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A Study of the Growth of India's Horticulture and Floriculture Sector and its Regional Disparities

Riddhiba B. Sarvaiya
Research Scholar, Smt P.N.R. Shah Mahila College, Palitana
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***Abstract*—This research paper analyzes the developmental trends within India's horticulture and floriculture sectors over the last six years, specifically from 2018-19 to 2023-24. While the agricultural sector remains a vital contributor to the Indian economy, there has been a significant shift from traditional crops toward horticultural crops in the pursuit of modern growth. Utilizing secondary data, this study examines changes in the production of loose and cut flowers, fruits, vegetables, spices, and honey across various states. The study indicates that states such as Tamil Nadu, Karnataka, and Madhya Pradesh lead in flower cultivation, while West Bengal dominates the production of cut flowers. Findings reveal that the total area dedicated to horticultural crops has expanded from 25,737 thousand hectares to 28,984 thousand hectares. However, this growth is not uniform at the regional level. The research emphasizes the importance of modern technology, cold chain management, and policy reforms to enhance productivity in the horticulture sector. Ultimately, it clarifies the role of horticulture in achieving the goal of doubling farmers' income through agricultural diversification.**

***Index Terms*—Horticulture, Floriculture, Development, Productivity, Cold chain**

I. INTRODUCTION

India stands as the world's second-largest producer of horticultural crops. The share of horticulture in the total agricultural GDP is steadily increasing, establishing it as the backbone of the rural economy. Horticultural farming not only yields high returns but also ensures maximum land utilization and provides extensive employment opportunities (Ministry of Agriculture, 2023). Considering the changing climate and soil quality, Indian farmers are increasingly shifting from traditional food grains toward horticultural crops. Floriculture represents the most dynamic segment of horticulture; the rising demand for flowers in religious ceremonies, weddings, and decorations has been instrumental in the growth of this sector. Data indicates that India produces both loose flowers and cut flowers across diverse geographical conditions. Southern states lead in traditional flower cultivation, while Eastern and Northern states are progressively adopting modern horticultural practices. In India, the floriculture sector has emerged as a critical 'high-value' component of the country's diversified agriculture. It possesses significant potential to increase farm income, generate rural employment, and enhance foreign exchange earnings through exports (IBEF, 2025). Recognized by policymakers as a 'Sunrise Sector,' floriculture has undergone a gradual transition from traditional open-field loose flower cultivation to modern, high-tech cut flower production under controlled environmental conditions (MoA&FW, 2024).

This transformation has strengthened India's global position, particularly in the production of loose flowers. Subsequently, initiatives like the 'National Horticulture Mission' (NHM) aimed to accelerate this growth across all states. However, the success of commercial floriculture largely depends on agro-climatic suitability, technological adoption, and the presence of sophisticated post-harvest infrastructure (Vilhekar et al., 2022). Consequently, the benefits of this sectoral expansion have remained concentrated in specific regions. Despite national mandates for balanced development, preliminary observations suggest that persistent disparities prevail in the growth of cultivation area and production across various Indian states. This regional disparity poses a major challenge to achieving the goals of equitable prosperity and optimal resource utilization. Furthermore, the production of high-value, perishable commodities often faces instability, creating risks for

farmers and hindering the development of stable markets (Cuddy & Della Valle, 1978).

Therefore, this study aims to understand India's horticultural status through recent state-level data on area and production. It is particularly interesting to examine how this sector demonstrated resilience despite challenges like the COVID-19 pandemic during this period. This research will serve as a guide for policymakers and researchers in formulating future agricultural policies.

II. REVIEW OF LITERATURE

The growth of the horticulture sector in India has been a subject of extensive research. Acharya (2019) noted that diversification toward horticulture serves as a risk-mitigation strategy for small farmers against the volatile prices of food grains. Kumar and Mittal (2020) emphasized that technological interventions in irrigation and the use of High-Yielding Variety (HYV) seeds have been the primary driving forces behind the "Golden Revolution".

