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Crafting India's Turmeric Sector for Global Dominance

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Turmeric is an ancient spice indigenous to the Indian subcontinent, where it has been cultivated for over 4,000 years. First domesticated in India, turmeric became an integral part of Ayurvedic medicine, religious rituals, and cuisine. Ancient texts, such as the **Atharva Veda** (circa 1500 BCE), highlight its healing properties. Over time, turmeric spread from India to regions including China, Africa, and the Middle East through trade routes. Arab traders were instrumental in introducing turmeric to Europe. The name "turmeric" is derived from the Latin phrase "terra merita," meaning "meritorious earth," which refers to the color of ground turmeric resembling a mineral pigment. Today, India stands as the world's largest producer, consumer, and exporter of turmeric, contributing around 80% of global production. Indian turmeric is renowned for its superior quality, primarily due to its high curcumin content, making it increasingly popular for medicinal and cosmetic applications.

Intrinsic values: Turmeric is an essential ingredient in Indian cuisine, known for its vibrant yellow color and distinctive flavor that gives curries their signature taste. In India, the average annual *per capita* consumption of turmeric is ~343 grams. Consumption patterns vary significantly across different regions: South India: Turmeric is widely used in daily cooking and holds religious significance. It is often incorporated into various dishes, including traditional recipes like Patholi for cooking. Northeast India: Turmeric is valued for its organic and medicinal properties, particularly in the Lakadong variety, which is renowned for its high curcumin content and health benefits. North India: In this region, turmeric is commonly found in spice blends (masalas), added to milk, and utilized in Ayurvedic practices. Beyond its culinary applications, turmeric has a long history of use in traditional medicine. It is recognized for its anti-inflammatory properties and is commonly used to treat digestive issues, liver problems, skin diseases, and wounds.

I. Production Landscape

Turmeric is cultivated in about 20 states in India, with the major producing states being Maharashtra, Telangana, Karnataka, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, and Odisha. Together, these states account for nearly 84% of the country's turmeric production. Over the past five years, the area under turmeric cultivation has yielded an average of 11.56 lakh tonnes from 3.10 lakh hectares, resulting in an average productivity of 3.72 t/ha. Productivity levels varied significantly among the major producing states during this period. While Maharashtra is the leading producer, its productivity hovers around 3.76 t/ha. In comparison, Telangana leads with a productivity of 7.04 t/ha, followed by Karnataka at 6.16 tonnes and Tamil Nadu at 5.02 t/ha. Conversely, Andhra Pradesh and Odisha exhibit lower productivity levels, recording averages of 2.24 t/ha and 1.95 t/ha, respectively, which are significantly below the national average of 3.72 t/ha. This disparity highlights the urgent need for technological and policy interventions to enhance productivity in Andhra Pradesh and Odisha while sustaining productivity levels in other major states.

II. Diversity

India boasts rich diversity in turmeric, both in terms of varieties and regional cultivation practices, which was evolved over centuries through domestication, cultural significance, and adaptation to local climates. Turmeric, scientifically known as *Curcuma longa*, is one species within the broader *Curcuma* genus, which belongs to the Zingiberaceae family. As a biodiversity hotspot, particularly in the Western Ghats and North-Eastern regions, India is home to significant species-level diversity within the *Curcuma* genus.

(a) Species Diversity

India hosts over 40 species of *Curcuma,* many of which are wild, while some are cultivated for food, medicine, dye, or ornamental use. In India eight different turmeric species are cultivated possessing different distinctive properties. Different species, their habitat and common uses are given below.

Major *Curcuma* Species in India

Species Name	Common Use	Habitat/Region	Uses
Curcuma longa	Cultivated turmeric	Pan-India	Main spice species
Curcuma aromatica	Wild/medicinal ("Kasturi manjal")	South India, NE India	Fragrant, used in cosmetics
Curcuma caesia	Black turmeric	Central & Eastern India	Medicinal, rare, dark blue rhizome
Curcuma amada	Mango ginger	Central & South India	Smells like mango, culinary use
Curcuma zedoaria	White turmeric	South & NE India	Bitter, used in Ayurveda
Curcuma neilgherrensis	Wild species	Western Ghats	Endemic, ornamental
Curcuma pseudomontana	Wild species	Deccan Plateau	Medicinal use
Curcuma angustifolia	Wild species	NE India, Eastern Ghats	Used in traditional medicine

