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Floriculture in Odisha: Statistical insights into status, challenges, and opportunities for sustainable growth

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Abstract
Floriculture has emerged as one of the fastest-growing segments of horticulture in India, contributing significantly to rural livelihoods, women's empowerment, and income diversification. Odisha, endowed with diverse agro-climatic conditions, is increasingly adopting commercial floriculture; however, its production still falls short of local demand. This review synthesizes the current status, challenges, and opportunities of floriculture in Odisha based on secondary data and government reports. The analysis highlights that loose flowers such as marigold (50,081.56 MT, 5,522 ha) and tuberose (1,278.21 MT, 466 ha) dominate cultivation, while cut flowers like rose, gladiolus, and gerbera are concentrated in specific districts including Cuttack, Puri, Jharsuguda, and Kandhamal. Despite steady expansion, Odisha's floriculture sector faces constraints in infrastructure, cold storage, market linkages, and adoption of modern technologies, resulting in heavy dependence on imports from West Bengal and Karnataka. Institutional initiatives such as Farmer Producer Organizations (FPOs), support under MIDH and RKVY, and collaborations with CSIR-NBRI reflect growing recognition of floriculture as a viable enterprise. The paper concludes that scaling up protected cultivation, improving post-harvest handling, strengthening cooperative marketing, and promoting value addition are essential for unlocking Odisha's floriculture potential. By leveraging its agro-climatic diversity and institutional support, the state can transform floriculture into a competitive and sustainable component of its horticulture economy.

Keywords: Floriculture, Odisha, commercial flowers, marigold, tuberose, rose, gladiolus, gerbera

Introduction
Flower is regarded as an aesthetic beauty in Ornamental horticulture adding decorative element. Floriculture has emerged as one of the fastest-growing segments of horticulture in India, contributing significantly to farm income, employment generation, and export earnings. India has an estimated 3.48 lakh hectares under floriculture cultivation, producing nearly 21.07 lakh tonnes of loose flowers and 1,198 crore cut flowers annually (NHB, 2023). It is regarded as Sunrise industry and thus it is vital to know about flower crops and their package of production practices on commercial scale for flower farming. It helps to improve livelihood of farm families, small and marginal farmers and women through adoption of flower crop cultivation and value addition (Jayasankar *et al*., 2015) [3]. Leading states such as Tamil Nadu, Karnataka, West Bengal, and Maharashtra dominate national production, with well-established markets and export linkages (Harisha, 2017) [2]. Despite this, several eastern states, including Odisha, remain underrepresented in commercial floriculture despite possessing favorable agro-climatic conditions and strong domestic demand.

Odisha has witnessed gradual expansion of floriculture in recent years, with approximately 6,500-7,500 hectares under flower crops, producing around 24,800 tonnes of loose flowers and 550 million cut flowers annually (Odisha Horticulture Department, 2024). However, this production meets only about 10% of the state's demand, forcing heavy dependence on imports from West Bengal, Karnataka, and Andhra Pradesh. The local flower trade is valued at nearly ₹50 crore annually, but much of this market is captured by external suppliers (Telegraph India, 2024). This mismatch between local demand and supply highlights both the challenges and opportunities for strengthening Odisha's floriculture sector.

In recent years, the state government and farmer collectives have taken initiatives to address these gaps. Notably, Odisha's first floriculture Farmer Producer Organization (FPO) the Sabuja Sanatanpali Farmer Producer Company Limited—signed an MoU with the CSIR-National Botanical Research Institute to promote climate-resilient, value-added floriculture

(Odisha News Times, 2024). Such institutional collaborations, along with subsidies under MIDH and RKVY, indicate growing recognition of floriculture as a viable enterprise for income diversification, rural livelihoods, and women's empowerment.

Despite these advances, systematic reviews on Odisha's floriculture remain limited. Most available studies focus on national trends, while region-specific insights into production systems, market chains, institutional innovations, and future opportunities are scarce. This review therefore aims to synthesize the current status of floriculture in Odisha, analyze key challenges and constraints, and highlight growth opportunities in comparison with other states. By doing so, it seeks to provide evidence-based recommendations for researchers, policymakers, and entrepreneurs working toward sustainable floriculture development in the state.

2. Status of Floriculture in Odisha

Floriculture has emerged as a rapidly developing sector in Odisha, supported by favorable agro-climatic conditions and increasing domestic as well as export demand. The state is endowed with diverse soils and climatic zones, making it suitable for the cultivation of a wide range of ornamental crops including rose, marigold, tuberose, gladiolus, gerbera, chrysanthemum, orchids, lotus and champa.