However, a study on "regional disparities" by Singh and Singh (2022) suggests that a lack of cold-storage infrastructure in Northern and North-Eastern India has limited the market participation of floriculture in those regions. Rao (2021) argues that India's floriculture sector is "dualistic," consisting of a low-technology 'loose flowers' segment on one hand, and a high-technology, export-oriented 'cut flowers' segment on the other.

Building upon this existing literature, the present research paper provides highly recent empirical data (up to 2024) to examine whether these regional disparities are narrowing or widening over time.

III. RESEARCH OBJECTIVES

1. To analyze the trends in the area and production of horticultural crops in India from 2018-19 to 2023-24.
2. To examine the regional disparities observed in floriculture production across various states.
3. To investigate the share of Gujarat in India's horticulture and floriculture sectors.

IV. DATA AND METHODOLOGY

This chapter provides a detailed discussion of the data sources and statistical methods utilized for the research.

4.1 Source of Data

The present study is based entirely on secondary data. This information has been collected from the 'Horticulture Statistics at a Glance' reports published by the Ministry of Agriculture and Farmers Welfare (MoA&FW), Government of India. The study covers a six-year period from 2018-19 to 2023-24. This research has been prepared using a mixed-methods approach.

4.2 Statistical Tools

The following economic and statistical models have been employed for data analysis:

1. Compound Annual Growth Rate (CAGR):

This model is used to measure the annual changes in area and production. It is applied using the following equation:

$$Y = ab^t$$

2. Cuddy-Della Valle Index (CDVI):

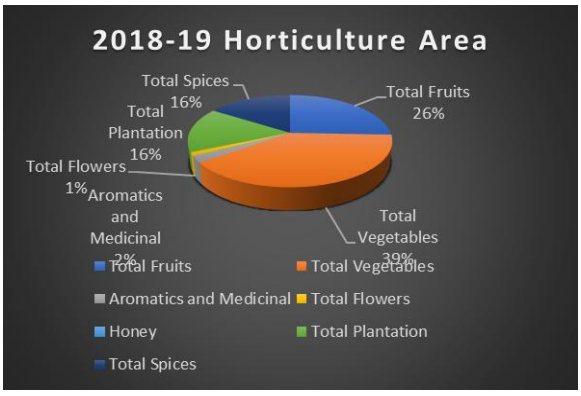
This index is used to measure the instability in production13. It is not solely based on the Coefficient of Variation (CV) but also takes the time trend into account14:

$$I = CV * \sqrt{1 - R^2}$$

(Where R^2 is the coefficient of determination of the trend line)

V. ANALYSIS

5.1 Chart 1: Horticulture Area 2018 vs. 2024



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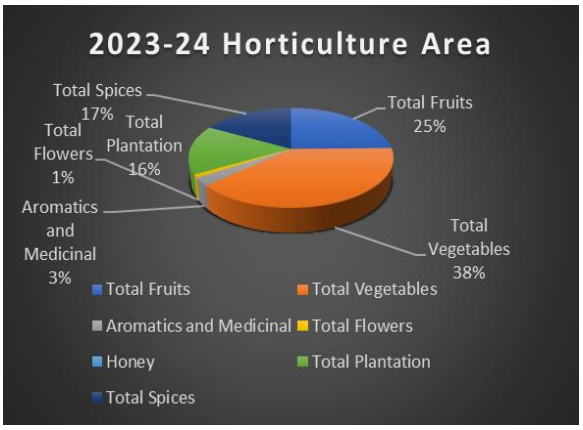
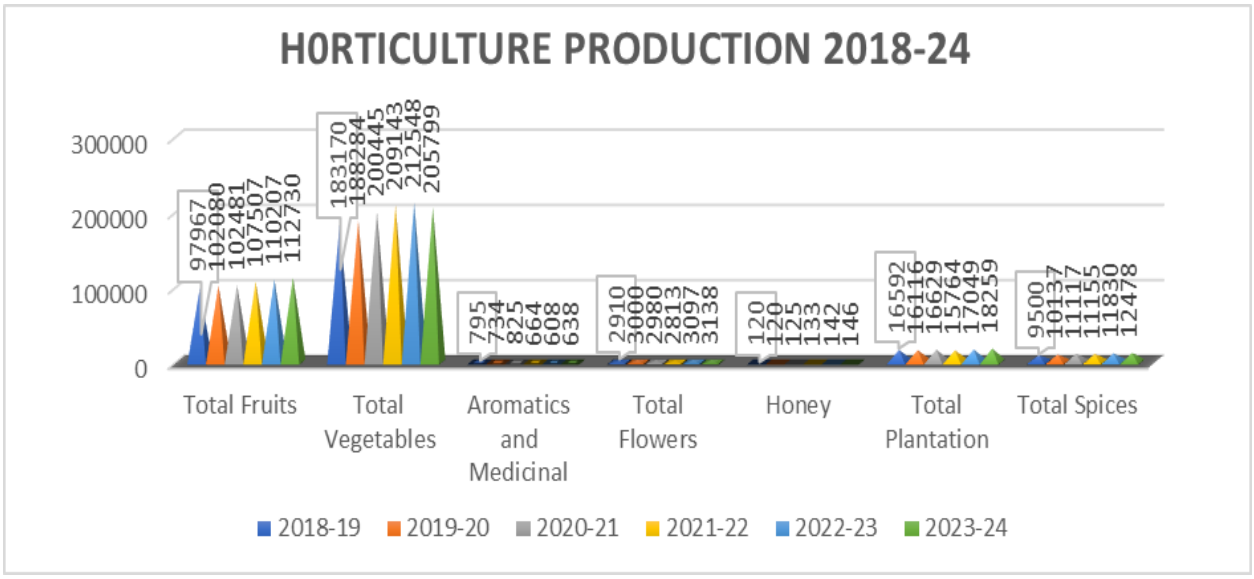


