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ETHNOBOTANICAL INSIGHTS INTO BRIDAL TREATMENT: TRADITIONAL WEDDING PLANT PRACTICES IN THE GORONTALO COMMUNITY

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ABSTRACT

This study explored the ethnobotanical practices embedded in traditional wedding ceremonies in Gorontalo, Indonesia, with a focus on the diverse plant species used during the bride's treatment stage. These practices are deeply rooted in cultural values and ancestral wisdom, serving not only as physical beautification rituals but also as spiritual preparations for marriage. Despite their significance, documentation of these ethnobotanical traditions remain scarce, raising concerns about the loss of valuable local knowledge. The research was conducted in Tapa District, Bone Bolango Regency of Indonesia, using qualitative methods to capture the complexity and cultural richness of these traditions. Data collection included direct observation, semi-structured interviews with key informants such as traditional healers and elderly women, and visual documentation. Informants were selected through snowball sampling to ensure in-depth and accurate information from individuals recognized for their expertise in wedding customs. Descriptive analysis was employed to categorize the plants, their parts, and their specific uses. A total of 30 plant species from 13 botanical families were identified. These species include trees (15%), herbs (26.7%), shrubs (20%), and lianas (3.3%). Most of the plants (76.7%) are cultivated in home gardens or local surroundings, while 23.3% are collected from the wild. Twelve different plant parts are used in the bride's treatment, including fruits, leaves, stems, seeds, rhizomes, bark, sap, flowers and tubers. These are utilized in various traditional applications such as *taluhu yilonuwa* (flower water), *molungudu* (traditional steam bath), *mato lo umonu* (herbal body treatment), *bada'a* (herbal cosmetic powder), and *tilangge* (natural nail coloring). Each preparation carries symbolic meanings associated with health, fertility, prosperity and spiritual balance, reflecting the community's holistic worldview on beauty and well-being. These rituals are passed down through generations and performed with great care, making them integral to the cultural identity of the Gorontalo people. The findings highlight the urgent need to preserve this rich ethnobotanical heritage amid modernization and changing lifestyles. By documenting these practices, the study contributes to safeguarding traditional ecological knowledge and promotes the integration of cultural heritage into broader discussions on biodiversity conservation, cultural sustainability, and the value of indigenous knowledge systems in contemporary society.

Key words: bride treatment, cultural preservation, ethnobotany, Gorontalo community, plant usage

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INTRODUCTION

Ethnobotany examines the relationship between humans and plants, focusing on how communities use and manage plant resources [1]. However, this global perspective often overlooks specific regional contexts, which can obscure localized plant knowledge and conservation challenges. In Indonesia, for example, the country's vast ethnic diversity results in unique plant management techniques across its regions. Ethnobotanical research plays a critical role in documenting the knowledge and practices of communities, highlighting the sustainable use of local plants and their cultural significance [2,3,4]. This field supports conservation goals by aligning traditional knowledge with efforts to preserve ecosystems, biodiversity and natural resources [5].

As nature conservation relies heavily on human participation, raising awareness about traditional plant-based practices is essential [6]. Socio-cultural values and local wisdom contribute to developing conservation-minded attitudes [7,8]. In Sulawesi, the Gorontalo people exemplify such practices, where plants hold significant roles in traditional wedding ceremonies. These plants are not merely decorative elements, they carry symbolic meanings associated with health, prosperity and the longevity of the bride and groom's relationship.

One example is the use of yellow bamboo, which is essential in constructing ceremonial arches, traditional staircases and wedding ritual structures. Yellow bamboo symbolizes strength, harmony and new beginnings. However, the knowledge of these symbolic meanings and the selection of appropriate plants is increasingly confined to elder community members.

The transition of this knowledge is under threat. As Urbaite notes, rapid globalization has led to the erosion of indigenous culture, with younger generations losing their connection to traditional knowledge [9]. This erosion is further compounded by the growing influence of science, technology and digital media, which often displace cultural practices and reduce interest in traditional plant use [10,11,12].

This decline reflects broader community concerns. In Gorontalo, the cultivation of culturally significant plants like yellow bamboo is diminishing. Although demand for these plants remains, only a few community members continue to grow them [13,14]. This points to a lack of awareness or interest in conservation, limited transmission of cultivation skills and possibly reduced land availability. Unfortunately, no recent data or testimonies provide quantitative backing on the extent of this decline—highlighting a gap in local conservation records.

These challenges are not unique to Gorontalo. Chekole *et al.* [15] similarly observed that modernization threatens both plant biodiversity and traditional knowledge

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systems in various ethnobotanical contexts. While some traditional knowledge is still passed down, it is aging and increasingly at risk of disappearing.

Amidst these challenges, the urgency to document and preserve ethnobotanical knowledge is growing. This knowledge is a vital part of both cultural heritage and biodiversity conservation. Mbelebele *et al.* [16] emphasize the importance of integrating traditional knowledge with modern conservation strategies to sustain indigenous plants and livelihoods, especially in rural areas. Sujarwo [17] also notes that modernization—including smartphone use—has impacted knowledge transmission in Bali's Aga villages. Similarly, Sultan *et al*. [18] document 48 plant species used by Oromo women in Ethiopia for traditional cosmetics, illustrating the continuing relevance of plant-based practices in maintaining cultural identity.

