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**Sagnika Dash**Assistant Professors (TE) of  
Botany, Nalini Devi Women's  
College of Teacher Education,  
Bhubaneswar, Odisha, India**Chandrasekhar Bhoi**Assistant Professor (TE) of  
Botany, Maharaja Purna  
Chandra Autonomous College,  
Bariipada, Odisha, India

## Aromatic oasis: Exploring the richness of Odisha's fragrant flora

**Sagnika Dash and Chandrasekhar Bhoi**

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**Abstract**

This abstract delves into the captivating world of Odisha's aromatic flora, presenting an exploration of the diverse and fragrant plant life that thrives in this region. Known for its rich biodiversity, Odisha serves as an aromatic oasis, offering a tapestry of scents that range from sweet and floral to earthy and spicy. The study aims to uncover the hidden gems within the state's botanical landscape, showcasing the unique olfactory experiences that can be derived from its indigenous plant species. The aromatic oasis not only contributes to the traditional practices and rituals of the local communities but also holds the potential for economic development through the extraction of essential oils and other aromatic compounds (Chand *et al.*, 2008). Furthermore, the abstract discusses the conservation efforts and sustainable practices essential for preserving Odisha's aromatic biodiversity. By understanding the ecological importance of these fragrant flora, policymakers and environmentalists can work together to ensure the long-term viability of these natural resources.

**Keywords:** Aromatic oasis, botanical landscape, indigenous plant, sustainable practice

**Introduction**

Odisha, a land steeped in ancient traditions and natural splendor, is home to a rich tapestry of biodiversity that includes a treasure trove of aromatic flora. Nestled in the eastern part of India, this region boasts a diverse range of ecosystems, from lush forests to coastal plains, providing an ideal habitat for a plethora of aromatic plants (Alam *et al.*, 2022) <sup>[1]</sup>. The aromatic flora of Odisha not only contributes to the state's ecological balance but also plays a pivotal role in traditional practices, cultural rituals, and the thriving herbal industry. From the sacred groves of Similipal to the dense jungles of Bhitarkanika, these botanical wonders are an integral part of the state's natural heritage. The aromatic diversity of Odisha encompasses fragrant flowers, leaves, barks, and roots, which have been utilized by local communities for generations in various aspects of daily life. The traditional knowledge and practices associated with Odisha's aromatic flora have been passed down through generations, forming an intricate link between nature and the cultural fabric of the region. Herbal remedies, fragrant oils, and incense derived from indigenous aromatic plants have been used in Ayurveda and other traditional healing systems, showcasing the profound connection between nature and well-being (Tripathi 2015) <sup>[2, 20]</sup>. This review delves into the diverse and aromatic plant species that contribute to the sensory tapestry of this culturally rich state.

**Floral Diversity**

Uncover the myriad of aromatic plant species that grace the landscapes of Odisha, from the sacred groves to the lush forests. The forests of Odisha are home to an abundance of aromatic plants, ranging from herbs to towering trees. The dense jungles of Similipal and the Eastern Ghats are particularly noteworthy for hosting a diverse range of aromatic flora, each species offering a distinct scent profile. Explore the unique fragrances that emanate from flowers like jasmine, champaka, basil, mint, aromatic grasses etc. contributing to the state's rich botanical heritage.

**Aromatic flora in Odisha:** There are various aromatic plants are found in Odisha. Some predominant species are described below:

**Aromatic grasses**

In Odisha, a state in eastern India, various aromatic grasses are found. These grasses are often valued for their fragrance and are used in traditional practices, including religious rituals,

**Corresponding Author:****Sagnika Dash**Assistant Professors (TE) of  
Botany, Nalini Devi Women's  
College of Teacher Education,  
Bhubaneswar, Odisha, India

traditional medicine, and cultural ceremonies. Some of the aromatic grasses found in Odisha may include:

**Vetiver (*Chrysopogon zizanioides*):** Also known as Khus, Vetiver is a fragrant grass with deep roots that is commonly used to make traditional perfumes, essential oils, and cooling mats. It is also used in religious ceremonies. It generally found in many riverside village of Jagatsinghpur, Kendrapara, Bhadrak, Jajpur and Balasore district of Odisha (Mohanty and Panda, 2021) <sup>[12]</sup>.