Floriculture statistics in Odisha shows production of 4163.59 Lakh numbers of cut flowers, amongst which Cut Roses rank first (3182.19 Lakh Nos, and Area of 1606.89 Ha), followed by Gladioli spikes (668.78 Lakh Nos & Area of 675.53 Ha) and Gerbera stems (312.62 Lakh Nos & Area 24.01 Ha). Loose flower production in the state Odisha accounts for production of 51359 MT with Marigold ranking first in the state (50081.56 MT and 5522.04 Ha) followed by Tuberose (1278.21 MT and 465.68 Ha). (Source: Directorate of Horticulture, Government of Odisha, 2024)

The Kewda flower from Ganjam district alone generates rupees 15 crores per year in Odisha through oil and perfume extraction. There are 129 unusual orchid spices found exclusively in Odisha, out of 1200 estimated orchid spices in India.

Table 1: Districts in Odisha ranking highest in Production and Area for commercial flowers (3rd Advance Estimates 2023-24, Government of Odisha)

Sr. No	Commercial Flowers	Production (Lakh Nos/MT)	Area (Ha)
1.	Rose	i. Cuttack	i. Cuttack
		ii. Puri	ii. Puri
		iii. Mayurbhanj	iii. Mayurbhanj
2.	Gladioli (Spikes)	i. Cuttack	i. Puri
		ii. Kandhamal	ii. Kandhamal
		iii. Puri	iii. Ganjam
3.	Gerbera (Stems)	i. Jharsuguda	i. Jharsuguda
		ii. Deogarh	ii. Deogarh
		iii. Rayagada	iii. Dhenkanal
4.	Marigold (Loose)	i. Ganjam	i. Ganjam
		ii. Cuttack	ii. Cuttack
		iii. Sundergarh	iii. Mayurbhanj
5.	Tuberose (Loose)	i. Ganjam	i. Ganjam
		ii. Kandhamal	ii. Cuttack
		iii. Cuttack	iii. Kandhamal

According to the Directorate of Horticulture, Odisha, commercial flower cultivation is concentrated in districts such as Khurda, Cuttack, Ganjam, Sundergarh, and Mayurbhanj, Puri, Kandhamal where both loose and cut flowers are produced. Khurda district, ranking 14th among 30 districts of Odisha in commercial flower production in particular, has developed a strong supply chain network through wholesale flower markets like the *Unit I Flower Market in Bhubaneswar*, which acts as a hub for growers, traders, and retailers (Samal, 2019) [8]. Table 1 shows the top three districts ranking in commercial flower production in Odisha for the year 2023-24.

The area under floriculture in Odisha has expanded significantly in the last two decades. Traditional flowers such as marigold and tuberose dominate the production landscape, primarily catering to local markets for religious and cultural purposes. However, in recent years, there has been a shift towards high-value cut flowers like rose, gerbera, and gladiolus, often grown under protected cultivation (Jena *et al*., 2025) [4].

Despite this progress, Odisha's floriculture industry still faces challenges including lack of cold storage facilities, inadequate transportation infrastructure, and limited adoption of advanced technologies. Strengthening post-harvest handling, varietal diversification, and cluster-based development programs will be key to enhancing the competitiveness of the state's flower sector.

2.1 Commercial Flower crops and their varieties grown in Odisha

Varities grown in Odisha of major commercial flowers are Bidhan Marigold-1, Bidhan Marigold-2, Bidhan Marigold-3, Siracole, Arka Agni, Arka Bangara in case of Marigold. Prajwal, Shringar, Calcutta single and Calcutta double in Tuberose. Open pollinated varities in Rose include Mainu parle, Madgod; Polyhouse varities are Top Secret, Gold Strike, Hotshot, Revival, Avalanche. Gerbera varities include Danna Ellen, Goliath, Cleopatra, Stanza, Balance, Shimmer. Chrysanthemum varities cultivated on commercial scale are yellow star, Flirt, Bidhan Jayanti, Bidhan Madhuri. Gladiolus varities grown are Friendship, American Beauty. Apart from this, Commercial Orcid cultivation under polyhouse is adopted with Dendrobium as major cut orchid. Varities grown in Odisha include Sonia 17, Emma White. Bird of Paradise (*Sterlizia reginae*) is also grown in Deras at Khurda district.

3. Current Scenario of Floriculture in Odisha

Odisha has gradually emerged as one of the promising states for floriculture in Eastern India. The state's diverse agro-climatic zones, ranging from coastal plains to plateau regions, are well suited for cultivating a wide spectrum of ornamental crops including marigold, tuberose, jasmine, gladiolus, rose, chrysanthemum, and orchids.