Aligned with such studies, this research on Gorontalo's wedding traditions aims to document and preserve the use of traditional plants, especially those involved in the bride's care. This includes identifying their symbolic meanings, parts used, preparation methods, and cultivation status. These practices are not only integral to Gorontalo's cultural rituals but also contribute to biodiversity conservation and intergenerational knowledge transfer.

This study hypothesizes that many of these plants are becoming scarce due to limited conservation efforts and the declining transmission of knowledge among younger generations. By documenting these practices, the research seeks to raise awareness of the importance of conserving culturally significant plants and supports broader efforts in cultural revitalization and sustainable development [19].

MATERIALS AND METHODS

This study employed a qualitative descriptive research design using a survey method, including semi-structured interviews, to document and analyze plants used in the physical care stage of the prospective bride within Gorontalo traditional wedding customs. The research was conducted in Tapa District, Bone Bolango Regency, Gorontalo Province, an area selected due to its strong adherence to traditional customs and the continued application of plant-based rituals in wedding ceremonies. The study focused on exploring the types of plants used, the plant parts utilized, methods of utilization, and their symbolic and cultural significance in the community's wedding practices.

Data Collection Techniques

Data were collected through three main techniques: observation, semi-structured interviews, and documentation. The observation component was not directed at informants but rather focused on observing the use of plants in rituals and in community settings where these practices occurred. This included examining the plants used during bride care rituals, noting their availability, forms of application,

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and how community members engaged with them. Observation also helped identify who in the community still practiced and preserved this knowledge.

Semi-structured interviews were conducted with selected informants using a snowball sampling technique. Initial key informants included traditional leaders and cultural experts, who then referred the researchers to other knowledgeable individuals, such as elder women responsible for preparing the bride. Interviews aimed to gather insights into plant types, cultural meanings, traditional preparation methods, and the intergenerational transmission of knowledge. The target number of respondents was not fixed in advance but was determined by the saturation point—when no new information was being obtained.

The documentation method served to complement both observation and interviews. It involved photographing plants, observing their processing and use during rituals, and analyzing materials provided by informants, such as local manuscripts, community records, and relevant literature. This triangulation of data sources ensured the richness and credibility of the information collected.

Data Analysis Techniques

Data analysis was conducted descriptively to detail the types of plants, plant parts utilized, methods of utilization, the symbolic meaning of plant parts, and plant status. The quantitative description was used to determine the number of specific families, the percentage of habitus types, the percentage of utilized plant parts, and the percentage of plant status using the formula by Nadiyawati *et al*. [20].

1) Percentage of Habitus

The percentage of plant habitus can be calculated using the formula:

$$\text{Percentage of plant habitus} = \frac{(\sum specific\ habitus)}{(\sum the\ entire\ plant\ habitus)}\ x\ 100\%$$

2) Percentage of Utilized Plant Parts

The percentage of utilized plant parts can be calculated using the formula:

$$\text{Percentage of utilized plant parts} = \frac{(\sum utilized\ parts)}{(\sum the\ entire\ utilized\ parts)}\ x\ 100\%$$

3) Percentage of Plant Status

The percentage of plant status can be calculated using the formula:

$$\text{Percentage of plant status} = \frac{(\sum cultivated\ parts)}{(\sum the\ entire\ species)}\ x\ 100\%$$

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Ethical Approval

This study was conducted in accordance with ethical guidelines, and approval was obtained from the relevant ethics committee. The research received ethical approval from Universitas Negeri Gorontalo. As the study did not involve human participants, no individual consent was required. This study also complies with the Protocol of Nagoya on Access and Benefit Sharing.

RESULTS AND DISCUSSION

Physical Preparation of the Prospective Bride

In Gorontalo traditional culture, physical preparation of the prospective bride is a deeply rooted practice intended to ensure that the bride appears healthy, radiant and symbolically ready for marriage. Historically, this preparation would span up to 40 days before the wedding. However, due to changing social roles and time constraints in modern society, the duration has been shortened, though the core rituals and symbolic meanings remain intact. This shift reflects broader trends in cultural adaptation under modernization pressures, as seen in other Indonesian communities [17].

The physical care ritual consists of five sub-stages: (1) *taluhu yilonuwa* (flower water bathing), (2) *molungudu* (steam bath), (3) *mongilu mato lo umonu* (drinking traditional herbal medicine), (4) *mohibada'a* (body scrubbing) and (5) *mopotilangge* (nail coloring). Each stage utilizes specific plants believed to cleanse, beautify and spiritually prepare the bride. As shown in Table 1 and Figure 1a–b, 30 plant species are involved across these rituals, with diverse habitus and parts used.