**Citronella Grass (*Cymbopogon nardus*):** Citronella found in different districts of Odisha & it is known for its citrusy fragrance and is often used as an insect repellent. The oil extracted from this grass is used in the production of perfumes, soaps, and candles.

**Palmarosa (*Cymbopogon martinii*):** Palmarosa is another aromatic grass that is known for its sweet, floral fragrance. Its essential oil is used in the fragrance industry and in the production of soaps and cosmetics. These plants are cultivated by tribal people in different area of Mayurbhanj district.

**Lemongrass (*Cymbopogon citratus*):** Lemongrass is widely used in culinary applications for its citrus flavor, but it also has aromatic properties. The essential oil from lemongrass is used in perfumes and aromatherapy (Ranade, 2004) <sup>[16]</sup>. The different districts like Koraput, Gajapati, Boudh and Mayurbhanj are quite suitable for cultivation of lemon grass.

**Patchouli (*Pogostemon cablin*):** Patchouli is a fragrant herb that belongs to the mint family. It is known for its strong, earthy aroma and is commonly used in perfumes, incense, and traditional medicine. These plants are grow mostly commercial purpose in different places of western Odisha like Paralakhemundi, Berhampur and Koraput.

These aromatic grasses contribute not only to the cultural and religious practices in Odisha but also to the economic activities, as they are often harvested for the extraction of essential oils and other aromatic compounds. It's important to note that the availability of these grasses may vary across different regions of Odisha.

**Basil:** Basil, including aromatic varieties like sweet basil (*Ocimum basilicum*), is commonly cultivated in various regions, including Odisha. In Odisha it is grown all over the state in the backyard of every house. Basil is often grown for culinary and medicinal purposes due to its distinctive flavor and aromatic properties. The combination of different compounds like Linalool, Methyl chavicol, Eugenol, Cineole gives Basil unique and pleasant scent.

**Mint:** Mint plants, which belong to the genus *Mentha*, are known for their aromatic leaves and are commonly used in culinary and medicinal applications (Singh, 2007) <sup>[18]</sup>. *Mentha* spp. Cultivation is possible in the high altitude places in Odisha like Thuamul Rampur of Phulbani Districts, Pottangi of koraput and Daringbadi under irrigated condition.

**Sandal Wood:** Sandalwood (*Santalum album*) is a fragrant and valuable tree known for its aromatic heartwood, which is used to extract essential oil. Red sandalwood is found in Garabandh, Goshani, Gandahati, Narayanpur, Jalanga and Kitchlingi forests in Gajapati District and also found in several area in Kalahandi, Gajapati and Ganjam districts of

Odisha. Generally this plant survives 20-25 years and it attains maximum girth upto 40-60 cm. Sandalwood is often associated with religious ceremonies and is used in the creation of religious artifacts, incense, and oils. It holds cultural significance in many parts of the world.

**Jasmine:** Jasmine (*Jasminum officinale*): Known for its delicate fragrance, Jasmine is widely used in religious and cultural ceremonies. It symbolizes purity and love. This plant is cultivated several region of Odisha for traditional and economical purpose. The yield of flowers per hectare in 2500-3000 kg and cost is around Rs 200 per kg.

**Kewda Flower:** Although kewda plants (*Pandanus fascicularis*) can be found through most of India, 90% of the commercial production of the kewda flower is estimated to occur in the Odisha state (Dey 2016) <sup>[7]</sup>. Kewda scent is generally produced in Chhatrapur, Brahmapur, Gopalpur and Jagannathpur in the district of Ganjam, Odisha. Kewra Attar has about 3% to 5% Kewra oil, and the remainder is Sandalwood oil. This is the most popular perfume used in India. The perfume is also added to various cosmetics (Nasim *et al.*, 2021) <sup>[12]</sup>.