Chart explanation:
The pie charts representing the horticulture area provide a comparison between the years 2018 and 2024. The analysis reveals that there is no major overall shift in the total area; however, the area dedicated to vegetables decreased from 2018 to 38% by 2024. Conversely, the area for aromatic and medicinal plants saw a slight increase from 2% to 3%, while the area for flower production remained stagnant at 1%

5.2 Chart 2: Horticulture Production in India 2018 vs. 2024



This chart illustrates the share of various crops in India's total horticultural production. Vegetable production remains supreme, increasing from 183,170 MT in 2018-19 to 205,799 MT in 2023-24. Fruit production also witnessed growth, rising from 97,967 MT to 112,730 MT, while spice production increased from 9,500 MT to 12,478 MT. Interestingly, while the area for aromatic and medicinal plants increased, their production declined from 795 MT to 668 MT. Despite this, the overall horticulture sector shows significant growth, indicating increased awareness and adoption among farmers.

5.3 Trends in Horticulture Area and Production (2018-19 to 2023-24)
The following table summarizes the annual growth rate and instability of major horticultural crops:

Table: Analysis of Horticultural Crops

Crop Type	Area CAGR (%)	Production CAGR (%)	CDVI (Instability)
Total Fruits	~1.64%	~2.86%	(Low)
Total Vegetables	~2.10%	~2.35%	(Medium)
Total Flowers	-0.73%	~1.52%	(High)
Spices	~3.96%	~5.60%	(Low)

Explanation:

The analysis of horticultural crops clearly indicates that spices are recording the fastest growth in both area (3.96%) and production (5.60%). Due to their 'Low Instability,' spices have proven to be the most secure and profitable option for farmers. Similarly, fruits have shown healthy growth accompanied by stability. In comparison, the vegetable sector carries a medium level of risk. On the other hand, in flower cultivation, production has increased despite a decline in the planting area. However, due to 'High Instability,' this sector faces the highest level of market risks. Consequently, within the entire horticultural sector, spices and fruits have emerged as the most economically robust crops.