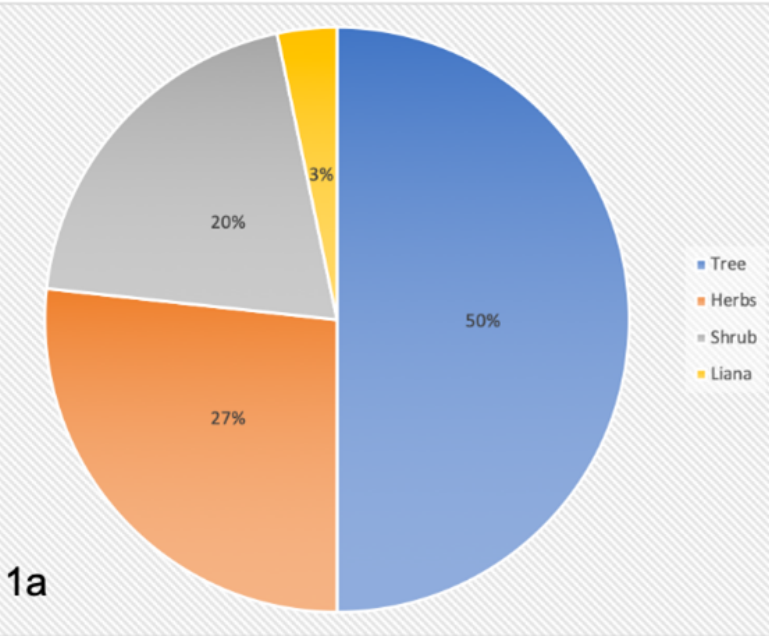

Figure 1a: Percentage of Plant Habitus

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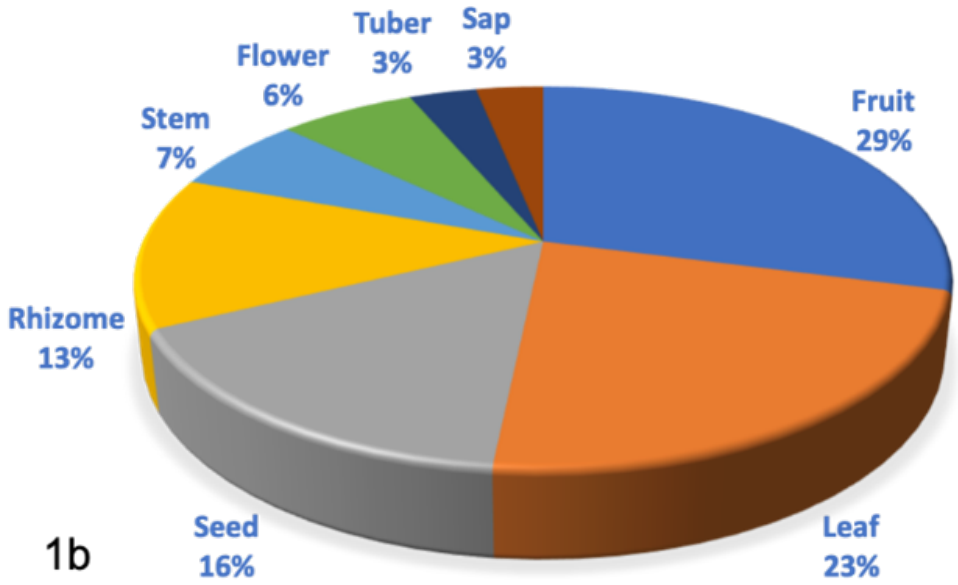

Figure 1b: Percentage of Plant Parts Utilized

The findings show that trees dominate the plant habitus used (15 species or 50%). This suggests a strong dependence on woody plants, which often yield multipurpose resources—bark, fruit, leaves and resin. Similar trends have been noted in other ethnobotanical studies, where trees serve both symbolic and practical roles in traditional medicine and rituals [16]. In the context of Gorontalo weddings, trees may symbolize strength, stability and continuity—qualities desirable in marriage.

Herbs (8 species or 26.7%) were the second most common, valued for their accessibility, ease of cultivation and medicinal properties. Their high representation aligns with studies in Bali and Ethiopia, where herbaceous plants are frequently used in traditional female body care and ceremonial preparations [18]. Shrubs (6 species or 20%) and lianas (1 species or 3.3%) were less commonly used, possibly due to their limited bioactivity, seasonal availability, or less established cultural associations.

Regarding plant parts used, fruits (9 species or 30%) topped the list. Fruits are rich in bioactive compounds, antioxidants and natural oils, which are often used in skin treatments and herbal tonics. Their popularity in bride care reflects both their cosmetic value and symbolic meaning, often associated with fertility and prosperity, resonating with the bride's future role. This aligns with Chekole *et al.* [15], who emphasized the symbolic and functional use of fruits in African and Asian wedding preparations. Leaves (7 species or 23.3%) followed closely, likely due to their

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widespread availability and phytochemical content that offers anti-inflammatory and cleansing effects.

Seeds (16.6%) and rhizomes (13.3%) also featured prominently. Rhizomes, such as ginger and turmeric, are traditionally used in scrubs and herbal drinks for their warming and purifying properties. Their use in Gorontalo mirrors findings in Southeast Asian contexts, where rhizomes are considered crucial for pre-marital body care due to their antimicrobial and revitalizing effects [16,18]. Stems, flowers, bulbs and resin, though less commonly used (6.7% or less each), hold niche ceremonial or aromatic functions. For instance, flowers used in *taluhu yilonuwa* are appreciated not only for their fragrance but also for spiritual purification—a theme common in Austronesian cultures.