**Rose flower:** The aroma of a rose (*Rosa indica*) is not only appreciated for its beauty but has also been used in various cultural and commercial applications. Rose essential oil is commonly used in perfumery, cosmetics, and aromatherapy due to its pleasing and calming scent. Additionally, rose petals are used in the preparation of teas, potpourri, and certain culinary dishes for their aromatic qualities. The different species of rose variety cultivate on in some regions of Odisha based on soil composition and local climatic condition.

**Aromatic rice:** Odisha produces aromatic rice similar to famous Basmati rice and have quality like pleasant fragrance with small and round grains, white colour and softness without much elongation in cooking. These indigenous scented rice mainly Kalajeera, Neelabati, Krushnabhog, Padmakeshari, Tulasiphoola are predominant in costal belts of the state (The Times of India, 2020) <sup>[17]</sup>.

### Cultural Significance

Aromatic plants play a significant role in the cultural landscape of Odisha, a state in eastern India. The use of aromatic plants is deeply rooted in the traditions, rituals, cuisine, and daily life of the people (Das *et al.*, 2014) <sup>[5]</sup>. Here are some aspects of the cultural significance of aromatic plants in Odisha:

**Religious and Ritualistic Importance:** Aromatic plants are often used in religious ceremonies, rituals, and festivals. The fragrant nature of these plants is believed to purify the surroundings and create a divine atmosphere. During religious ceremonies and festivals, people use aromatic plants like jasmine, champaka, and sandalwood to decorate temples, deities, and homes (James 2016) <sup>[9]</sup>.

**Traditional Medicine (Ayurveda):** Odisha has a rich tradition of herbal medicine, and many aromatic plants are used in traditional healing practices. The fragrant oils and extracts from these plants are believed to have therapeutic properties. Plants like tulsi (holy basil), neem, and vetiver are

commonly used in Ayurvedic preparations for their medicinal value (Rahman *et al.*, 2015) <sup>[15]</sup>.

**Culinary Uses:** Aromatic herbs and spices are integral to Odia cuisine. Ingredients like curry leaves, coriander, mint, and fenugreek contribute to the distinctive flavors of the local dishes. The use of aromatic spices in traditional recipes reflects the cultural identity and culinary heritage of the region.

**Ceremonial Offerings:** Aromatic flowers and leaves are often used as offerings in various ceremonies and pujas. This practice is not only symbolic but also adds a pleasant fragrance to the environment. Flowers like marigold and jasmine are commonly used in ceremonial garlands and decorations.

**Traditional Attire and Adornments:** Aromatic plants are sometimes incorporated into traditional attire and adornments. For instance, women may wear flowers in their hair, contributing to the overall aesthetics and cultural identity (Padhy *et al.*, 2016) <sup>[14]</sup>. Fragrant oils derived from plants like sandalwood are also used in perfumes and as beauty products.

**Cultural Festivals:** Festivals in Odisha often involve the use of aromatic plants in the form of floral decorations, garlands, and incense. The fragrances contribute to the festive ambiance and are associated with joy and auspiciousness (Das *et al.*, 2018) <sup>[14]</sup>.

**Traditional Crafts:** Aromatic plants are sometimes used in traditional crafts. For example, sandalwood may be carved into intricate designs for religious or artistic purposes.

### Medicinal Marvels

In Odisha, like in many other regions of India, aromatic plants are not only valued for their fragrance but also for their medicinal properties. The rich biodiversity in the state provides a wealth of aromatic plants that have been traditionally used in various forms of traditional medicine, including Ayurveda (Behera *et al.*, 2014) <sup>[3]</sup>. Here are some aromatic plants in Odisha known for their medicinal marvels:

**Tulsi (*Ocimum sanctum*):** Also known as holy basil, Tulsi is highly revered for its medicinal properties. It is considered an adaptogen, helping the body adapt to stress. Tulsi is used to treat respiratory disorders, as an immune system booster, and for its anti-inflammatory and antioxidant properties.