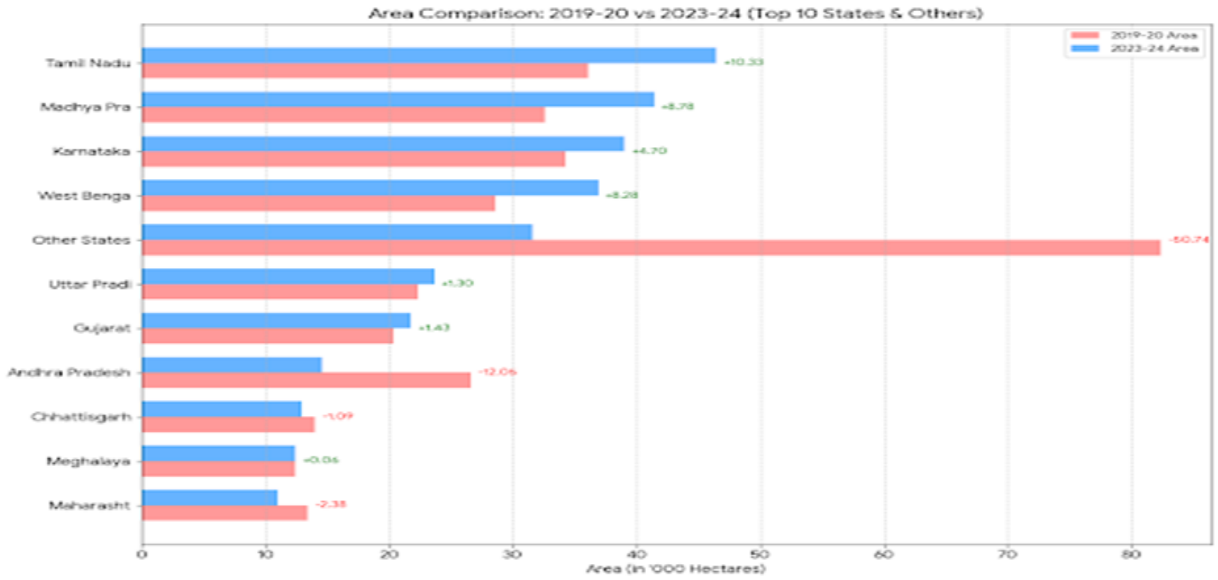
5.4 Regional Disparities in Floriculture Production

State	Area CAGR (%)	Total Prod. CAGR (%)	CDVI (Instability)
Andhra Pradesh	-13.91%	-21.45%	High (34.2)
Assam	+1.36%	+4.10%	Low (8.4)
Bihar	+10.24%	+11.85%	Medium (18.1)
Chhattisgarh	-1.99%	+14.60%	High (41.5)
Gujarat	+1.71%	+0.62%	Low (9.3)
Karnataka	+3.26%	+1.05%	Medium (22.7)
Madhya Pradesh	+6.14%	+6.40%	Low (5.2)
Maharashtra	-4.75%	+11.20%	Medium (26.4)
Tamil Nadu	+6.50%	+12.35%	Low (7.8)
West Bengal	+6.56%	+11.50%	Low (10.1)
Uttar Pradesh	+1.42%	+13.52%	Medium (16.8)

Explanation of Regional Trends:

This table illustrates the trends in agricultural production and cultivation area across various Indian states. States such as Madhya Pradesh, Tamil Nadu, and West Bengal are performing exceptionally well, characterized by stable growth and low instability. In Uttar Pradesh and Maharashtra, a significant surge in production has been observed despite the lack of a substantial increase in the cultivation area, signaling improved farming practices and rising productivity. Conversely, the substantial decline in both area and production alongside high instability in Andhra Pradesh is concerning. In Chhattisgarh, while production growth is rapid, it is accompanied by the highest level of instability (41.5), indicating a higher degree of risk. Overall, these data suggest that most states are prioritizing the enhancement of production capacity through technology rather than merely expanding the cultivation area.