(b) Turmeric types

India cultivates a wide variety of turmeric types across different states, each known for its unique properties such as curcumin content, color, aroma, and suitability for culinary or medicinal uses. Here's a list of important types of turmeric grown in India:

S. No.	Type	State	Curcumin content (%)	GI tag	Specialty	Use
1	**Lakadong** 	Meghalaya (Jaintia Hills)	6.8 - 7.8	Yes	Extremely high curcumin content	Medicinal, organic markets, exports
2	**Erode** 	Erode, Tamil Nadu	2.5 - 4.5	Yes	Bright yellow colour, fine powder, high market value	Culinary and dye industry
3	**Salem** 	Salem, Tamil Nadu	3.2 - 4.2	No	Long fingers, bright yellow, fast-growing	Powder making, exports
4	**Vasmat** 	Hingoli, Maharashtra	3.4	Yes	Distinct quality, texture, aroma, and colour	Religious festivals and spiritual ceremonies.
5	**Sangli** 	Sangli, Maharashtra	2.8 - 4.3	Yes	Large rhizomes, excellent quality for powder	Natural dye, traditional medicine, cosmetics
6	**Waigaon** 	Wardha District, Maharashtra	>6	Yes	High curcumin content, mustard-yellow colour	Culinary and religious traditions
7	**Rajapuri** 	Rajapuri, Maharashtra	4.5	No	Bold fingers, rich aroma, moderate curcumin	Spice trade

S. No.	Type	State	Curcumin content (%)	GI tag	Specialty	Use
8	**Alleppey Finger** 	Alleppey, Kerala	5 - 6	No	Deep yellow colour, high curcumin content	Ayurvedic & dye industry, exports
9	**Nizabmabad bulb** 	Nizamabad, Telangana	2 - 4	No	Bulb-like rhizomes, processed for powder	Culinary application
10	**Duggirala** 	Duggirala, Andhra Pradesh	2 - 3	No	Oldest, larger rhizomes and good quality.	Medicinal industry and exports
11	**Kandhamal** 	Kandhamal, Odisha	3.2 - 4.2	Yes	Strong aroma, higher medicinal value	Medicinal and industrial applications

(c) Varietal Diversity

India grows over 30 well-known varieties of turmeric, each with different characteristics like color, curcumin content, yield, and disease resistance. Some popular varieties have been developed by various institutions and recommended for different turmeric-growing regions of the country, and their salient features furnished in the table.

Variety	Growing States	Yield (ton/ha)	Curcumin (%)
IISR Pragati	Kerala, Tamil Nadu, Andhra Pradesh, Telangana, Karnataka and Chhattisgarh	6.8	5.1
Phule Swarupa	Maharashtra	7.9	5.2
Rashmi	Andhra Pradesh, Tamil Nadu, Odisha, Kerala, Himachal Pradesh	7.2	6.4
Roma	Andhra Pradesh, Tamil Nadu, Kerala, Himachal Pradesh	6.4	6.1
Surama	Andhra Pradesh, Tamil Nadu, Odisha, Kerala, Himachal Pradesh	5.2	6.1
UBKV Turmeric 2	West Bengal	6.1	4.9
UBKV Turmeric 3	West Bengal, Bihar, Tamil Nadu	5.8	5.1
C02	Tamil Nadu, Karnataka, Maharashtra, Andhra Pradesh, Telangana	8.6	4.2
GNT-2	Southern Gujarat	5.9	4.1

III. Grading

Currently, there is no scientific grading system for turmeric in the farmers' fields and market yards. However, informal grading is used by local traders for the assessment and transacting with regional traders given in figures.

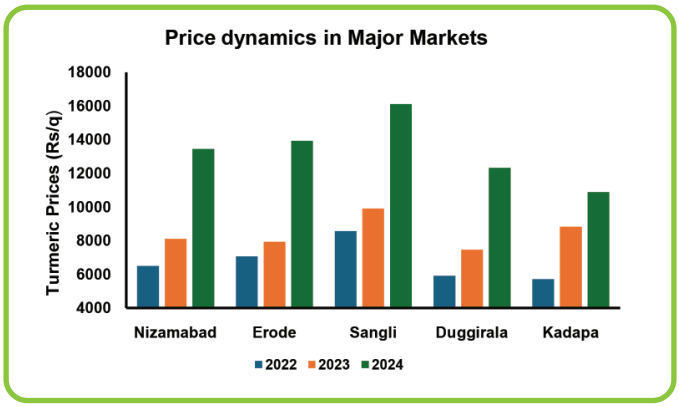
1. **Finger**: Preferred grade, fetches higher price than bulb.
2. **Bulb**: Fetches slightly lower price than the finger and is preferred for powder-making
3. **Thonda**: A bold finger, usually 3 inches or more, exported to Japan and EU
4. **Mukda**: A 'g-shaped' bulb with a finger intact, preferred by consumers in local markets
5. **Chura** is small chips of turmeric that fetches the lowest price