**Vetiver (*Vetiveria zizanioides*):** Vetiver is valued for its cooling properties. The roots of the plant are used to make essential oil, which is known for its calming and grounding effects. It is used in traditional medicine for conditions such as stress, anxiety, and insomnia.

**Ashwagandha (*Withania somnifera*):** Ashwagandha is an adaptogenic herb that has been used for centuries in Ayurvedic medicine. It is believed to help the body cope with stress, improve energy levels, and enhance overall wellbeing. Ashwagandha is also used for its potential benefits in supporting the immune system and promoting vitality.

**Ginger (*Zingiber officinale*):** While commonly used as a spice, ginger also possesses medicinal properties. It is used to alleviate digestive issues, reduce inflammation, and relieve

nausea. Ginger is often consumed in various forms, including as a tea or in traditional recipes.

**Turmeric (*Curcuma longa*):** Turmeric, with its active compound curcumin, is a powerful anti-inflammatory and antioxidant. It is used in Ayurveda for its healing properties and is believed to support joint health, digestive function, and overall immunity (Babu *et al.*, 2015) <sup>[2]</sup>.

**Ajwain (*Trachyspermum ammi*):** Ajwain, or carom seeds, is known for its digestive properties. It is often used to alleviate stomach discomfort, indigestion, and flatulence. Ajwain seeds are commonly used in culinary preparations and traditional remedies.

**Sandalwood (*Santalum album*):** Sandalwood is known for its aromatic wood and essential oil. It is used in traditional medicine for its skin-healing properties, anti-inflammatory effects, and its calming fragrance, which is believed to promote mental clarity and relaxation. The traditional use of these aromatic plants in Odisha's medicinal practices reflects the deep-rooted knowledge of the local communities and their reliance on natural remedies for maintaining health and well-being.

### Sustainable Harvesting Practices

In an attempt to investigate the sustainable harvesting practices employed by local communities to ensure the preservation of aromatic plant species and to learn about initiatives and efforts to balance the demand for these precious plants with environmental conservation, fostering a harmonious coexistence, here are some recommended sustainable harvesting practices for aromatic plants in the region:

**Community Involvement and Education:** Local communities should be engaged in the conservation and sustainable harvesting of aromatic plants. Conducting awareness programs are required to educate harvesters about the importance of sustainable practices and the long-term benefits of conservation.

**Harvesting Guidelines:** Development and implementation of clear guidelines for the selective harvesting of aromatic plants, emphasizing the need to preserve the reproductive structures of the plants to allow for natural regeneration is highly needed along with encouraging the harvesting methods that minimize impact, such as handpicking instead of uprooting entire plants (Chand *et al.*, 2008) <sup>[8]</sup>.

**Harvesting Seasons:** Identification of specific harvesting seasons for each aromatic plant species is essential to coincide with their growth and reproductive cycles. Regulations are to be established to prohibit harvesting during critical periods like flowering and seed setting to allow the plants to propagate naturally.

**Cultivation and Agroforestry:** Promotion of the cultivation of aromatic plants in agroforestry systems to reduce pressure on wild populations; and providing training and resources to local farmers for sustainable cultivation practices, ensuring the maintenance of plant health and quality are needed Kumar *et al.*, 2018) <sup>[11]</sup>.

**Rotation and Rest Periods:** Implementation of rotational harvesting practices, allowing harvested areas to recover and regenerate; establishing rest periods for specific areas to prevent over-exploitation and maintain the overall health of the ecosystem are required.

**Regulation and Monitoring:** It includes enforcement and strengthening of regulations related to the harvesting of aromatic plants, including the issuance of permits along with implementation of monitoring programs to assess the impact of harvesting on plant populations and ecosystems.

**Fair Trade and Ethical Sourcing:** Encouraging fair trade practices to ensure that harvesters receive fair compensation for their efforts and promoting ethical sourcing practices among industries that utilize aromatic plants to create a market for sustainably harvested products.