In terms of plant status, 76.7% (23 species) of the plants were cultivated, while only 23.3% were wild. This suggests that the community maintains active cultivation practices to ensure the availability of key ritual plants. Such a pattern indicates a proactive cultural effort to sustain traditions despite external pressures. Similar findings were reported by Mbelebele *et al*. [16], who noted that rural communities preserve culturally valuable plants through home gardens. However, the limited number of wild species could also reflect a loss of forest biodiversity, land-use changes, or reduced access to traditional harvesting grounds—issues that warrant further ecological investigation.

Importantly, the high reliance on cultivated plants may serve as a double-edged sword. While it demonstrates cultural resilience and conservation, it may also mean that some wild species are being forgotten, thus contributing to a narrowing of ethnobotanical knowledge. The limited use of wild species may also indicate environmental degradation or urban encroachment in Tapa District, suggesting an urgent need for community-based conservation programs to reintroduce or protect wild medicinal plants [19].

Furthermore, the transmission of plant knowledge is currently confined to elder community members and cultural custodians, echoing concerns raised by Urbaite [9] and Sujarwo [17], who warned that globalization and digital media increasingly disrupt intergenerational knowledge transfer. In Gorontalo, if this trend continues without structured documentation or education efforts, much of the plant-related symbolic knowledge—especially those associated with rituals like *mopotilangge* and *molungudu*—may be permanently lost.

The implication of this study, therefore, extends beyond mere documentation. By identifying and categorizing the plants used in the bride's preparation, this research supports the preservation of intangible cultural heritage and adds value to biodiversity conservation. In line with global frameworks on traditional knowledge

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preservation, such as those promoted by United Nations Educational, Scientific and Cultural Organization (UNESCO) and the CBD (Convention on Biological Diversity), these findings highlight the need to integrate cultural practices with modern conservation policies and community engagement programs.

Components of Plants Used in Each Sub-Stage of Physical Preparation for the Prospective Bride and the Meaning of Each Stage

Taluhu Yilonuwa (Flower Water Bathing)

The study revealed that prospective brides in Gorontalo undergo a traditional flower bathing ritual known as *taluhu yilonuwa* as part of their physical preparation before the wedding. This bathing ceremony is not merely cosmetic, it carries deep philosophical and spiritual meaning in Gorontalo culture. *Taluhu yilonuwa* refers to both the ritual and the values it embodies, symbolizing purification and the cultivation of virtues expected of a bride. It also serves as a medium to connect individuals to cultural identity, community values and spiritual readiness for marriage.

The term *taluhu yilonuwa* itself encompasses seven commendable qualities that represent the ideal character of a graceful woman. These include:

1. Molamahu to pi'ili – having praiseworthy characteristics or an elegant personality
2. Molumboyoto to ayuwa – displaying friendliness and gentleness of character
3. Mopiduduto to syare'ati – showing commitment to Islamic principles
4. Modu'oto hilawo – upholding strong moral convictions
5. Molimomoto to akali – demonstrating clarity and rationality in thinking
6. Maulintapo to karaja – being skillful and diligent in work
7. Moponuwa to'u motomele – nurturing love and harmony in the household.

These moral ideals show parallels with broader ethnobotanical traditions, where ceremonial plant use is tied not just to physical care but to socialization into culturally valued behaviors, as also noted in research from Bali and Ethiopia [17,18].

The bathing mixture is prepared by a cultural elder using seven cleaned segments of yellow bamboo, each filled with a specially formulated floral and herbal blend. The number seven here symbolizes both the moral attributes mentioned above and the purification of the seven body parts believed to be vulnerable to sin: the mouth, eyes, ears, nose, feet, hands and genitals (with the stomach sometimes added as the eighth, representing gluttony or consuming the forbidden). This mirrors symbolic purification processes in other Indonesian ethnic traditions, where specific body parts are ritually cleansed to reflect inner moral renewal [16].

The mixture inside the bamboo segments consists of:

- Finely sliced limu tutu (*Citrus hystrix* or kaffir lime) peel,
- Seven halved limu tutu fruits,

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- Slices of seven types of polohungo (*Croton* spp.) leaves,
- Finely pounded umonu (a traditional aromatic blend known as *yilonta*), and
- Bungaputi (*Jasminum sambac* or jasmine flowers).

Each component carries specific symbolic and functional roles. For instance, kaffir lime is widely used in traditional Indonesian medicine and purification rituals for its cleansing properties and strong citrus aroma believed to ward off negative energy. Similar use of citrus fruits for ritual purification has been documented in Javanese and Balinese wedding practices [17]. Polohungo leaves are known for their antibacterial properties and are often associated with spiritual protection. Umonu provides fragrance and represents inner beauty and emotional calm. The inclusion of jasmine signifies purity and sacredness, commonly used in various Indonesian ceremonies.

Another important plant used during this ritual is the bulewe (*betel flower*), presented as a whole bunch. Symbolically, bulewe reflects the core principles of human life and represents the bride as a bearer of divine trust. In the broader ethnobotanical literature, betel plants are commonly linked with social identity, ceremonial importance, and ancestral connections across Southeast Asia [15].