According to the Directorate of Horticulture, Odisha, the state has approximately 6,500-7,500 hectares under floriculture, producing nearly 24,800 tonnes of loose flowers and around 550 million cut flowers annually (Odisha Horticulture Department, 2024). However, this production meets only 10% of local demand, with the remaining supply being imported from West Bengal, Karnataka, and Andhra Pradesh. As a result, the annual floriculture trade in Odisha is valued at nearly ₹50 crore, of which a major portion benefits outside suppliers (The Telegraph, 2024). Districts such as Khordha, Cuttack, Sundergarh, Ganjam, and Sambalpur have emerged as major hubs of flower production. The Unit I wholesale flower market in Bhubaneswar is one of the largest flower markets in Eastern India, linking producers with retailers, temple authorities, event managers, and exporters (Samal, 2019) [8]. Loose flowers such as marigold and tuberose dominate production and cultural demand, while high-value cut flowers like rose, gladiolus, and gerbera are increasingly cultivated under polyhouse or shade-net structures. In addition to rising domestic demand during festivals, marriages, and religious ceremonies, the cut flower segment is expanding due to the growth of the hospitality and event management sectors. Odisha's first Floriculture Farmer Producer Organization (FPO), Sabuja Sanatanpali Farmer Producer Company Limited, has also partnered with CSIR-NBRI to introduce climate-resilient varieties and strengthen market linkages (Odisha News Times, 2024). These initiatives indicate a growing recognition of floriculture as a viable enterprise for enhancing farmer income and creating local employment opportunities, particularly for women and rural youth.

Despite this progress, significant gaps remain in terms of infrastructure, scientific cultivation practices, and organized marketing. Addressing these gaps through policy support, research, and extension will be crucial for Odisha to harness its floriculture potential fully.

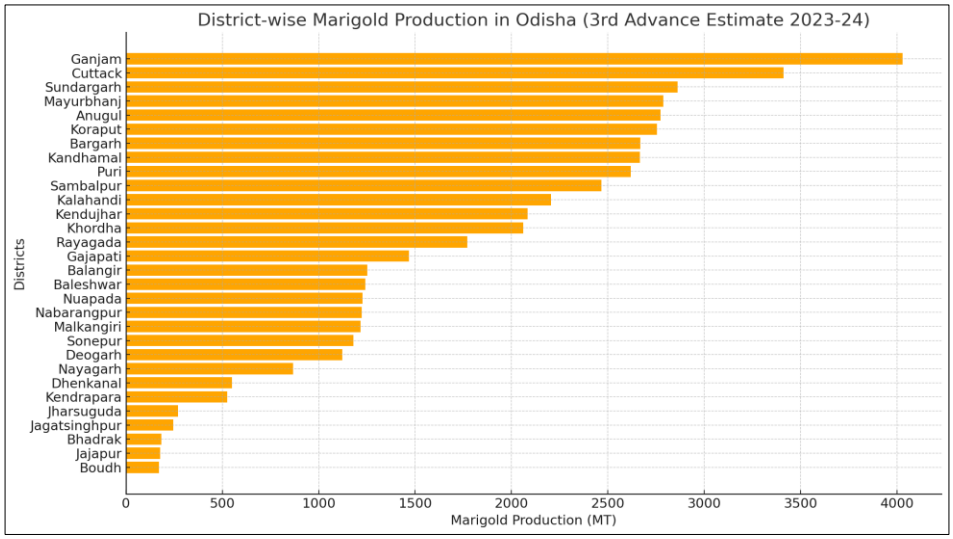

Fig 1: District-wise marigold production in Odisha (3rd Advance Estimate, 2023-24). Source: Directorate of Horticulture, Government of Odisha