**Value Addition and Diversification:** Supporting value addition initiatives to encourage the sustainable use of aromatic plants. Encouraging the development of products such as essential oils, perfumes, and herbal medicines to increase the economic value of these resources.

**Research and Development:** Investing in research to understand the biology and ecology of aromatic plants, helping to develop better management strategies. Exploring sustainable extraction methods to minimize environmental impact during processing.

**Collaboration and Partnerships:** Fostering collaboration between government agencies, non-governmental organizations, local communities, and industries to create holistic and effective strategies for sustainable harvesting.

Implementing these sustainable harvesting practices will contribute to the conservation of Odisha's aromatic plant species, support local livelihoods, and ensure the long-term availability of these valuable botanical resource.

### Aromatic Trails and Gardens

There are various aromatic trails and gardens in Odisha that showcase the diverse flora and offer a sensory experience. Here are some places that were known for their aromatic trails and gardens in Odisha:

**Ekamra Kanan Botanical Gardens, Bhubaneswar:** Ekamra Kanan Botanical Gardens in Bhubaneswar is known for its diverse collection of plant species.

**Regional Plant Resource Centre (RPRC) Garden, Bhubaneswar:** RPRC in Bhubaneswar is focused on the conservation of plant biodiversity. The garden showcases a variety of plant species, including those with aromatic properties. It serves as an educational and research center for plant resources.

**Nandankanan Botanical Park, Bhubaneswar:** Nandankanan Botanical park, located near Bhubaneswar, is famous for its botanical garden. The garden includes a variety of plant species, including those with aromatic qualities. Visitors can explore the lush greenery and enjoy the natural scents.

**Indira Gandhi Park, Bhubaneswar:** Indira Gandhi Park in Bhubaneswar is a popular recreational area with well-maintained greenery. While not exclusively dedicated to aromatic plants, it provides a pleasant environment for visitors to enjoy nature.

### Challenges and Conservation

Conserving aromatic plants in Odisha faces several challenges that are often interconnected with broader environmental, economic, and social issues. Here are some key challenges and considerations for the conservation of aromatic plants in Odisha.

**Habitat Loss and Degradation:** Urbanization, agricultural expansion, and deforestation contribute to the loss and degradation of natural habitats where aromatic plants thrive. This leads to a decline in plant populations and biodiversity.

**Illegal Harvesting and Trade:** Aromatic plants are often targeted for their essential oils, which are in high demand for various industries, including perfumery and pharmaceuticals. Overharvesting, often illegal, can deplete populations and threaten the survival of certain species.

**Lack of Awareness:** Limited awareness about the importance of aromatic plant species and their role in ecosystems can contribute to inadequate conservation efforts. Public awareness and education campaigns are crucial for promoting the value of these plants and the need for their protection.

**Climate Change:** Changes in climate patterns, such as shifts in temperature and precipitation, can impact the distribution and growth of aromatic plants. Climate change may alter the conditions required for specific plant species, affecting their survival and abundance.

**Invasive Species:** The introduction of invasive plant species can outcompete native aromatic plants for resources, leading to a decline in their populations. Managing and controlling invasive species is essential for the conservation of native flora.

**Fragmentation of Habitats:** Fragmentation of natural habitats due to infrastructure development can isolate populations of aromatic plants, making it difficult for them to reproduce and maintain genetic diversity.

**Limited Research and Documentation:** Insufficient research on the ecology, distribution, and population dynamics of aromatic plants in Odisha may hinder effective conservation strategies. Comprehensive studies are needed to understand the specific needs of these plants and their ecosystems.

**Poverty and Livelihoods:** In some cases, local communities may resort to unsustainable harvesting of aromatic plants for economic reasons. Addressing poverty and providing alternative livelihoods can help reduce pressure on natural resources.

**Conservation Strategies:** Protected Areas and Reserves: Establishing and effectively managing protected areas and reserves can provide safe havens for aromatic plants, allowing them to thrive in undisturbed environments.