The yellow bamboo segments not only serve as ritual containers but also represent spiritual discipline and purification. The act of filling each bamboo segment with a symbolic mix reinforces the bride's moral and physical readiness. However, with modernization and decreasing transmission of such traditional knowledge, there is concern that the meanings and rituals associated with *taluhu yilonuwa* may be diluted or lost among younger generations. This echoes Sujarwo's findings in Bali's Aga villages, where the rise of digital media has contributed to the erosion of traditional plant knowledge among youth [17].

In conclusion, *taluhu yilonuwa* exemplifies the fusion of botanical knowledge and moral education in Gorontalo culture. The ritual reflects how plant use is embedded in broader systems of meaning, emphasizing that the conservation of these plants is inseparable from the preservation of cultural values. Strengthening community-based documentation and intergenerational learning is essential for sustaining these practices in the face of modern challenges.

Molungudu (Steam Bath with Traditional Herbal Mixture)

The study revealed that molungudu is a traditional steam bath ritual practiced by the ancestors of Gorontalo and continues to play an important role in the physical and symbolic preparation of brides before marriage. This ceremony serves not only to induce sweating, cleanse the body, and remove odors, but also to symbolize spiritual purification and the cultivation of desirable behavior in a future wife.

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In practice, molungudu is performed using steam infused with seven traditional aromatic plants, each selected for its medicinal, aromatic and symbolic value. These include:

1. Timbuwale (*Cymbopogon citratus*, lemongrass) – crushed stems and leaves
2. Totapo talanggilala (*Solanum ferox*, egg tree bark) – coarsely pounded
3. Tapulapunga (*Blumea balsamifera*) – coarsely pounded leaves, stems, and roots
4. Linggoboto (*Alpinia galanga*, galangal) – coarsely pounded rhizome and leaves
5. Dungo meme (*Erythrina variegata*, dadap) – fragrant leaves
6. Nutmeg flesh (*Myristica fragrans*)
7. Clove leaves (*Syzygium aromaticum*)

These ingredients are boiled together in an earthen pot (*belanga*), and the hot steam is funneled through a bamboo pipe into a small enclosed space known as *bele-beleya*, where the bride is seated. Covered in thick cloth, she receives the steam directly, allowing the herbal vapors to penetrate the skin. This traditional sauna technique promotes sweating and is believed to extract physical impurities and bad energy.

Beyond its cleansing effects, *molungudu* symbolizes the purification of seven negative character traits that the bride must leave behind as she prepares for marriage. These undesirable traits are:

- Nene'olo – irritating or annoying behavior
- Wetetolo – speaking without thinking
- Kekengolo – restlessness
- Kureketolo – improper words or actions
- Pa'ingolo – disrespecting elders
- Bulabolo – talking out of turn or irrelevantly
- Hutatingolo – rudeness or arrogance

This shows a clear connection between plant-based body care and moral education—a cultural practice in which physical rituals serve as vehicles for socialization. The number seven again holds symbolic weight, mirroring the seven virtues in *taluhu yilonuwa* and reflecting broader cultural patterns where numerology is tied to spiritual completeness.

Ethnobotanical parallels have been observed in other Indonesian traditions, where steam bathing with herbal mixtures is not only used for healing but also to prepare individuals—especially women—for transitional life phases such as marriage or childbirth. For example, Sujarwo [16] and Mbelebele *et al*. [17] note similar cultural uses of lemongrass, galangal and *Blumea balsamifera* for both ritual and medicinal

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purposes. These practices reflect a holistic worldview, where health, morality and ritual are deeply interconnected.

However, there is concern that such traditions are declining. The younger generation may prefer modern spa treatments or may be unaware of the symbolism and medicinal value of these plants. As in other regions, the transmission of ethnobotanical knowledge in Gorontalo is at risk due to urbanization, modernization, and digital culture, which replace embodied practices with commodified beauty routines [17].

Given that reliable sources on Gorontalo's ethnobotanical traditions are limited, much of this knowledge—especially about plant use in rituals like *molungudu*—relies heavily on oral transmission and community memory. This study, therefore, draws significantly from the work of Husain [21] on Gorontalo traditional ceremonies, a key yet unpublished reference. The repetition of this citation reflects the scarcity of documented sources, underscoring the urgency of research and preservation efforts in this field.

In conclusion, *molungudu* represents more than just a physical steam bath—it is a symbolic rite that aligns bodily purification with moral and cultural refinement. Preserving this tradition contributes not only to biodiversity awareness but also to safeguarding Gorontalo's cultural identity in a rapidly modernizing world.

Mongilu Mato Lo Umonu (Traditional Herbal Drink)

Jamu Mato Lo Umonu is a traditional herbal concoction from Gorontalo made from fragrant plants, including *bohu*, a fruit known for its skin-brightening properties, *masoyi*, a type of bark that tightens nerves, muscles and vital organs in the body; *dumbaya,* which treats intestinal inflammation and opens skin pores to facilitate sweat secretion; *bungale,* a medicinal plant that improves blood circulation, *botu pomunggudu* or alum, a medicinal plant that improves blood circulation; *alama bunga,* a type of incense similar to frankincense, used for body steam and nerve recovery; *bilobohu,* preserved bark with cleansing properties for the digestive system, urinary tract, and ovaries; nutmeg; cloves; *piyamputi* (garlic), *limu tutu* (kaffir lime) [21].

