Chapter 12
Underutilized Tropical Herbs in Cosmeceuticals: A Review

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ABSTRACT

Tropical herbs are rich in bioactive phytochemicals with untapped cosmeceutical potential. Constituents such as flavonoids, terpenoids, saponins, alkaloids, tannins, and phenolics provide antioxidant, antimicrobial, anti-inflammatory, and rejuvenating effects. These structures enable free radical scavenging, UV protection, collagen stabilization, and modulation of inflammation, supporting uses in hair growth, skin lightening, nail strengthening, and odor control. Evidence spans in vitro assays (coffeeberry, tea tree, garlic), in vivo studies (calendula, bergamot, ginseng), and clinical trials (soy, aloe, rosehip) showing benefits in wound healing, hydration, tone, and acne reduction. Yet, most tropical herbs lack standardized formulations, toxicity profiling, and large-scale validation. Systematic exploration and commercialization could foster innovation, biodiversity conservation, and sustainable development in the global cosmeceutical industry.

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INTRODUCTION

The global cosmeceutical industry has experienced remarkable growth in recent years, driven by consumer demand for products that combine cosmetic appeal with therapeutic efficacy. Academic studies confirm that cosmeceuticals represent one of the fastest growing segments of the personal care market, with herbal and plant derived formulations gaining particular attention due to their perceived safety and multifunctional benefits (Kumar and Komal, 2021; Hussain et al., 2022).

Despite the abundance of biodiversity in tropical regions, many indigenous herbs remain underutilized compared to globally commercialized botanicals such as aloe vera, green tea, and ginseng. Tropical ecosystems harbor a vast reservoir of phytochemicals, including flavonoids, terpenoids, alkaloids, tannins, saponins, and phenolics, which exhibit antioxidant, antimicrobial, anti-inflammatory, and photoprotective properties (Chakraborty et al., 2018). These chemical constituents provide functional activity relevant to cosmetic science, such as free radical scavenging, ultraviolet (UV) absorption, collagen stabilization, and modulation of inflammatory pathways. Their potential applications span hair growth stimulation, skin lightening, nail strengthening, acne management, and body odor control (Ekore, 2025).

Despite their rich phytochemical diversity, tropical herbs remain underutilized in global cosmeceutical formulations due to several interrelated factors. These include limited documentation in internationally accessible databases, variability in phytochemical composition arising from ecological and seasonal influences, lack of standardized extraction and formulation protocols, and insufficient clinical validation compared to well-established temperate species. Additionally, regulatory barriers, supply chain challenges, and underrepresentation of indigenous knowledge systems further constrain their commercialization. As a result, many tropical botanicals with promising cosmeceutical activity remain confined to traditional or localized use (Moghimipour et al., 2012). This gap underscores the need for systematic exploration of tropical herbs, emphasizing both their chemical structures and pharmacological evidence.

The purpose of this chapter is therefore fourfold: (i) to review the phytochemical basis of underutilized tropical herbs in cosmeceuticals; (ii) to organize pharmacological evidence into in vitro, in vivo, and clinical categories; (iii) to highlight opportunities for innovation, biodiversity conservation, and sustainable commercialization; and (iv) to identify research gaps in standardization, toxicity profiling, and clinical validation. By integrating chemistry and pharmacology, this work seeks to advance the scientific foundation for tropical herbs in cosmeceutical applications and encourage their adoption in global cosmetic industries.