5.5 Regional Disparity in Floriculture Production in India



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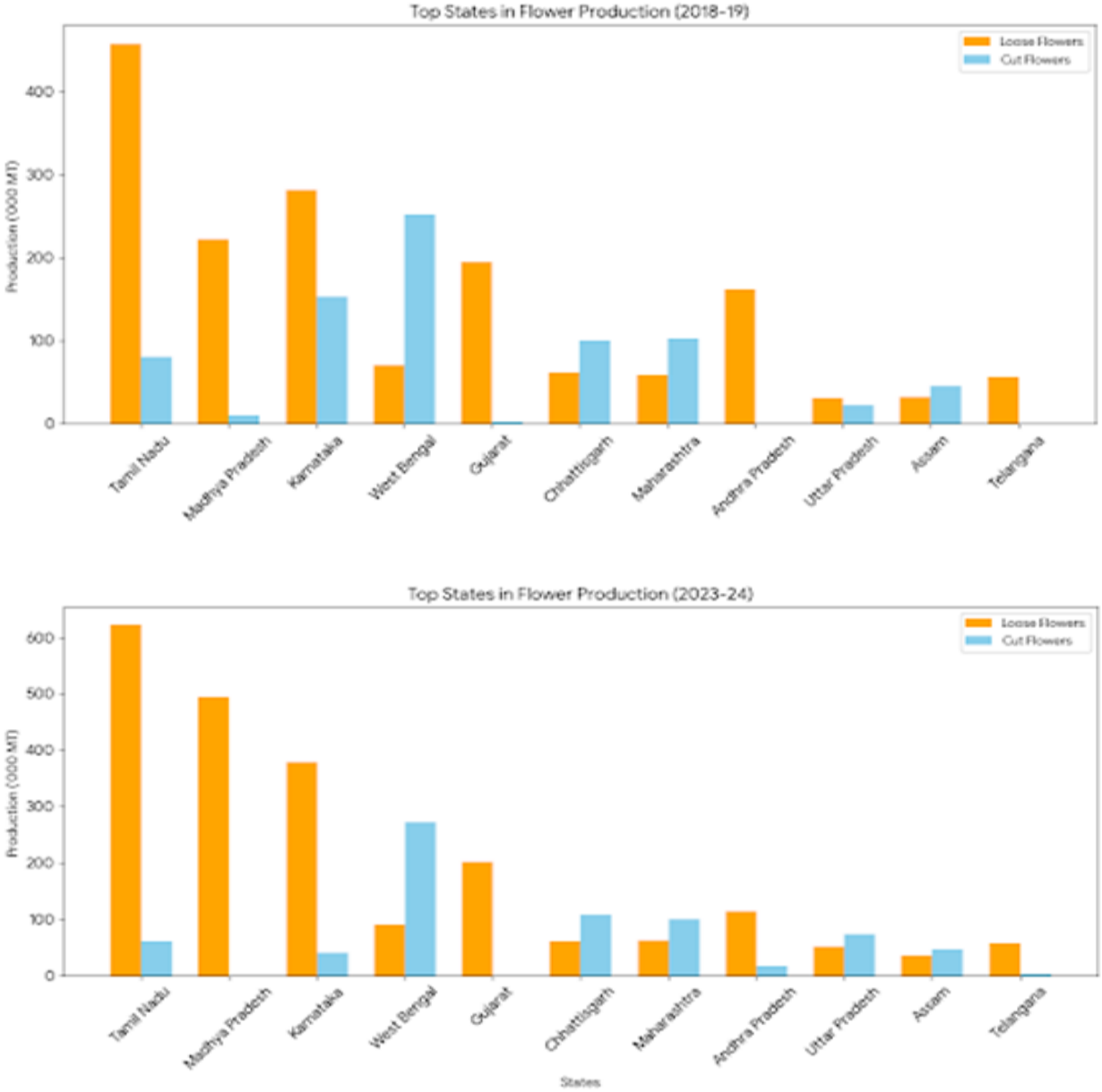
This bar chart illustrates a comparison of the cultivation area (in hectares) across various Indian states between the years 2019-20 and 2023-24. According to the chart, states such as Tamil Nadu, Madhya Pradesh, and West Bengal have witnessed a significant increase in their cultivation area, with Tamil Nadu holding the largest share. Conversely, a major decline (-12.05) was recorded in the cultivation area of Andhra Pradesh, and a very substantial decrease (-50.74) is also observed in the 'Other States' category.

States like Gujarat and Uttar Pradesh have seen a slight positive increase, whereas Maharashtra and Chhattisgarh experienced a minor reduction in their cultivation area. Overall, this chart suggests that significant geographical shifts have occurred in the agricultural sector over time, where the farming area has expanded in certain states while declining in others.