Finger grade | Bulb grade | Thonda grade | Mukda grade | Chura grade

Figure : Informal grades in turmeric

IV. Market and Price Dynamics

Major turmeric markets are Nizamabad, Duggirala, Erode, and Sangli. Nizamabad and Sangli markets are leading trading centers in India. The turmeric price trends across major markets in India during the last three years (2022-24) observed that the prices have almost doubled in the previous three years. However, there was a wide variation in prices across the major markets, which might be due to the variety/type, quality parameters of turmeric grown in different states. Thus, employing a price support system for turmeric farmers can help to offset the rising labour costs and sustain farmers to continue turmeric cultivation. Additionally, adopting a pricing system based on grades and curcumin content could also yield better prices.



Source: Agmarknet, 2025

V. Economics of Cultivation: Among the different components of turmeric cost of cultivation, planting material and Labour cost are predominant, while manures & fertilisers, plant protection and irrigations accounts for lesser share, which indicates the need of technological interventions to reduce the cost. The cost of cultivation per acre ranges from 1 lakh to 1.25 lakh, depending on different states/ regions. The average per quintal cost of production varies from ₹ 1800 to 2500, depending on the region.

VI. Consumption Pattern: Turmeric consumption pattern in India are influenced by cultural, regional, medicinal, and culinary factors. The emerging patterns are demand in urban markets and rising demand for organic and high-curcumin turmeric varieties. The processed products are increasing as the demand for products like turmeric tea, capsules, essential oil, etc are increasing.

Consumption pattern of turmeric

Particulars	Quantity (lakh tons)
Turmeric Production	11.6
Exports (whole)	1.1
Exports (value added form)	0.5
Domestic consumption	9.0
Household consumption	5.0
Industry consumption	4.0

Source: Authors estimate

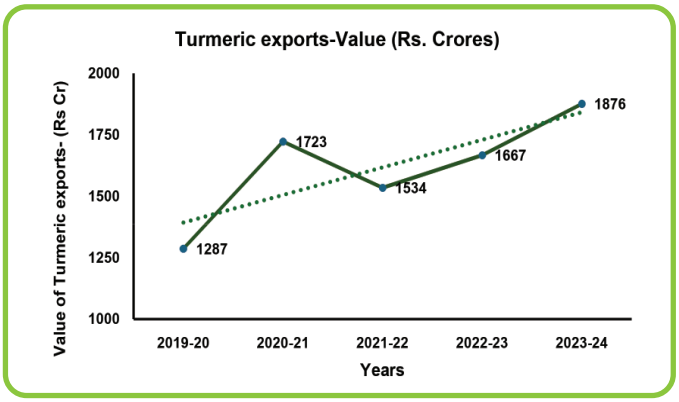
VII. Export Landscape

Turmeric ranks third in the spice exports. India dominates the global turmeric export market, contributing around 70% of total exports and covering more than 150 countries. Major turmeric-importing countries are Bangladesh, USA, UK, Germany, UAE, Malaysia, Morocco, and Iran. The volume and value of turmeric exports increased from 1.38 lakh tons (₹1287 crores) in 2019-20 to 1.62 lakh tons (₹ 1876 crores) in 2023-24. Majority of exports are in unprocessed form (70%) which includes only 10% of high curcumin types. The demand for turmeric is increasing across the globe and shifting towards turmeric with high curcumin content and organic varieties. Developed markets like the EU and the USA are emerging as key centres for the consumption of high-quality turmeric that meets stringent sanitary and phytosanitary (SPS) and quality standards. Hence, the Indian turmeric supply chain needs to align with this growing demand for high curcumin content. Overall, turmeric industry is projected to grow at a CAGR of approximately 7% from 2024 to 2030 while turmeric market is estimated to grow at a CAGR of 5.7% driven by increased adoption in functional foods, Ayurveda, and dietary supplements. The curcumin market is expected to grow at a CAGR of 14.5% from 2021 to 2030, with significant applications in the pharmaceutical sector. These statistics indicate robust growth across various facets of the turmeric industry, indicating its expanding domestic and international demand. Despite the growing demand, the trade faces several challenges such as logistical challenges, climate change and emerging competitors Vietnam, Fiji and Myanmar, and trade barriers in some countries limit the market access. On the other hand, India imports 0.24 lakh tonnes of turmeric accounting ₹ 246 crores, which needs to be substituted with the domestic types to minimize the import bill on agri-commodities.