**Community Involvement:** Engaging local communities in conservation efforts and ensuring that they benefit from sustainable practices can foster a sense of responsibility and stewardship.

**Legal Frameworks:** Strengthening and enforcing legal frameworks for the protection of aromatic plants can deter illegal harvesting and trade.

**Research and Monitoring:** Conducting research on aromatic plants, their ecosystems, and population dynamics is crucial for developing informed conservation strategies. Regular monitoring helps assess the success of conservation efforts.

**Education and Awareness:** Increasing awareness about the importance of aromatic plants, their cultural significance, and the need for conservation can garner support from the public and policymakers. Sustainable conservation efforts often involve a combination of these strategies, tailored to the specific needs and challenges faced by aromatic plant species in Odisha. Collaboration between government agencies, non-governmental organizations, local communities, and researchers is key to achieving effective and lasting conservation outcome.

### Future Prospects

The future prospects for aromatic plants in Odisha hold promising opportunities across various sectors, ranging from traditional practices and biodiversity conservation to economic development and global markets. Here are some potential avenues for the future of aromatic plants in Odisha:

**Sustainable Agriculture and Agroforestry:** Promoting sustainable cultivation practices for aromatic plants can reduce pressure on wild populations. Encouraging agroforestry models with aromatic plants can provide a supplementary income for farmers while contributing to ecological balance.

**Herbal and Ayurvedic Industries:** Aromatic plants play a vital role in herbal and Ayurvedic medicine. The development of herbal medicines and wellness products can create a niche market. Establishing processing units for the extraction of essential oils from aromatic plants can contribute to the herbal and pharmaceutical industries.

**Eco-Tourism and Wellness Retreats:** Capitalize on the aromatic diversity of the region to develop eco-tourism initiatives and wellness retreats. Showcasing the cultural and medicinal significance of aromatic plants can attract tourists interested in holistic experiences.

**Research and Development:** Invest in research to explore the untapped potential of aromatic plants for new applications. Develop innovative products, such as natural fragrances, cosmetics, and therapeutic oils, through continued research and development.

**Biodiversity Conservation:** Implement conservation programs to safeguard endangered or rare aromatic plant species. Establish botanical gardens and conservation areas to preserve and showcase the aromatic diversity of the region.

**Skill Development and Training:** Provide training programs to local communities on sustainable harvesting, cultivation,

and processing techniques. Empower local communities with the skills needed to participate in the value chain of aromatic plants.

**Global Market Opportunities:** Tap into the global market for essential oils, natural fragrances, and herbal products by adhering to sustainable practices and quality standards. Establish partnerships with international markets for the export of Odisha's aromatic products.

**Climate-Resilient Species Cultivation:** Research and promote the cultivation of aromatic plant species that are resilient to changing climatic conditions. Foster the adoption of climate-smart agricultural practices to ensure the continued growth of aromatic plants.

**Community-Based Enterprises:** Facilitate the establishment of community-based enterprises for the sustainable management of aromatic plant resources. Empower local communities to take ownership of their natural resources and benefit from the economic opportunities presented by aromatic plants.

**Government Policies and Support:** Formulate and implement policies that encourage the sustainable use of aromatic plants, balancing economic development with conservation goals. Provide financial incentives and support for initiatives that promote the responsible utilization of aromatic plant resources.

By strategically integrating these approaches, Odisha can harness the full potential of its aromatic plant wealth, contributing to economic growth, environmental sustainability, and the preservation of cultural and ecological heritage.

### Conclusion

In essence, the aromatic flora of Odisha weaves a fragrant tapestry that intertwines nature, culture, and economy. Preserving and promoting sustainable practices will not only safeguard the botanical treasures of the state but also contribute to the well-being of local communities and the global appreciation of Odisha's aromatic legacy. As we celebrate the scents that waft through the air, we embark on a journey to ensure that the aromatic flora of Odisha flourishes for generations to come.

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