



Turmeric Revolution in Kushinagar

From Trials to Transformation

A Journey of Sustainable Livelihood and Agricultural Diversification Led by SHDA



Sustainable Human Development Association

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Turmeric Revolution in Kushinagar: From Trials to Transformation

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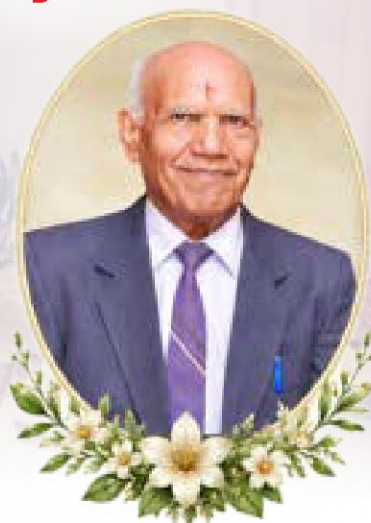
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In Reverent Memory of **Late Uday Bhanu Pandey Ji**



This publication, “Turmeric Revolution in Kushinagar – From Trials to Transformation,” is humbly dedicated to the cherished memory of Late Uday Bhanu Pandey, Founder of National Horticultural Research and Development Foundation (NHRDF).

For Sustainable Human Development Association (SHDA), Pandey Sir was not merely a guide or mentor — he was a constant source of inspiration, wisdom, and encouragement. His deep commitment towards farmers and sustainable agriculture, especially in the field of vegetable cultivation, helped shape the vision and confidence of our organization during its formative years.

With simplicity, affection, and unmatched dedication, he nurtured not only agricultural initiatives but also the people associated with them. His guidance strengthened our resolve to work closely with farming communities and created a foundation of trust, learning, and service that continues to inspire us today.

Though he is no longer among us, his values, teachings, and blessings remain deeply embedded in our journey. This publication stands as a humble tribute to a remarkable soul whose legacy continues to illuminate the path of rural development and farmers' empowerment.


SN Pandey

Founder Member and former President,
Sustainable Human Development Association

Dr Sudhakar Pandey
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FOREWORD

I am pleased to learn about the efforts of the Sustainable Human Development Association (SHDA) in promoting turmeric and spice-based livelihood systems in Kushinagar district of eastern Uttar Pradesh. The initiative documented in this publication reflects a thoughtful integration of scientific knowledge, field-based extension, and community-led development, an approach that is increasingly critical for strengthening India's horticulture and spice value chains.



Turmeric occupies a unique position as a commercial spice crop. Turmeric has immense nutritional, medicinal, and cultural significance. India's leadership in global turmeric production brings with it the responsibility to continuously improve productivity, quality, and farmer incomes, particularly in emerging production regions. Initiatives such as SHDA's turmeric programme demonstrate how improved varieties, standardised package of practices, and scientific post-harvest management can substantially enhance farm-level outcomes without placing undue pressure on land and natural resources.

I particularly appreciate SHDA's emphasis on varietal evaluation, adoption of improved cultivars such as "Rajendra Sonia", and the systematic attention given to post-harvest management, processing, and aggregation. These aspects are often underemphasised in traditional crop promotion programmes, yet they play a decisive role in determining market acceptance and price realisation. The organisation's efforts to strengthen farmer collectives, engage women's self-help groups in value addition, and build linkages with research and extension institutions align well with ICAR's broader mandate of inclusive, science-led horticulture development.

The comparative analysis of established turmeric hubs presented in this publication offers valuable insights for policymakers, development practitioners, and farmer institutions. The lessons drawn—particularly around quality discipline, institutional aggregation, and phased scaling—are highly relevant for regions like eastern Uttar Pradesh, where horticultural diversification holds significant promise for income enhancement and rural employment.

I am confident that this publication will serve as a useful reference for policy makers, donor agencies, research institutions, and grassroots organisations working towards sustainable spice-based livelihoods. I commend SHDA for documenting its journey and wish the organisation continued success in its efforts to develop Kushinagar as a vibrant, farmer-centric turmeric and spice cluster.

(Sudhakar Pandey)



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Prof. (Dr.) Vishal Nath
Principal Scientist and OSD

FOREWORD



The Sustainable Human Development Association (SHDA) has undertaken systematic documentation of its turmeric and spice-based livelihood interventions in Kushinagar district of eastern Uttar Pradesh. This publication provides a structured account of how research-based technologies, field-level extension, and community institutions can converge to support horticulture-based livelihood development in resource-constrained regions.

Diversification through horticultural crops and spices is an important strategy for improving farm income, nutritional security, and resilience among small and marginal farmers. Turmeric in particular, offers substantial potential for productivity enhancement and value addition when supported by suitable varietal selection, recommended agronomic practices, and scientific post-harvest management. SHDA's focus on varietal evaluation, farmer training, and integration of farmer's collective efforts and women's self-help groups in value addition activities reflects sound alignment with national horticulture development priorities.