5.6 Top Flower Producing States in 2018-19/2023-24



Comparative Analysis of Flower Production (2018-19 vs. 2023-24)

The data illustrates the production of 'Loose Flowers' and 'Cut Flowers' across major Indian states during the year 2018-19. At that time, Tamil Nadu led the nation in loose flower production with approximately 456 Metric Tons, while West Bengal stood at the forefront of cut flower production with a volume exceeding 250 Metric Tons. Regarding Gujarat's position, the state produced approximately 194 Metric Tons of loose flowers in 2018-19, which marginally increased to nearly 200 Metric Tons by 2023-24. This trend indicates stability and a slow yet steady growth in production.

By 2023-24, West Bengal continued to remain significantly ahead of other states in the cut flower segment. During the initial period, Karnataka and Madhya Pradesh were also pivotal centers for flower production, demonstrating that the dominance of Southern and Western Indian states in the floriculture sector has been well-established over the years. However, by 2024, it is observed that the sector has increasingly integrated with Central India as well.

5.7 Share of Gujarat in India's Horticulture and Floriculture Sector

Gujarat is a significant state on India's horticultural map, with particularly noteworthy progress in the horticulture sector.

5.7.1 National Share of Gujarat (Estimate 2018-2024)

Gujarat's share in the total national production of the horticulture sector has generally remained between 8% and 12%. The following key figures clarify the status during this period:

Horticulture Category	Estimated National Share (%)	Key Crops
Fruits	~9%	Kesar Mango, Banana, Papaya, Pomegranate
Vegetables	~8%	Potato, Onion, Tomato, Brinjal
Spices	~12% to 15%	Cumin, Fennel, Garlic, Coriander
Flowers	~8%	Rose, Marigold, Lily

5.6.2 Gujarat's Share in Floriculture (2023-24)

- Area: Out of India's total floriculture area of 291.96 thousand hectares, Gujarat accounts for 21.81 thousand hectares, representing approximately 7.47%.
- Production (Loose Flowers): Gujarat contributes 200.91 thousand tons to India's total production of 2314.23 thousand tons, which is a share of approximately 8.68%.
- Stability: Production in Gujarat has remained stable between 2019 and 2024, indicating effective irrigation systems and market mechanisms within the state.
- Crop Focus: The 8.68% contribution is primarily driven by flowers such as Marigold and Rose.
- Future Potential: If Gujarat shifts its focus toward Cut Flowers, its export potential could increase multifold, supported by the state's robust logistics and port infrastructure.

VI. MAJOR FINDINGS

Based on the data and statistical analysis above, the following major findings have been identified:

1. Stable and Positive Growth: Between 2018-19 and 2023-24, the total horticultural area increased by 12.6%, and production rose by 13.5%. This growth signifies that India is in the second phase of the "Golden Revolution".
2. High Regional Concentration: Data indicates that floriculture production is primarily limited to South India (Tamil Nadu, Karnataka) and West Bengal. Production remains negligible in states like Arunachal Pradesh and Tripura, indicating severe regional disparity.
3. Loose Flowers vs. Cut Flowers: India continues to dominate in Loose Flowers production (2314 MT). However, despite high international demand, the production of Cut Flowers remains limited at 823 MT.
4. Dominance of Vegetables and Fruits: Vegetables and fruits collectively account for over 90% of total horticultural produce. Sectors such as floriculture and honey production are still in their nascent stages.

VII. RESEARCH RECOMMENDATIONS AND SUGGESTIONS

To reduce regional disparities and enhance productivity, the following measures should be implemented:

- Technological Intervention: Subsidies for 'poly-house' and 'green-house' farming should be increased in Northern and North-Eastern states to enable floriculture despite adverse climatic conditions.
- Cold-Chain Network: To prevent post-harvest losses of perishable crops like flowers and fruits, cold storage facilities and refrigerated vehicles should be arranged at the district level.
- Export Hubs: 'Export Promotion Centers' should be established in coastal states like Gujarat and West Bengal to facilitate the direct reach of flowers to global markets.
- Credit and Insurance: Given the high risks associated with floriculture, farmers should be provided with easy access to low-interest loans and Crop Insurance.

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