Mato lo umonu herbal signifies the elimination of body odor, which is tabooed among young girls, including *tingongo* (a pervasive body odor emanating from breath, head, nose, mouth, and armpits that repels others), *lontungo* (a musty odor from the body regardless of cleanliness or attire, noticeable to others), *panguto* (a sweat odor during menstruation, sometimes pungent like the smell of decaying rodents), *bunuto* (a dried sweat smell that clings to clothing, akin to stale rice), *lotingo* (an acidic smell from within, like vinegar, affecting those nearby), *adelo* (black spots on the neck base (*longungu*), armpits, and body creases), *hulango* (dull and cracked skin

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covering pores, including dandruff) and *Pa'e'e* (urine odor resembling animal urine) [21].

Mohibada'a (Body Scrubbing)

Bada'a, a traditional exfoliating powder, holds a vital place in the bridal preparation rituals of the Gorontalo community. It symbolizes the community's aspirations for the bride to have smooth and fair skin, akin to the refined qualities of *talanggilala* wood (egg tree bark), known for its flavonoid compounds that function as natural sunscreens [22]. The preparation of Bada'a involves a meticulous process, blending various botanically significant ingredients, each contributing unique properties that enhance both the effectiveness and cultural significance of this traditional cosmetic.

The key ingredient, *totapo talanggilala* (egg tree bark), is specially prepared by removing its outer bark, which reveals a smoother inner layer. The egg tree, known for its resilient and fine-textured wood, metaphorically represents the desired attributes of the bride's skin: smoothness, fineness and resilience. The process of preparing this bark involves careful selection and handling, ensuring that the beneficial inner bark is preserved for use in the exfoliating powder.

Antayi, a fruit from a tree growing on the coast, is another vital component. Coastal plants often have unique biochemical properties due to their adaptation to harsh, saline environments. *Antayi* fruit may contain natural exfoliants and antioxidants that help in skin rejuvenation, making it an integral part of the *Bada'a* mixture. The inclusion of this fruit underscores the community's deep knowledge of local flora and their ability to harness nature's resources for health and beauty purposes.

Pale yilahumo (rice soaked in water) is included in the mixture for its known benefits in skin care. Rice water is rich in vitamins, minerals, and amino acids that can brighten and smooth the skin. Its inclusion in *Bada'a* highlights the traditional use of everyday food items in beauty treatments, a practice rooted in the holistic approach of using readily available resources for multiple purposes.

Nutmeg seeds are another important ingredient. Nutmeg is known for its anti-inflammatory and antimicrobial properties, which can help in treating skin issues and enhancing the overall complexion. The aromatic and therapeutic qualities of nutmeg also add a sensory dimension to the *Bada'a*, making the exfoliating process both a physical and a fragrant experience.

Turmeric is a well-documented traditional remedy with potent anti-inflammatory, antimicrobial, and antioxidant properties. Its inclusion in *Bada'a* is particularly significant for its ability to improve skin tone, reduce blemishes and provide a natural glow. Turmeric's vibrant yellow color also symbolizes purity and prosperity, aligning with the auspicious nature of wedding preparations.

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Lesser galangal, a relative of ginger, is known for its stimulating and antiseptic properties. It aids in skin exfoliation and improves blood circulation, contributing to a healthy and radiant complexion. The use of galangal in *Bada'a* reflects the community's understanding of the synergistic effects of combining different botanicals to achieve optimal results.

The process of grinding these ingredients on a rough stone (*botu pongi'ila*) until fine exemplifies the meticulous and labor-intensive nature of traditional beauty practices. This method not only ensures that the ingredients are well-integrated but also imbues the powder with a cultural and spiritual significance. The act of preparing *Bada'a* is a communal activity, often involving the participation of female relatives and community members, reinforcing social bonds and the transmission of traditional knowledge.

Bada'a signifies more than just a physical preparation, it embodies the hopes and blessings for the bride's new journey. The ritualistic application of the exfoliating powder serves to purify and beautify the bride, enhancing her appearance and ensuring she is both physically and spiritually ready for marriage. The smooth and fair skin achieved through *Bada'a* symbolizes a fresh start and the community's aspirations for the bride's future prosperity and happiness.

Moreover, the use of *Bada'a* highlights the Gorontalo community's rich ethnobotanical heritage and their sophisticated understanding of plant properties. Each ingredient in the exfoliating powder has been carefully selected for its specific benefits, demonstrating a deep-seated knowledge of local flora and their applications. This tradition underscores the importance of preserving such ethnobotanical practices, which are valuable not only for their cultural significance but also for their contributions to natural and sustainable beauty treatments.

In conclusion, *Bada'a* is a testament to the Gorontalo community's intricate and meaningful use of plants in traditional rituals. The preparation and application of this exfoliating powder reflect a holistic approach to beauty that integrates physical, cultural and spiritual elements, ensuring that the bride is prepared for her new life with smooth, fair skin and a sense of communal support and tradition.

Mopo Tilangge (Coloring the Nails of the Prospective Bride)

The practice of coloring the nails of the prospective bride using a plant known as *dungo tilangge* (Arabic madder or henna leaves) is deeply embedded in the wedding customs of the Gorontalo community. This ritual involves finely grinding the henna leaves and applying the paste to the bride's nails, where it is left to sit overnight. By the following day, the bride's nails display a distinctive orange or red color, signifying not only a beautification process but also a ceremonial preparation steeped in cultural significance.