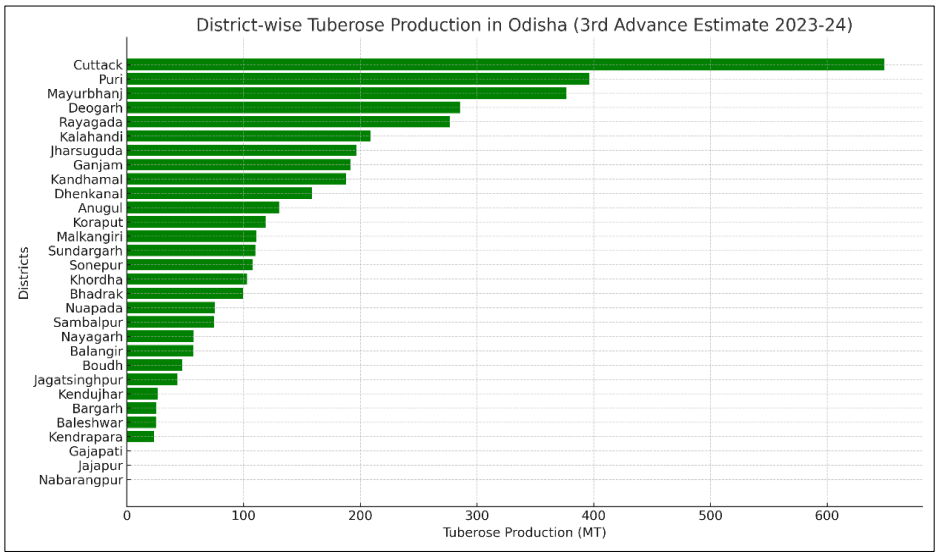

Fig 2: District-wise Tuberose production in Odisha (3rd Advance Estimate, 2023-24). Source: Directorate of Horticulture, Government of Odisha

Among the loose flowers cultivated in Odisha, marigold and tuberose occupy a significant share in terms of both area and production. As shown in Figure 1, marigold production is concentrated in districts like Ganjam, Cuttack, Mayurbhanj, Koraput, Kandhamal, and Puri, each contributing substantially to the state's overall output. Smaller

production levels are observed in districts such as Boudh, Bhadrak, and Kendrapara, indicating regional variability in cultivation practices and agro-climatic suitability.Similarly, Figure 2 highlights tuberose production across 30 districts, with Puri, Mayurbhanj, Cuttack, Rayagada, and Deogarh emerging as leading producers. Several districts, including Gajapati and Jajpur, reported negligible or no tuberose production, suggesting its limited adoption outside favorable belts. Together, these figures demonstrate that Odisha's loose flower production is spatially clustered, with marigold dominating in both scale and distribution, while tuberose shows more selective but high-yielding pockets.

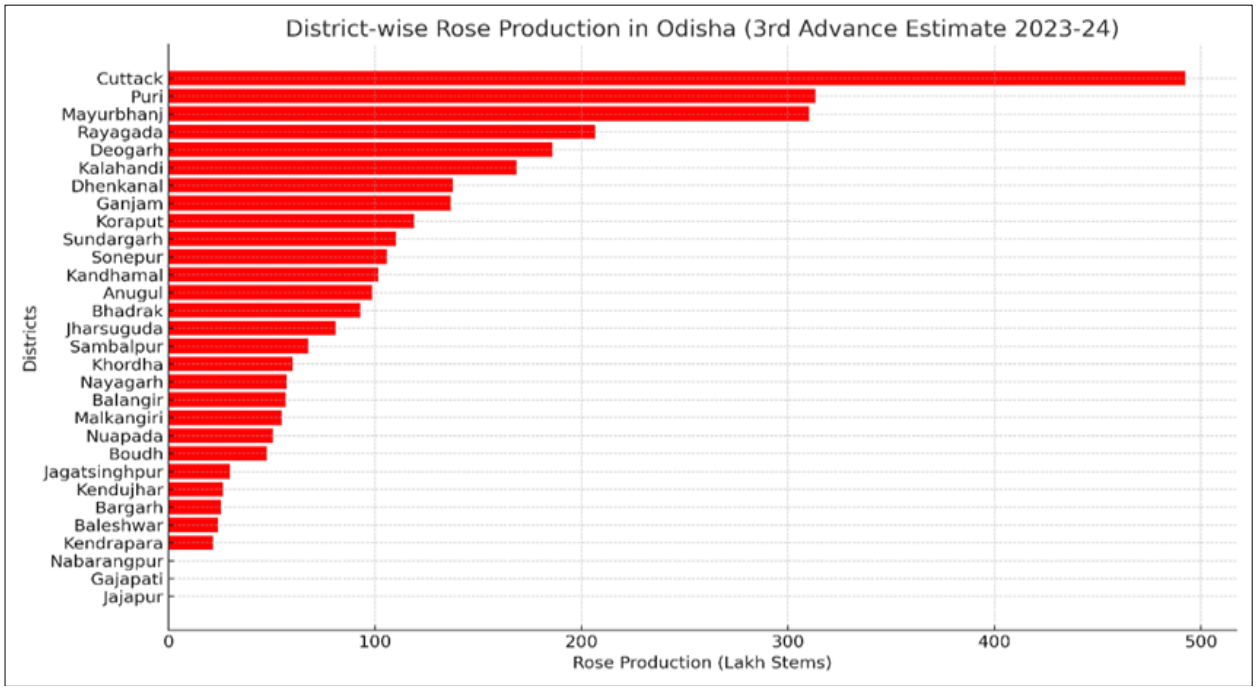

Fig 3: District-wise Rose production in Odisha (3rd Advance Estimate, 2023-24). Source: Directorate of Horticulture, Government of Odisha

