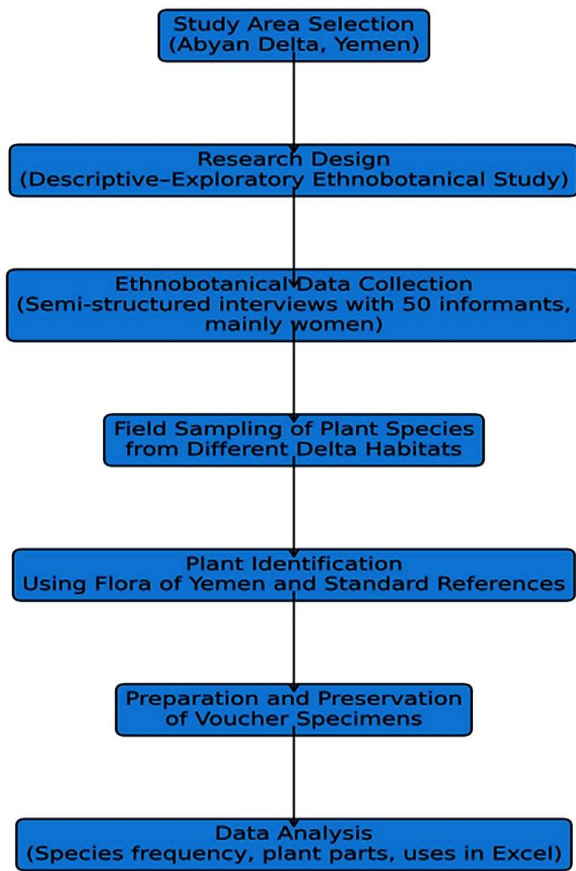


Fig. 2: Methodology Flowchart for the Ethnobotanical Study in Delta Abyan

3. Results

The present study recorded a total of 22 plant species belonging to 17 families that are traditionally used for cosmetic and dermatological purposes in Abyan, Yemen. Among these families, Malvaceae and Asteraceae were the most represented, each contributing three species Fig. (3)., while the remaining families were represented by a single species. This distribution indicates that certain plant families are particularly valued for their cosmetic properties, reflecting the focused selection of species based on their traditional uses Table (1).

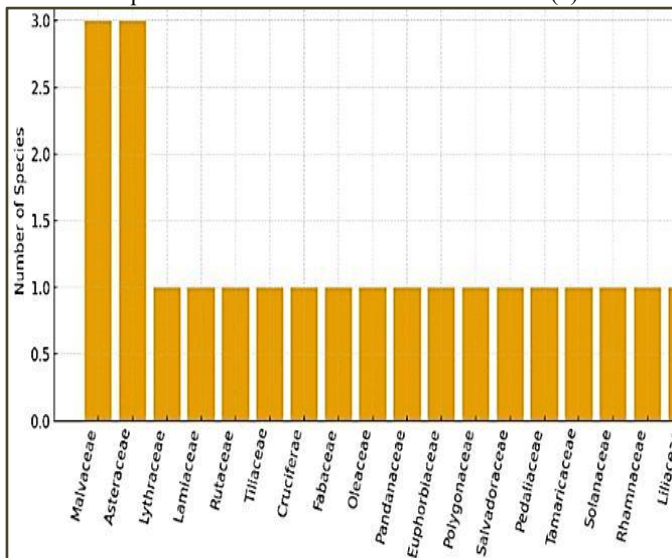


Fig. 3: Dominant Plant Families Used for Cosmetic and Ornamental Purposes

Analysis of the plant parts utilized revealed that leaves were the predominant component, accounting for 63.2% of uses, followed by fruits at 15.8%. Seeds, oils, and flowers were used less frequently Fig. (4), while bark was the least commonly applied part, appearing only in the use of *Tamarix aphylla*. The predominance of leaves is consistent with traditional practices, as they are easily available, renewable, and typically rich in bioactive secondary metabolites. Fruits and seeds were primarily employed for oil extraction and hair treatment, whereas flowers were mainly valued for their fragrance and ornamental purposes. The unique inclusion of bark highlights a distinctive local practice and emphasizes the depth of indigenous knowledge in the region.