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The active compounds in *dungo tilangge* leaves are well-documented and contribute to both the color and potential health benefits of the application. These leaves contain several bioactive compounds, including 2-*hydroxy*-1:4-*naphthoquinone* (lawsone), *p-coumaric acid*, 2-*methoxy*-3-*methyl*-1,4-*naphthoquinone*, *apiin*, *apigenin*, *luteolin*, and *cosmosiin* [23,24,25]. Each of these compounds plays a role in the henna's efficacy and cultural relevance.

Lawsone, or 2-*hydroxy*-1:4-*naphthoquinone*, is the primary compound responsible for the dyeing properties of henna. When lawsone binds with the keratin in the nails, it produces a lasting stain, which is enhanced by the acidic environment often created by mixing henna with lemon juice or another acidic medium. This binding process results in the characteristic orange-to-red coloration that is both vibrant and enduring. The presence of *p-coumaric acid* and other *naphthoquinones* further enhances the staining properties and ensures a deep, rich color.

Additionally, Yang *et al*. [26] note that the orange color produced by *dungo tilangge* leaves is specifically due to the quinone compound *alpha-naphthoquinone*. This compound, similar to lawsone, interacts with the keratin in nails to produce a durable and vivid color. The chemical structure of *alpha-naphthoquinone* allows it to penetrate the nail layers, providing a deeper and more saturated hue compared to other natural dyes.

Beyond the aesthetic application, the use of henna carries health benefits attributed to its bioactive components [27]. *Apigenin*, *luteolin*, and *cosmosiin* are flavonoids with known antioxidant, anti-inflammatory and antimicrobial properties. These compounds contribute to the overall health of the nails and skin, providing a protective barrier against infections and promoting healing [28]. The traditional use of henna in wedding preparations thus intertwines beauty with health, ensuring the bride's physical well-being during a time of significant personal transition [29].

Moreover, the application of henna is not merely a cosmetic enhancement but a ritual imbued with cultural and symbolic meaning [30,31]. The act of adorning the bride's nails with henna represents purity, fertility and auspiciousness, qualities highly revered in marriage ceremonies. The vibrant color signifies joy and celebration, marking the bride’s transition into a new phase of life.

In the broader context of ethnobotanical practices, the use of *dungo tilangge* highlights the intricate knowledge systems that Indigenous communities have developed over generations. The careful selection, preparation and application of these plants reflect a deep understanding of botanical properties and their relevance to human life. As globalization and modernization threaten to erode such traditional knowledge, documenting and preserving these practices becomes crucial.

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Ethnobotanical studies, therefore, play a vital role in safeguarding cultural heritage and ensuring that valuable traditional knowledge is passed down to future generations.

In summary, the use of *dungo tilangge* (henna) in the Gorontalo wedding customs exemplifies the intersection of cultural tradition, botanical knowledge and health benefits. The compounds present in henna not only provide a vibrant color but also contribute to the health and well-being of the bride, underscoring the holistic approach of traditional practices. As such, preserving these ethnobotanical traditions is essential for maintaining the cultural identity and heritage of the Gorontalo community.

CONCLUSION AND RECOMMENDATIONS FOR DEVELOPMENT

This study highlights the significant role of plants in the traditional wedding rituals of the Gorontalo community, particularly during the bride's physical preparation. Through a combination of semi-structured interviews, field observations, and documentation, 30 plant species from 13 families were identified and classified based on morphological characteristics and local vernacular names. Identification was further cross-verified using regional floras and ethnobotanical literature.

Trees were the dominant plant habitus (50%), followed by herbs (26.7%), shrubs (20%) and lianas (3.3%). Most of these species (76.7%) are cultivated, reflecting a strong tradition of home-garden conservation and intentional propagation to maintain ritual practices. The remaining 23.3% are wild-harvested, indicating a continued but more limited reliance on surrounding natural environments. The plant parts utilized—fruits, leaves, stems, seeds, rhizomes, latex, flowers and tubers—are prepared and applied in culturally meaningful ways, such as in *taluhu yilonuwa* (flower water bathing), *molungudu* (steam bathing), *mato lo umonu* (herbal tonics), *bada'a* (body scrubbing powder), and *tilangge* (nail coloring).

In addition to their practical applications, these treatments hold deep symbolic meanings related to purity, fertility, vitality, and the moral and spiritual readiness of the bride for marriage. The selection and use of each plant are guided by generations of cultural knowledge passed down through oral tradition and ritual practice.

The findings emphasize the urgency of preserving ethnobotanical knowledge as a vital component of Gorontalo's cultural heritage. At the same time, they point to the need for targeted conservation strategies to ensure the sustainable use of both cultivated and wild plant species. As modernization and land-use changes threaten traditional knowledge systems and biodiversity, integrating this cultural wisdom into education, community-based conservation, and local development initiatives is essential.

It is recommended that ethnobotanical documentation be expanded to include other ceremonial and medicinal uses of plants across Gorontalo. In addition, the establishment of community-based gardens is encouraged to conserve key species commonly used in traditional rituals. To promote the intergenerational transmission of knowledge, youth education programs should integrate traditional practices and local wisdom. Furthermore, interdisciplinary research that combines cultural anthropology, botany, and conservation science is highly recommended to strengthen the role of traditional practices in biodiversity protection.