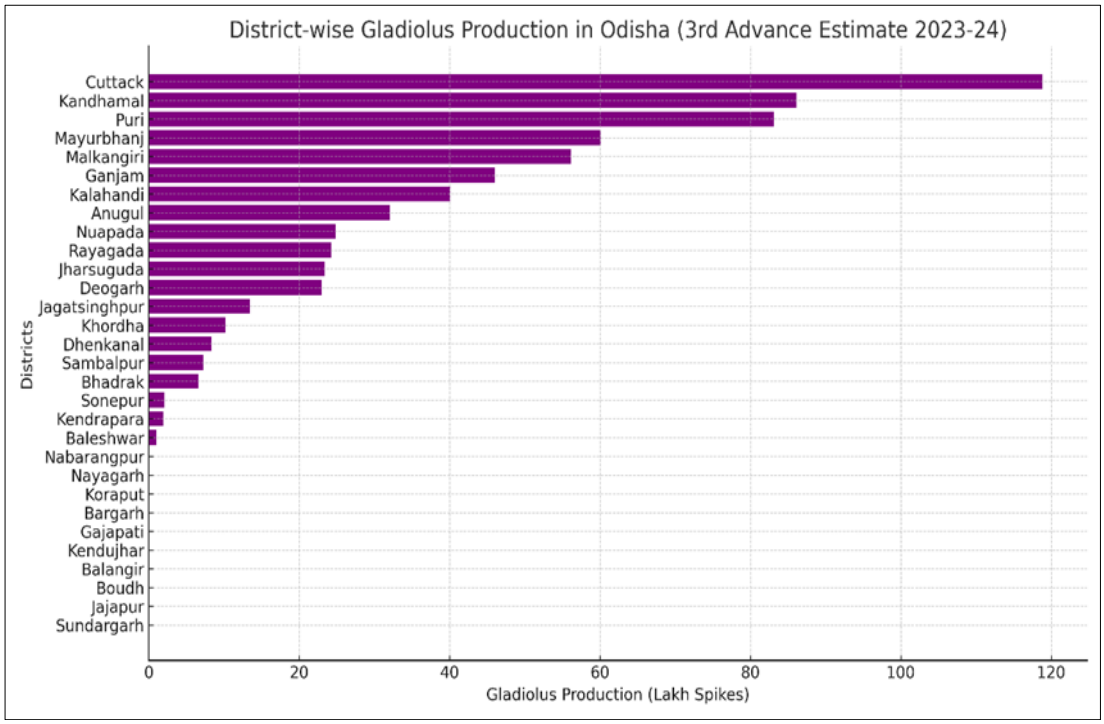

Fig 4: District-wise Gladiolus production in Odisha (3rd Advance Estimate, 2023-24). **Source:** Directorate of Horticulture, Government of Odisha