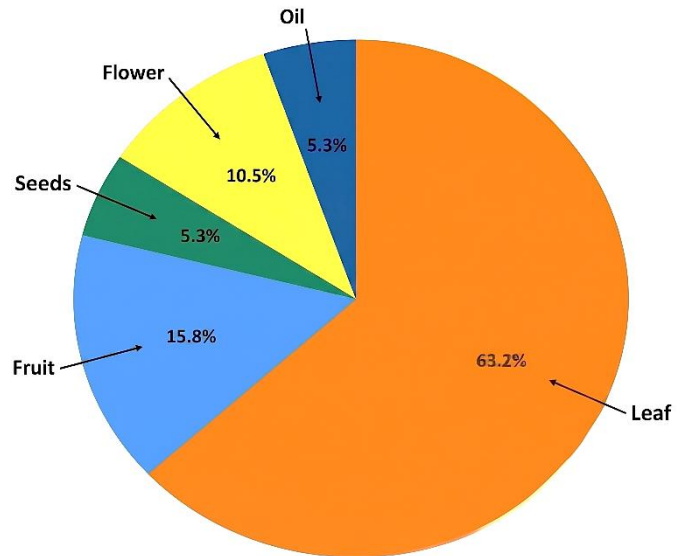


Fig. 4: Most Frequently Used Plant Parts (Corrected)

The applications of these plants were diverse, encompassing hair care, skin care, health-related cosmetic benefits, and ornamental or aromatic uses. Hair care represented the most dominant category, with species utilized for softening and smoothing the hair, natural hair dyeing, enhancing fragrance, and promoting hair growth and thickness. Skin care applications included the use of facial masks for cleansing, moisturizing, and treatment of acne, while some species, such as *Salvadora persica*, were associated with health-related cosmetic benefits, including postpartum recovery and weight management. Additionally, several species were employed for decorative or aromatic purposes, reflecting their socio-cultural significance during events such as weddings.

Overall, the results demonstrate a well-established traditional knowledge system in Abyan, Yemen, in which plants are integrated into cosmetic, cultural, and medicinal practices. The diversity of species and their applications highlight both the biological and socio-cultural value of these plants and underscores their potential as candidates for the development of modern natural cosmetic products.

Table 1: Plant Families and Species Used for Ornamentation and Cosmetics in the Abyan Delta