The comparative learning from established turmeric hubs added significant technical value, reinforcing the relevance of quality management, institutional aggregation, and phased value chain development. Such documentation effectively bridges research gaps between institutions and field-level extension efforts, offering practical guidance for replication in similar agro-ecological contexts.

This publication is expected to serve as a reference literature for researchers, extension professionals, development agencies, and policy makers engaged in horticulture-led livelihood initiatives. I congratulate team SHDA for this effort and wish the organisation continued success in strengthening turmeric and spice-based farming systems in eastern India.

(Vishal Nath)

FOREWORD



I am delighted to go through this publication that documents the work of the Sustainable Human Development Association (SHDA) in promoting turmeric and spice-based livelihood systems in Kushinagar district of eastern Uttar Pradesh. The initiative reflects a meaningful convergence of scientific knowledge, participatory extension, and community-driven development—an approach that is essential for building resilient and inclusive rural economies.

Turmeric, as a crop, carries significant economic, nutritional, and cultural value, particularly for small and marginal farmers. Efforts that focus on improving productivity alongside strengthening post-harvest practices, value addition, and market linkages are critical in ensuring that farmers derive sustainable and enhanced incomes. SHDA's work demonstrates how the adoption of improved varieties such as "Rajendra Sonia," combined with better agronomic practices and attention to processing and aggregation, can lead to tangible improvements at the farm and community level.

I particularly appreciate the organisation's emphasis on strengthening local institutions, especially the engagement of women's self-help groups in value addition and collective enterprise. Such interventions not only enhance livelihoods but also contribute to social empowerment and local capacity building, which are central to sustainable rural development.

The insights presented in this publication, including the comparative understanding of established turmeric-growing regions, provide valuable lessons for practitioners, researchers, and policymakers. The focus on quality, institutional development, and phased scaling is especially relevant for regions like eastern Uttar Pradesh, where there is immense potential for diversification into high-value crops.

I commend SHDA for its dedicated efforts and for systematically documenting its learnings. I am confident that this publication will serve as a valuable resource for organisations and institutions working towards strengthening spice-based livelihoods and promoting inclusive rural development.

I wish SHDA continued success in its endeavours.



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Message

Turmeric (*Curcuma longa* L.) is an important spice crop of India with significant potential for income enhancement and diversification of small hold farming systems in eastern Uttar Pradesh. The Sustainable Human Development Association (SHDA) has implemented a field-based programme to promote improved turmeric cultivation practices in Kushinagar district, with emphasis on varietal evaluation and adoption of recommended agronomic practices. Krishi Vigyan Kendra (KVK), Kushinagar has been closely associated with the programme by providing technical guidance, field advisories, and scientific support during implementation.

The varietal trials and demonstrations conducted under farmers field conditions have generated useful evidence on varietal performance, highlighting the importance of yield stability, economic returns and farmer preference for technology adoption. The programme also underscores the role of continuous technical backstopping and farmer participation in strengthening extension outcomes. This publication documents the key experiences and learning from the initiative and will be useful to farmers, extension personnel, development agencies engaged in promotion of turmeric and other spice crops in similar agro-ecological situations.

I appreciate the efforts of SHDA, KVK Kushinagar, and the participating farmers and extend best wishes for further strengthening and scaling of such initiatives.

(Dr. Arun Pratap Singh)
Krishi Vigyan Kendra, Kushinagar
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Acknowledgment



This publication on turmeric cultivation and livelihood transformation in Kushinagar is the outcome of a collective effort spanning several years of learning, field engagement, and institutional support. On behalf of the Sustainable Human Development Association (SHDA), I express my deep sense of gratitude to all those who have contributed, directly and indirectly, to this journey.

I sincerely acknowledge the guidance and encouragement of the SHDA Advisory Board, whose strategic insights, technical advice, and constructive feedback have continuously strengthened the direction and quality of our turmeric interventions and documentation. Their role in shaping evidence-based approaches and ensuring long-term sustainability has been invaluable.

We gratefully recognize the support of our donors and development partners, particularly the Azim Premji Foundation, for their trust, financial support, and belief in community-led, agro-based livelihood models. Their partnership enabled SHDA to pilot, scale, and consolidate improved turmeric varieties, production practices, and post-harvest management systems in the district.

This work would not have been possible without the active participation of the farming communities of Kushinagar, especially women farmers, who embraced new practices while building upon their rich traditional knowledge of turmeric cultivation. Their resilience, experimentation, and collective action form the backbone of this publication.

I also acknowledge the dedicated efforts of the SHDA field team, technical experts, and partner institutions, whose commitment, rigorous data collection, and continuous handholding ensured credible outcomes and learning.

We hope this publication serves not only as a record of achievements, but also as a resource for practitioners, policymakers, and donors interested in promoting sustainable spice-based livelihoods. Any impact this work creates belongs equally to all who walked this path with us.

Vanday

With sincere gratitude

President, Sustainable Human Development Association (SHDA)

Executive Summary

Sustainable Human Development Association (SHDA) has always believed that lasting rural prosperity can be achieved when traditional wisdom, scientific innovation, and community participation move hand in hand. Our journey with turmeric cultivation in the Ramkola block of Kushinagar district stands as a strong example of this belief - a story of persistence, partnership, and progress.