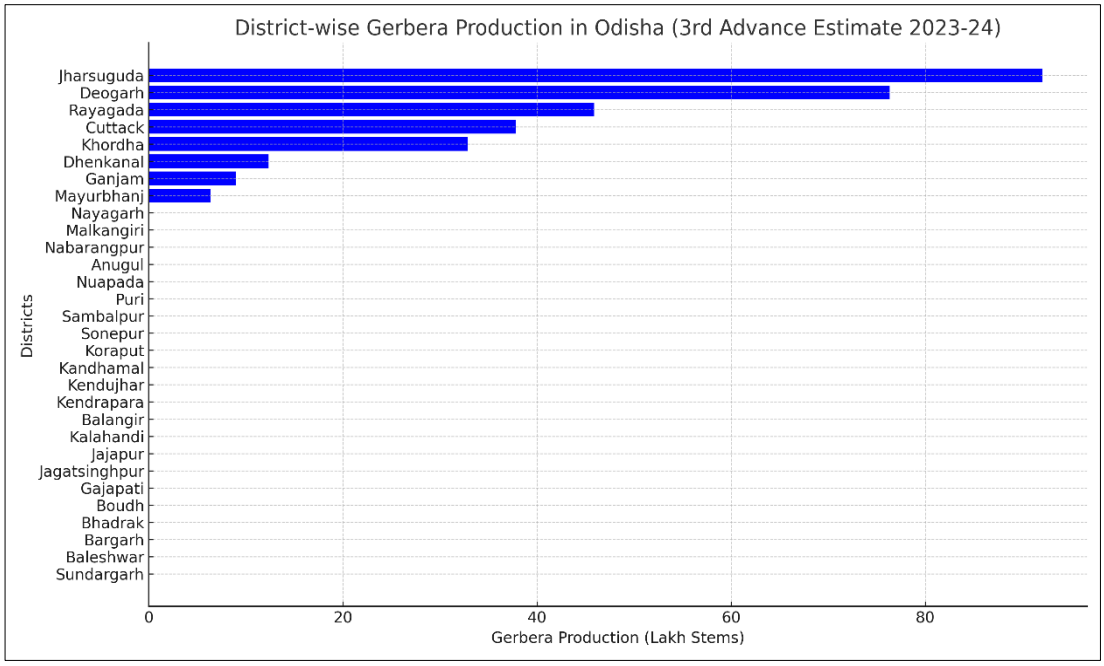

Fig 5: District-wise Gerbera production in Odisha (3rd Advance Estimate, 2023-24). **Source:** Directorate of Horticulture, Government of Odisha

As shown in Figure 3, rose production is widely distributed across Odisha with Cuttack, Puri, Mayurbhanj, Rayagada, and Deogarh emerging as the leading districts. Several others like Boudh and Kendrapara recorded much lower outputs. The figure highlights that rose cultivation is more geographically widespread compared to loose flowers. This suggests roses are well integrated into both commercial and domestic floriculture markets across the state.

Figure 4 depicts gladiolus production, which is concentrated in Kandhamal, Cuttack, Puri, and Mayurbhanj. Districts such as Malkangiri and Jharsuguda show moderate contributions, while many others have negligible output. The figure indicates gladiolus is more region-specific, adopted mainly in pockets with suitable conditions. This demonstrates its role as an emerging ornamental crop with localized importance in Odisha. As presented in Figure 5, gerbera cultivation is confined to only a few districts such as Jharsuguda, Deogarh, Rayagada, Cuttack, and Khordha. Among these, Jharsuguda and Deogarh stand out with higher production. Most districts reported no production, showing gerbera's status as a specialized high-value crop. The figure clearly reflects its niche character, limited in spread but important for commercial floriculture in selected zones.

4. Marketing and Value Chain in Odisha

The marketing of flowers in Odisha is still in a nascent stage compared to other states, with the value chain dominated by traditional channels and heavy dependence on imports. The bulk of flowers consumed in the state are supplied from West Bengal, Karnataka, and Andhra Pradesh, reflecting a major gap between local production and demand (Samal, 2019) [8].

4.1 Wholesale and Retail Networks

The Unit I Flower Market in Bhubaneswar serves as the state's largest wholesale hub, catering to both retail florists and bulk buyers such as temples, hotels, event organizers, and wedding planners. Similar wholesale markets exist in Cuttack and Berhampur, although they function primarily as redistribution points. Farmers generally sell to middlemen or commission agents, who dominate the supply chain and capture much of the profit margin. Direct farmer-to-consumer linkages remain limited due to lack of organized cooperatives and infrastructure.

4.2 Price Dynamics and Imports

Odisha's dependence on imports is evident during peak festival seasons (e.g., Durga Puja, Diwali, and marriages), when local supply is inadequate. Prices fluctuate widely due to perishability, absence of cold storage, and dominance of middlemen. For example, marigold prices can rise sharply by 40-60% during festive demand periods (Samal, 2019) [8]. This volatility discourages small farmers from expanding cultivation despite strong market potential.

4.3 Value Addition and Supply Chain Constraints

Currently, value addition in Odisha's floriculture sector is minimal. Practices such as grading, packaging, cold storage, and processing into essential oils or dried flowers are virtually absent. As a result, postharvest losses are high, estimated at 20-30%, reducing profitability (Odisha Horticulture Department, 2024). Transport bottlenecks, poor road connectivity in interior districts, and limited access to refrigerated vans further restrict market expansion.

4.4 Emerging Initiatives

To address these gaps, the state government has supported the formation of farmer groups and FPOs. Odisha's first floriculture FPO, Sabuja Sanatanpali Farmer Producer Company Limited, is collaborating with CSIR-NBRI to introduce improved varieties, strengthen postharvest handling, and establish direct market linkages (Odisha News Times, 2024). Such institutional models, if scaled up, can reduce middlemen dominance and improve farmers' share in consumer prices.