This study contributes not only to the preservation of Gorontalo's intangible cultural heritage but also to broader discussions on the integration of traditional ecological knowledge in sustainable development.

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Competing interests

The authors declare that there was no conflict of interest.

Authors' contributions

Jusna Ahmad conceptualized and designed the study, conducted the fieldwork and performed the primary data analysis. Ramli Utina provided significant input on the study design and methodology, supervised the fieldwork and contributed to the data analysis. Sri Patimi assisted with data collection, conducted literature reviews, and helped in the interpretation of the results. All authors read and approved the final version of the manuscript.

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Table 1: Types of Plants Utilized in the Physical Preparation Stage of the Prospective Bride

Local/Indonesian/Scientific Plant Name	Plant Family	Plant Habit	Utilized Parts	Plant Status
Body Care Stage *Taluhu Yilonuwa*				
1. **Polohungo/Puring (*Codiaeum variegatum* L)**	Euphorbiaceae	Shrub	Leaves	Cultivated
2. **Onumo/Miana (*Coleus benth)***	Lamiaceae	Herb	Leaves	Cultivated or wild
3. **Bungaputi/Bunga melati (*Jasminum sambac)***	Oleaceae	Shrub	Flowers	Cultivated
4. **Bulewe/Bunga pinang (*Areca catechu* L.)**	Arecaceae	Tree	Flowers	Cultivated
5. **Talilo hulawa/Bambu kuning (*Bambusa vulgaris* S)**	Poaceae	Tree	Stem	Cultivated or wild
6. **Limu tutu/Jeruk purut (*Citrus hystrix)***	Rutaceae	Shrub	Fruit	Cultivated
Body Care Stage *Molungudu*				
1. **Timbuwale monu/Serai wangi (*Cymbopogon nardus* L)**	Poaceae	Herb	Stem and leaves	Cultivated
2. **Totapo talanggilala/ Kulit kayu telur (*Alstonia scholaris)***	Apocinaceae	Tree	Bark	Cultivated
3. **Tapulapunga/Sembung (*Blumea balsamifera* L)**	Asteraceae	Shrub	Whole plant	Cultivated or wild
4. **Linggoboto/Lengkuas (*Alpinia galanga* S)**	Zingiberaceae	Herb	Rhizome	Cultivated
5. **Dungo meme/Daun dadap (*Erythrina variegata* L)**	Fabaceae	Tree	Leaves	Cultivated
6. **Pala/Pala (*Myristica fragrans* H)**	Myristicaceae	Tree	Fruit	Cultivated
7. **Hungolawa/Cengkih**	Myrtaceae	Tree	Leaves	Cultivated

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Local/Indonesian/Scientific Plant Name	Plant Family	Plant Habit	Utilized Parts	Plant Status
***(Syzygium aromaticum* L)**				
Body Care Stage *Mongilu Mato Lo Umonu*				
1. **Bohu**		Tree	Fruit	Wild
2. **Masoyi**		Tree	Bark	Wild
3. **Dumbaya/ Tepurang (*Momordica cochinchinensis)***	Cucurbitaceae	Liana	Seeds	Wild
4. **Bungale/Bangle (*Zingiber)***	Zingiberaceae	Herba	Rhizome	Cultivated
5. **Alama bunga/ Kemenyan (*Styrax benzoin Drian)***	Styracaceae	Tree	Sap	Cultivated
6. **Bilobohu**		Tree	Bark	Wild
7. **Pala/Pala (*Myristica fragrans* H)**	Myristicaceae	Tree	Fruit	Cultivated
8. **Hungolawa/Cengkih *(Syzygium aromaticum* L)**	Myrtaceae	Tree	Seeds	Cultivated
9. **Piyamputi/ Bawang putih (*Alium sativum)***	Liliaceae	Herba	Tubers	Cultivated
10. **Limu tutu/Jeruk purut (*Citrus hystrix)***	Rutaceae	Shrub	Seeds	Cultivated
Body Care Stage *Mohibada'a*				
1. **Totapo talanggilala/ Kulit kayu telur (*Alstonia scholaris)***	Apocinaceae	Tree	Bark	Cultivated
2. **Antayi/Butun *(Barringtonia asiatica)***	Lecythidaceae	Tree	Seeds	Liar
3. **Pale yilahumo/ Padi (*Oryza sativa* L)**	Poaceae	Herb	Fruit	Cultivated
4. **Pala/Pala (*Myristica fragrans* H)**	Myristicaceae	Tree	Seeds	Cultivated
5. **Alawahu/Kunyit**	Zingiberaceae	Herb	Rhizome	Cultivated

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Local/Indonesian/Scientific Plant Name	Plant Family	Plant Habit	Utilized Parts	Plant Status
***(Curcuma domestica* Val.)**				
6. **Humopoto/Kencur (*Kaempferia galanga* L)**	Zingiberaceae	Herb	Rhizome	Cultivated
Body Care Stage *Mopotilangge*				
Tilangge/ Pacar kuku (*Lawsonia inermis)*	Lythraceae	Shrub	Leaves	Cultivated or wild

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