Present and Forecast of exports

Particulars	Present scenario-2024	Forecast scenario-2030
Turmeric export	1.6 lakh tons	2.7 lakh tons
Whole turmeric	1.1 lakh tons	1.7 lakh tons
Value-added products	0.5 lakh tons	1 lakh tons
Exchange revenue	₹1900 Cr	₹ 5000-5500 Cr

Source: Authors estimate



Source: Spice Board, 2025

VIII. Regulatory Framework

Different regulatory bodies govern domestic markets and exports in India, which includes Spices Board, Food Safety and Standards Authority of India (FSSAI), and the Bureau of Indian Standards (BIS). The Spices Board oversees turmeric export, whereas other two agencies impose varying compliance requirements. CODEX Alimentarius (International standards) has regulation on low curcumin types (2%). On other hand, mutual recognition agreements with international markets for processed organic produce are lacking.

IX. Constraints in Turmeric Sector

Based on the production, exports, market & prices the following constraints need to be addressed for enhancing turmeric production and exports.

- Lack of high yielding region specific curcumin varieties
- Non availability of affordable planting material
- Poor crop establishment due to soil born diseases
- Incidence of diseases (root rot and rhizome weevil) and lack of IPM measures
- Incidence of storage pests
- No scientific grading system
- Less mechanisation in cultivation and processing
- Non -availability of skilled labour in processing and grading operations
- Quality loss (volatile compounds and curcumin) due to improper curing
- High pesticides use leading to the rejections
- Less focus on value addition
- Limited R&D and innovative products
- Lack of organised market facilities
- Price fluctuations and lack of remunerative prices
- Price is not determined based on curcumin content
- Logistical challenges in supply chain
- Information asymmetry in the markets
- Lack of market knowledge
- FPOs not engaging in marketing, and processing.
- Trade barriers such as tariffs and non-tariff barriers in some countries limit market access.
- Lack of liaison of suppliers with regulatory bodies

X. National Turmeric Board (NTB)

Till recently, there were five commodity boards, Tea, Coffee, Rubber, Tobacco and Spice board under the Ministry of Commerce and Industry. Recognizing the need to regulate production, promote overseas marketing, and control recurring instances of imbalances in supply and demand, recently, Minister of Commerce and Industry announced the National Turmeric Board headquartered at Nizamabad, Telangana. Board will pay special attention to the welfare of the turmeric farmers spread over 20 states. New Board will promote research and development of new turmeric products, value addition of turmeric, creating awareness on the medicinal properties of turmeric, ways to increase the yield, boost logistics & supply chain and quality & safer standards of turmeric. It will play pivotal role in providing the financial and technical assistance to farmers and help them to participate in trade fairs, buyer-seller meet, branding and promotion, etc.

Anticipated Activities

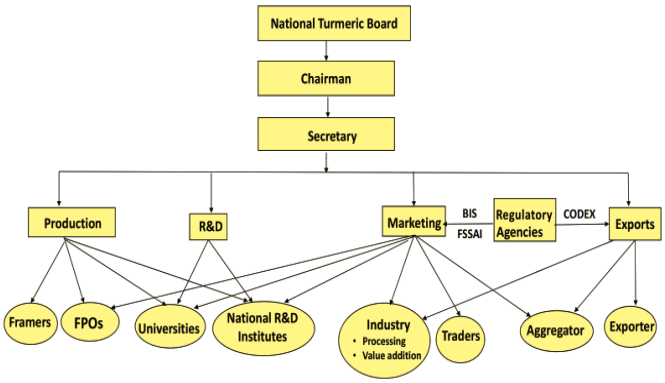
- Constant monitoring of turmeric market, both in India and abroad for ensuring fair and remunerative price to the farmers and reducing wide fluctuations in the prices
- Sustaining and improving the existing international markets and exploring new markets overseas for turmeric and its products
- Promote research and development of new turmeric products & value addition of turmeric
- Devising marketing strategies for indigenous types in consonance with demand & in convergence through group marketing.
- Sponsoring, assisting, encouraging scientific, technological and economic research for promotion of turmeric.