Overall, the floriculture value chain in Odisha is characterized by a strong demand-supply mismatch, weak

infrastructure, and dependence on imports, but emerging FPO initiatives and policy support provide opportunities for restructuring and modernization.

5. Institutional and Policy Support

Floriculture in Odisha has gained policy attention in recent years as part of the state's broader horticulture development agenda. The Directorate of Horticulture, Government of Odisha, in coordination with national programs such as the Mission for Integrated Development of Horticulture (MIDH) and Rashtriya Krishi Vikas Yojana (RKVY), provides subsidies and technical support for nursery development, protected cultivation, and drip irrigation facilities. These interventions aim to encourage farmers to diversify into high-value floriculture crops.

5.1 Government Schemes and Support Programs

Under MIDH, Odisha has promoted polyhouse cultivation of cut flowers such as gerbera, gladiolus, carnation, and orchids. Financial assistance is extended for polyhouse construction, quality planting material, and drip irrigation systems. Similarly, RKVY has supported pilot projects on loose flower cultivation (e.g., marigold, tuberose, jasmine), capacity-building programs, and exposure visits for farmers (Odisha Horticulture Department, 2024). Despite these efforts, adoption rates remain modest due to small landholdings and lack of awareness among farmers.

5.2 Research and Extension Support

Research institutions such as the Orissa University of Agriculture and Technology (OUAT) have played a vital role in varietal development, training, and demonstration of improved production practices. Additionally, ICAR institutes like the Central Horticultural Experiment Station, Bhubaneswar, contribute to research on ornamental crops. However, the linkage between research and field-level adoption requires further strengthening.

5.3 Role of Farmer Producer Organizations (FPOs)

A major milestone in institutional support is the formation of Odisha's first dedicated floriculture FPO, the Sabuja Sanatanpali Farmer Producer Company Limited (SSFPCL). This FPO has partnered with the CSIR-National Botanical Research Institute (NBRI) to introduce climate-resilient varieties, promote sustainable cultivation, and develop a climate-smart value chain for flowers (Odisha News Times, 2024). Such collaborations represent a paradigm shift toward collective marketing and scientific cultivation practices.

5.4 Policy Priorities

The Government of Odisha has emphasized diversification toward high-value horticultural crops in its agricultural policy frameworks. However, floriculture remains underrepresented compared to fruits and vegetables. Strategic interventions, including improved access to credit, cold chain infrastructure, cooperative marketing systems, and integration with e-marketing platforms, are essential to unlock the state's floriculture potential.

In summary, while institutional and policy support mechanisms are evolving in Odisha, greater emphasis on extension, infrastructure creation, and collective farmer organizations will be critical to transform floriculture into a sustainable and profitable enterprise.

6. Challenges and Constraints

Despite its potential, floriculture in Odisha continues to face several challenges across production, postharvest management, and marketing that limit its growth and competitiveness.

6.1 Production Constraints

The majority of flower growers in Odisha are small and marginal farmers cultivating on fragmented holdings. This limits investment in high-value crops such as roses, gerbera, or orchids, which require protected cultivation and modern technologies. Farmers still depend largely on traditional varieties of marigold, tuberose, and jasmine, leading to lower productivity compared to other leading states (Samal, 2019) [8]. Limited access to quality planting material and insufficient adoption of scientific practices further constrain yield and quality.

6.2 Postharvest and Infrastructure Bottlenecks

Flowers are highly perishable, yet postharvest infrastructure in Odisha is poorly developed. Cold storage units, refrigerated vans, and pack houses are almost absent, leading to 20-30% postharvest losses (Odisha Horticulture Department, 2024). Grading, packaging, and value addition activities such as extraction of essential oils or dried flower production are rarely practiced. This reduces farmers' ability to capture higher market prices.

6.3 Marketing Limitations

The floriculture supply chain is dominated by middlemen and commission agents, who capture a significant share of profits. Farmers often lack direct access to wholesale or retail markets, and price realization is therefore poor. Market volatility is high, with flower prices fluctuating sharply during festivals and marriage seasons (Samal, 2019) [8]. Odisha's dependence on imports from West Bengal and Karnataka during peak demand further increases local price instability.