Scientific Name	Family	Local Name	Part used	Method of use
<i>Abelmoschus esculentus</i> L.	Malvaceae	Bamia	Leaf	The fruits are ground and mixed with <i>Lawsonia inermis</i> (henna), then applied to the hair to enhance its smoothness.
<i>Aloe vera</i>	Asphodelaceae	Saber	Leaf	Aloe vera gel is used as a facial mask and is also applied to nourish the hair, promote its growth, and enhance its smoothness.
<i>Artemisia abyssinica</i>	Asteraceae	Ba'theeran-Shqar	Leaf	It is used as an adornment in women's hair due to its pleasant fragrance.
<i>Citrus aurantium</i> (L.)	Rutaceae	Lime	Fruit	The liquid contained within the pod is traditionally applied as a facial mask for skin cleansing and is also used to promote hair growth and enhance its smoothness.
<i>Corchorus olitorius</i>	Tiliaceae	Mallow / Wika	Leaf	The leaves are dried, ground, and mixed with water, then applied to the hair to enhance its smoothness.
<i>Eruca sativa</i> Miller	Cruciferae	Arugula	Leaf	The leaves are dried, ground, and mixed with water, then applied to the hair to enhance its smoothness.
<i>Gossypium barbadense</i> L.	Malvaceae	Cotton	Seeds	Cotton seeds, after being pressed for oil extraction, are further utilized by grinding the remaining residue into a powder, which is applied as a facial mask to moisturize and lighten the skin.
<i>Hibiscus sabdariffa</i> L.	Malvaceae	Karkadi	Fruit	It is used to dye the hair a pink color.
<i>Indigofera spinosa</i> Forssk	Fabaceae	Al-Hooroor	Leaf	The leaves are dried and ground, and are used to dye gray or white hair.
<i>Jasminum sambac</i> L. A. T.	Oleaceae	Full	Flower	It is used as a hair adornment, particularly by women, during special occasions and weddings.
<i>Lawsonia inermis</i> L.	Lythraceae	Henna / Hanoun	Leaf	The leaves are dried, ground, and mixed with water, then applied to the hair to enhance its smoothness.
<i>Ocimum basilicum</i>	Lamiaceae	Shqar-Rihlan-Shahada	Leaf	It is used as an adornment in women's hair due to its pleasant fragrance.
<i>Pandanus odoratissimus</i>	Pandanaceae	Kadi	Flowers	It is applied to the hair to provide fragrance and impart a pleasant aroma.
<i>Pulicaria jaubertii</i> E.Gamal-Eldin	Asteraceae	Khawa'a	Leaf	It is used as an adornment in women's hair due to its pleasant fragrance.
<i>Pulicaria undulata</i> (L.) C. A.Mey	Asteraceae	Khawa'a	Leaf	It is used as an adornment in women's hair due to its pleasant fragrance.
<i>Ricinus communis</i> L.	Euphorbiaceae	Castor /Khuro'	Oil	The extracted oil is used to promote hair growth and improve its smoothness.
<i>Pluchea dioscoridis</i> (L.) DC	Asteraceae	Athrab	Leaf	The leaves are dried, ground, and mixed with water, then applied to the hair to enhance its smoothness.
<i>Salvadora persica</i> (L.) Garcin	Salvadoraceae	Miswak /Arak	Leaf	Decoction of the leaves is used for fat dissolution and weight loss. The leaf extract is also used in cooking porridge that is offered to women after childbirth, as it is believed to help tighten abdominal sagging following delivery.
<i>Sesamum indicum</i> L.	Pedaliaceae	Sesame/ Jaljal	Fruit	The extracted oil is used to promote hair growth and improve its smoothness.
<i>Tamarix aphylla</i> (L.) Karst	Tamaricaceae	Athl	Leaf	The bark of the trees is dried, ground, and traditionally used to increase hair thickness; locally, it is referred to as Lajbah.
<i>Withania somnifera</i> (L.) Dunal	Solanaceae	Abb	Fruit	The pod, once ground, is used as a facial mask for cleansing and softening the skin.
<i>Ziziphus spina-christi</i> (L.) Willd	Rhamnaceae	Sadr/ Sidr	Leaf	The leaves are dried, ground, and mixed with water, then applied to the hair to enhance its smoothness. It is also used as a facial mask for cleansing the skin from acne and blemishes.

4. Discussion:

The present study documented 22 plant species belonging to 17 families that are traditionally used for cosmetic and dermatological purposes in Abyan, Yemen. The diversity of species indicates a rich ethnobotanical knowledge within the local community, particularly regarding hair and skin care. Among the recorded families, Malvaceae and Asteraceae were the most represented, each contributing three species, while the remaining families were represented by a single species. This pattern suggests that certain families are particularly valued for their cosmetic properties, consistent with previous ethnobotanical studies from Yemen and neighboring regions [12].

Analysis of plant parts revealed that leaves were the most frequently utilized (63.2%), followed by fruits (15.8%), seeds and oils, flowers, and, less commonly, bark. The predominance of leaves is common in traditional practices, as they are readily available, renewable, and often rich in secondary metabolites with biological activity [4]. Fruits and seeds were primarily used in oil extraction and hair treatment, while flowers were valued for their fragrance and ornamental uses. The inclusion of bark (*Tamarix aphylla*) represents a unique local practice, emphasizing the breadth of indigenous knowledge.