- Establishing auction platforms for sale of turmeric by registered growers and functioning as an auctioneer at auction platforms.
- Recommending to the Central Government the minimum prices to be fixed for major turmeric types to avoid unhealthy competition among the exporters.
- Purchasing turmeric from growers when considered necessary or expedient for protecting the interests of the farmers and disposing it in India or abroad as and when considered appropriate.
- Promoting turmeric grading at growers level.

An ideal framework to be adopted for a National Turmeric Board with the following divisions

(i) Crop development (ii) Research & Extension (iii) Marketing (iv) Exports. Board should have a regional offices across major producing regions with region specific targets

Proposed Organogram of National Turmeric Board



XI. Strategic Pathway for Accelerating Turmeric Exports and Augmenting Farmers Income

Concerted and coordinated efforts of all stakeholders on production, post-production, value addition, marketing and exports is very much essential. Some of the strategies are given below.

(a) Turmeric Production:

- *Supply of Healthy Planting Material:* Emphasis should be placed on providing healthy, disease-free planting material of popular turmeric varieties. NTB must take a proactive role in estimating demand from farmers and Farmers' Producer Organizations (FPOs), registering nurseries, and ensuring a seamless supply of seedlings.
- *Training and Awareness Programs:* The NTB needs to prioritize training and awareness programs on Good Agricultural Practices (GAPs), including effective fertilizer and water management, and strategies to minimize pesticide use.
- *Critical Input Supply and Custom Mechanization:* Focus on ensuring a smooth supply of critical inputs, including customized mechanization implements and processing equipment. This can be achieved through subsidies and the establishment of custom hiring centers.
- *Controlled Environmental Structures for Storage:* Provide support for the establishment of controlled environmental structures for storage and strengthen the overall supply chain to maintain product quality.
- *Financial Support for R&D Institutions:* The NTB should offer financial support to R&D institutions to develop technologies that address site-specific production constraints, characterize landraces, and secure GI tags.
- *Production and Supply Chain Strategies:* Develop strategies to integrate identified landraces into the production and supply chain effectively.
- *Quality Indices Development:* R&D institutions should create quality indices for different turmeric types to standardize and improve overall quality.
- *Identifying Organic Production Zones:* Development agencies need to focus on identifying suitable zones for organic turmeric production and establish protocols for certification

(b) Turmeric Value Addition

- *Enhance R&D for Processing Equipment:* R&D institutions should focus on developing cost-effective and farmer-friendly turmeric processing equipment. This includes creating value-added machinery such as boilers, polishers, and driers. Emphasis should also be placed on utilizing non-conventional energy sources for post-harvest processing operations.
- *Implement Mechanized Grading Systems:* Develop and implement mechanized grading systems at the farm level to ensure effective and timely grading of turmeric.
- *Innovate Low-Cost Biosensors:* Create affordable biosensors for farm use to identify and quantify bioactive compounds in turmeric.
- *Seek Financial Support for Product Diversification:* NTB should provide financial support for innovative consumer-based product diversification, including beverages, cosmetics, food and health supplements, ready mixes, nutraceuticals, and pharmaceuticals.
- *Invest in Green Energy Extraction:* R&D institutions must prioritize the development of low-cost, green energy-based extraction methods for bioactive compounds.
- *Collaborate with Industry for Value Addition:* Identify and develop value-added products in collaboration with industry partners through public-private partnerships (PPP).
- *Inventory of International Brands:* The NTB should create an inventory of international turmeric-based brands that produce value-added products, including dyes, coloring agents, and food supplements, and develop strategies to align with these brands.
- *Explore Secondary Agricultural Options:* Investigate secondary agricultural opportunities using turmeric waste, such as utilizing supernatant liquids from turmeric boiling and exploring the above-ground parts of the plant, like leaves and stems.
- *Facilitate Financial Support for Start-ups:* Provide institutional financial support at low interest rates and incentives for establishing turmeric-based industries and start-ups.