6.4 Policy and Institutional Gaps

Although schemes under MIDH and RKVY provide subsidies for protected cultivation, adoption is low due to lack of awareness and technical guidance. Floriculture remains underrepresented in state horticultural policy compared to fruits and vegetables. Weak linkages between research institutions (e.g., OUAT, ICAR stations) and field-level extension also limit the transfer of improved technologies to growers.

In summary, production limitations, infrastructure bottlenecks, market dependence on other states, and weak institutional support systems collectively constrain the growth of floriculture in Odisha. Addressing these barriers will require integrated interventions across research, extension, infrastructure, and policy domains.

Despite multiple challenges, Odisha possesses strong potential to emerge as a floriculture hub in Eastern India due to its diverse agro-climatic conditions, rising domestic demand, and supportive institutional frameworks. With appropriate interventions, the state can transform floriculture into a profitable and sustainable enterprise.

7. Opportunities and Future Prospects

7.1 Expanding Domestic Demand

Odisha's cultural and religious traditions ensure continuous demand for flowers, particularly marigold, jasmine, and tuberose. Urbanization, weddings, temple festivals, and the hospitality industry further contribute to year-round demand. This provides a strong base for scaling up local production and reducing dependence on imports from other states (Samal, 2019) [8].

7.2 Scope for High-Value Crops and Protected Cultivation

There is significant opportunity to diversify beyond loose flowers to high-value cut flowers such as rose, gerbera, orchid, carnation, and chrysanthemum. Promotion of polyhouse and shade-net cultivation under schemes like MIDH and RKVY can improve productivity, quality, and profitability, enabling farmers to target premium markets.

7.3 Export Potential

Odisha is strategically located near ports such as Paradip and Dhamra, offering opportunities for export of cut flowers and ornamental plants to South and Southeast Asian markets. With improved infrastructure and cold chain facilities, the state could integrate into the national and international flower trade network.

7.4 Value Addition and Postharvest Technologies

Development of cold storage facilities, refrigerated transport, and modern pack houses can reduce postharvest losses. Value addition through production of essential oils, natural dyes, dried flowers, and floral arrangements can further enhance farmer income and create rural employment opportunities, particularly for women and youth.

7.5 Institutional Innovations and FPOs

The establishment of Odisha's first floriculture FPO, Sabuja Sanatanpali Farmer Producer Company Limited, demonstrates the potential of collective action. Partnerships with scientific institutions such as CSIR-NBRI provide a model for introducing climate-resilient varieties, capacity building, and market integration (Odisha News Times, 2024). Scaling up such models across districts can strengthen bargaining power and market access for smallholders.

7.6 Policy and Research Support

The Odisha government's emphasis on diversification into high-value horticulture provides a favorable policy backdrop. Strengthening research-extension linkages through OUAT and ICAR stations can accelerate adoption of improved varieties and scientific practices. Integrating floriculture into agri-business incubators and e-marketing platforms could further expand opportunities.

In conclusion, Odisha's floriculture sector has significant untapped potential. Strategic investments in protected cultivation, value chain infrastructure, institutional innovations, and policy support can enable the state to not only meet its domestic demand but also establish itself as a competitive player in the national and export flower markets.

8. Conclusion and Way Forward

Floriculture in Odisha is at a transitional stage—marked by steady growth in area and production, but still constrained by infrastructure gaps, market inefficiencies, and limited adoption of advanced technologies. The state currently produces only a fraction of its domestic flower demand, resulting in heavy dependence on imports from neighboring states. However, Odisha's diverse agro-climatic conditions, strong cultural demand, and emerging institutional initiatives provide a solid foundation for scaling up floriculture as a profitable enterprise.

The formation of dedicated farmer producer organizations, partnerships with research institutions such as CSIR-NBRI, and government support through schemes like MIDH and RKVY have opened new avenues for protected cultivation, varietal improvement, and market integration. With strategic investments in cold chain facilities, grading and packaging infrastructure, and e-marketing platforms, Odisha can reduce postharvest losses, enhance value addition, and strengthen its flower value chain.

To achieve sustainable growth, policy makers must prioritize floriculture in state horticulture programs, while research institutions and extension agencies need to intensify capacity-building efforts at the grassroots level. Promoting women's participation, encouraging youth entrepreneurship, and fostering rural clusters of high-value cut flowers can further accelerate growth.

In summary, Odisha has the potential to emerge as a leading floriculture hub in Eastern India. By addressing existing challenges and capitalizing on institutional and market opportunities, the state can transform floriculture into a driver of rural income diversification, employment generation, and sustainable horticultural development.

Competing Interests

Authors have declared that no competing interests exist.

Authors' Contributions

All authors read and approved the final manuscript.

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