The recorded uses were categorized into four major domains:

1. Hair care: the most dominant application, including softening and smoothing (*Abelmoschus esculentus*, *Eruca sativa*), natural hair dyes (*Lawsonia inermis*, *Hibiscus sabdariffa*, *Indigofera hochstetteri*), fragrance enhancement (*Jasminum sambac*, *Pandanus odoratissimus*), and promoting hair growth or thickness (*Ricinus communis*, *Sesamum indicum*, *Tamarix aphylla*).

2. Skin care: several plants were used as facial masks for cleansing, moisturizing, and acne treatment (*Ziziphus spina-christi*, *Gossypium barbadense*).

3. Health-related cosmetic benefits: such as *Salvadora persica*, which was reported to aid postpartum recovery and weight loss, linking traditional beauty practices with medicinal functions. This overlap highlights the concept of cosmeceuticals, where natural products serve dual purposes in health and aesthetics [12].

4. Ornamental and aromatic uses: related to decoration and social occasions, such as using *Jasminum sambac* flowers for hair adornment during weddings, emphasizing the socio-cultural value of these plants beyond their biological properties [5].

The findings of this study are consistent with ethnobotanical surveys conducted in other regions, highlighting the importance of plants in cosmetic and personal care practices. In Northeastern Ethiopia, [4] documented 17 plant species traditionally used for hair and skin care among Afar communities. Similar to the present study, most Ethiopian species were applied for hair-related purposes, including straightening, cleansing, and dyeing, while others were used as facial masks or for treating skin disorders. Notably, *Ziziphus spina-christi* was also among the preferred species, reflecting a shared ethnobotanical heritage across the Horn of Africa and the *Arabian Peninsula*. Malvaceae emerged as the most represented family in Ethiopia.

In Cairo, Egypt, [5] recorded 42 plant species traditionally used for cosmetic purposes, with Lamiaceae being the dominant family (14.3%). Their study further highlighted the role of social media in disseminating knowledge on natural cosmetics, with students representing the main user group (54.8%).

By contrast, the present study in Abyan identified Asteraceae as the dominant family. This divergence in leading families—Lamiaceae in Egypt, Malvaceae in Ethiopia, and Asteraceae in Yemen suggests that local ecological availability, cultural practices, and traditional knowledge systems shape the prominence of particular plant families in cosmetic applications. Nevertheless, there is a general agreement across these regions on the reliance upon plants for hair and skin care, underscoring their enduring ethnobotanical significance.

These findings underline the importance of documenting unwritten traditional knowledge, which is orally transmitted through generations, and encourage the adoption of natural and organic products instead of chemical-based materials. Overall, this study highlights that the people of Abyan possess a well-developed traditional knowledge system that integrates plants into cosmetic,

cultural, and medicinal practices. Documenting such knowledge is crucial not only for preserving intangible cultural heritage but also for identifying potential candidates for modern cosmetic and pharmaceutical industries.

Future phytochemical and pharmacological studies are recommended to validate the bioactive compounds of these plants and to assess their potential as safe and effective natural cosmeceuticals.

5. Conclusion

The study revealed that women in Delta Abyan possess extensive traditional knowledge of plants used for hair care, skin care, and ornamentation. A total of 22 plant species belonging to 17 families were documented, with leaves and fruits being the most frequently utilized parts. The findings highlight the multifaceted role of these plants in cosmetic, health-related, and cultural practices, reflecting the deep connection between local environmental resources and social identity. This inherited knowledge presents significant potential for developing sustainable and safe natural cosmetic products, while also emphasizing the importance of preserving intangible cultural heritage.

6. Recommendations

- Conduct phytochemical and pharmacological studies to identify bioactive compounds in the documented cosmetic plants.
- Promote sustainable use of traditional plants and conserve plant diversity in Delta Abyan.
- Raise community awareness about the value of traditional knowledge and its integration with modern natural products.
- Support comparative research with other regions to better understand shared ethnobotanical traditions across the Middle East and Africa.
- Explore opportunities for scientifically developing safe and effective cosmetic and medicinal products derived from local plants.

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