- *Meet National and Global Standards:* Develop strategies to comply with national and international standards such as BIS, FSSAI, and CODEX.
- *Encourage Financial Investment in Innovation:* Allocate funds to support the development of innovative turmeric-based products.

(c) Marketing Interventions

- *Establishment of E-Marketing Platforms:* NTB should set up e-marketing platforms to monitor turmeric markets effectively.
- *Creation of a Marketing Intelligence Cell:* Establish a dedicated marketing intelligence cell within the NTB to maintain a comprehensive turmeric database and enhance market insights.
- *Price Forecasting Studies:* Initiate studies on price forecasting and the dissemination of market trends to inform stakeholders and optimize decision-making.
- *Formation of an Indian Turmeric Association:* Create an Indian Turmeric Association to unite all stakeholders in the turmeric supply chain, facilitating collaboration and communication.
- *Demand Indentation and Trade Fairs:* The NTB should indent export and domestic demand and conduct trade fairs to promote turmeric and boost exports.
- *Deployment of Low-Cost Biosensors:* Use low-cost biosensors in market yards to assess curcumin levels, enabling better pricing strategies.
- *Facilitation of Regional Markets:* Facilitate regional markets by ensuring proper registration of farmers, buyers, and traders to streamline transactions.
- *Linking FPOs to the Supply Chain:* Develop a business plan to connect Farmers' Producer Organizations (FPOs) to the turmeric supply chain, enhancing their market participation.
- *Creation of a Market Stability Fund:* Advocate the government to establish a market price stability fund to support turmeric farmers during price fluctuations.
- *Minimum Price Guarantees:* Explore mechanisms for setting minimum guarantee or expected pricing for turmeric farmers to ensure their financial security.
- *Storage Facilities and Warehouses:* Invest in the creation of storage facilities and warehouses to facilitate storage during market gluts and prevent distress sales.

(d) Turmeric Exports

- *Demand Estimation:* NTB should estimate future domestic and international demand for turmeric products, ensuring that production and processing align with these projections.
- *Aligning with destination markets:* Prepare a comprehensive inventory of different turmeric products tailored to specific destinations and their market dynamics.
- *Promotion of GI Landraces:* Promote the unique traits of GI landraces and identify their end uses, facilitating targeted marketing strategies for various destinations.
- *Adherence to Global Requirements:* Emphasize strict adherence to Guided Residue Levels (GRLs) for different export destinations to ensure compliance and smooth trade.
- *Traceability Studies:* Initiate studies on the traceability of Indian turmeric using advanced software techniques to enhance transparency and build trust in global markets.
- *Global Campaigning:* Conduct vigorous campaigns to promote Indian turmeric and its products among the global diaspora, highlighting their quality and unique attributes.
- *Niche Market Identification:* The NTB should identify niche markets for organic turmeric and strategize production to effectively meet this demand.
- *Export Cluster Identification*: Identify and promote turmeric export clusters to enhance regional competitiveness and collaboration among producers.

(e) ESG (Environmental, Social, and Governance) norms

ESG norms are becoming increasingly relevant for turmeric production in India, a key spice crop with significant domestic and international demand. Adhering to ESG principles in turmeric production promotes sustainability by enhancing environ-mental practices, social impact, and governance standards.

(i) Sustainable Farming Practices

- *Organic and Regenerative Agriculture:* Promote practices that avoid chemical fertilizers and pesticides. Implement crop rotation and intercropping to maintain soil health, encouraging the adoption of organic fertilizers such as vermicompost and biofertilizers.
- *Water Management:* Adopt efficient water use practices like drip irrigation and encourage rainwater harvesting in turmeric-growing regions to optimize water resources.
- Soil Health: Conduct regular soil testing and promote minimal tillage techniques to reduce soil erosion and enhance fertility.
- *Climate Resilience:* Develop and promote climate-resilient turmeric varieties and encourage agroforestry practices to buffer against climate variability.
- *Waste Management:* Utilize by-products from turmeric processing for composting or bioenergy production, fostering a circular economy.

(ii) Social Norms

- *Fair Labour Standards:* Ensure adherence to fair labor practices, including prohibiting child labor, maintaining safe working conditions, and providing fair wages.
- *Community Engagement:* Involve local communities in decision-making processes to enhance social responsibility and inclusivity.
- *Women's Participation:* Encourage and support women's involvement in value-added turmeric activities to empower local communities.
- *Health and Safety:* Promote safe handling of pesticides (when used) by providing personal protective equipment (PPE) and supporting healthcare access for farm laborers and their families.

(iii) Governance Norms

- *Compliance with National Laws:* Align production practices with national regulations, including FSSAI, APEDA standards.
- *Following International Standards:* Adhere to international export standards, such as EU Maximum Residue Limits (MRLs) and USDA guidelines, to facilitate global market access.
- *Transparency and Accountability:* Maintain accurate records of farming inputs, yields, and sales to ensure transparency and accountability.
- *Third-Party Audits:* Establish third-party audits to verify ESG compliance and enhance credibility among stakeholders.

XII. Role of NIRCA in Strategic Partnership

ICAR-NIRCA has the expertise necessary to provide both technical and policy support through its research stations located in major turmeric-producing regions, including:

- **Andhra Pradesh**: HQ at Rajahmundry, NIRCA Centers, Guntur (Duggirala Zone), Kandukur (Ongole District)
- **Tamil Nadu**: NIRCA Centre at Vedasandur (Dindigul District)
- **Karnataka**: NIRCA Centre at Hunsur (Mysore District)
- **North Bengal**: NIRCA Centre at Dinhata (Cooch Behar District)

Additionally, other ICAR institutes in turmeric-producing states such as Maharashtra, Telangana, Odisha, and the Northastern states will liaison with ICAR-NIRCA to provide essential technical and policy support.

Ongoing Activities of ICAR-NIRCA

- *Landrace Characterization*: Characterizing local turmeric landraces to facilitate Geographical Indication (GI) registration and promote their uniqueness.
- *Promotion of Unique Turmeric Types:* Identifying and characterizing unique turmeric varieties to promote them within the supply chain.
- *Innovative Planting Material Production:* Developing cost-effective and innovative methods for the production of high-quality planting materials.
- *Cost Reduction through Custom Tools:* Minimizing production costs by creating customized machinery for both production and post-production processes.
- *Quality Indices Development:* Establishing quality indices specific to different turmeric-producing zones to standardize and enhance product quality.
- *Training on Good Agricultural Practices (GAPs)*: Providing training on GAPs, including post-harvest processing and value addition techniques.
- *Integration of Turmeric-Based FPOs:* Facilitating the integration of turmeric-based Farmers' Producer Organizations (FPOs) into business plans and supply chains.
- *Innovative Product Development:* Creating innovative turmeric products designed for diverse end-users, including pharmaceuticals, nutraceuticals, food industries, and cosmetics.
- *Quality and Residue Indices:* Developing rapid and sensitive quality indices, including assessments of pesticide residues.
- *Scientific Grading System:* Implementing a scientific grading system at the farm level to enhance pricing strategies.
- *In-Season Farmer Advisories:* Offering timely advisories to farmers to optimize their production strategies.
- *Yield Loss Enumeration:* Assessing and documenting yield losses due to weather variability, enabling improved risk management strategies.
- *Knowledge Partnership in Policy Making:* Acting as a knowledge partner in policy-making bodies of the Turmeric Board, contributing valuable expertise and insights.
- *Stakeholder Database Creation:* Establishing a comprehensive database of stakeholders and developing linkages to foster collaboration.
- *Innovative Extension Models:* Implementing innovative extension models for effective technology transfer and implementation.
- *Value Addition Initiatives:* As the voluntary center for the All India Coordinated Research Project (AICRP) on turmeric focused on value addition, ICAR-NIRCA is well-equipped to support these initiatives.
- *Collaborations with Developmental Organizations:* Collaborating with developmental organizations such as NABARD, APCNF, and various NGOs to strengthen partnerships with the Turmeric Board.

Through these initiatives, ICAR-NIRCA is positioned to become the principal technical partner to the Turmeric Board in achieving its vision.

Way Forward

Through collaborative innovation, ICAR-NIRCA is partnering with research institutions, the National Turmeric Board, Development agencies, Exporters and industry stakeholders to transform India's turmeric sector. This strategic alliance is developing value-driven technologies to overcome industry challenges, enhance global competitiveness, and establish India as the world's turmeric hub - targeting ₹ 5,000 crore (USD 1 billion) in exports by 2030.

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