The initiative was launched in 2015 with the support of a philanthropy organization. Although the overall programme was primarily centred on strengthening vegetable cultivation systems across 10 village panchayats, SHDA simultaneously initiated very small-scale exploratory trials on turmeric to assess its potential as an emerging livelihood crop. It is important to note that Kushinagar has a long and rich history of turmeric cultivation, with farmers traditionally growing local turmeric varieties for decades. Building on this legacy, SHDA undertook varietal assessments of Rajendra Sonia, Rajendra Sonali, Megha-1, and Lakadong. Among these, Rajendra Sonia emerged as the most promising variety, demonstrating higher productivity, superior quality, and excellent curcumin content. However, as the project concluded—and given that its core mandate was vegetable promotion—large-scale expansion of Rajendra Sonia could not be undertaken, and only a small number of progressive farmers continued cultivating it on a limited scale thereafter.

A new chapter unfolded in 2023 when another philanthropy organization extended its support to SHDA for scaling up the production of high yielding varieties of turmeric. This partnership enabled us to reach 1,020 farmers across 10 villages, promoting Rajendra Sonia on a wider scale and conducting further varietal trials. The results have been remarkable - farmers now report nearly double the production and higher profitability, with greater confidence in turmeric as a sustainable livelihood option.

We take this opportunity to express our deep gratitude to donor agencies for enabling us to expand and strengthen the intervention. We also acknowledge the technical guidance and collaboration of the Indian Council of Agricultural Research (ICAR) institutions, particularly the National Research Centre on Seed Spices (NRCSS), Ajmer, whose expertise helped us diversify into seed spices such as coriander, fenugreek, fennel, ajwain and nigella. These crops have shown excellent adaptability to the local agro-climatic conditions and are opening new avenues for income diversification among small and marginal farmers.

Turmeric holds a special place in India's agricultural, cultural, and health traditions. Renowned for its anti-inflammatory and medicinal properties, it symbolizes purity, prosperity, and wellness in every Indian household. Beyond its spiritual and culinary importance, turmeric is increasingly recognized as a catalyst for economic empowerment, especially for women and smallholder farmers. In Kushinagar, it has become more than a crop — it is a source of identity, pride, and hope.

This publication documents SHDA's evolving journey - from early varietal trials to large-scale promotion and diversification - while reflecting on the collective efforts of farmers, technical experts, and partner organizations. It presents key lessons, achievements, and pathways for developing Kushinagar as a leading turmeric and spice-producing cluster in Eastern Uttar Pradesh.

We hope that the insights, experiences, and models presented in these pages will inspire stakeholders from policymakers and researchers to farmer organizations and entrepreneurs - to work together toward building a sustainable, inclusive, and vibrant spice economy rooted in the spirit of community empowerment.

-BM Tripathi, Secretary

Chapter 1: Introduction

Background of SHDA and its livelihood interventions

SHDA works across multiple sectors, including livelihoods and entrepreneurship, nutritional security, women and child development, disability, migration and environment/climate change. Presently we are working in Kushinagar, Gorakhpur, Varanasi and Chandauli in Uttar Pradesh.

SHDA has significantly improved the livelihoods of over 15,000 small and marginal farmers through agro based interventions with special focus on vegetables & spice (turmeric) cultivation. It has documented agricultural practices in flood-prone areas and conducted capacity-building programs for farmers in vegetable cultivation. The organization introduced litchi-based intercropping, developed high-value vegetable crop models (onion with NHRDF storage model), and established connections between farmers and technical institutes. Additionally, SHDA facilitated farmers' access to National Horticulture Mission (NHM) and MNREGA programs.

The organization has also been actively involved in seed production and multiplication of improved varieties, including zinc-biofortified wheat and paddy (producing over 1,200 tons in the last ten years). It conducted successful demonstrations of Swarna Sub-1 rice in waterlogged areas under the IRRI-NFSM program and promoted turmeric production and processing.

Under its Community-Based Rehabilitation (CBR) program, SHDA has supported the mainstreaming of 450 Persons with Disabilities (PwDs), including children, with the support of Caritas India.

Migration Program – Mission Gaurav

During the COVID-19 pandemic, SHDA facilitated the mainstreaming of 35,000 migrant workers, ensuring their access to government schemes and cash benefits, supported by Tata Trusts.

Current Programs

The organization is presently engaged in turmeric production and value chain development, focusing on varietal replacement, distillation, drying, polishing, grinding, packaging, and marketing. It is also working on zinc wheat seed production. Additionally, SHDA is conducting demonstrations and trials on cereals, pulses, oilseeds, spices and vegetables, along with varietal research, evaluation, and demonstrations of paddy varieties.

Collaborations

SHDA has built strong partnerships with reputed institutions and organizations, including Department of Science & Technology (Govt. of India), Tata Trusts, HarvestPlus, International Food Policy Research Institute (IFPRI), Azim Premji Foundation, ICRISAT,

GAIN Geneva, CINI, NABARD, Caritas India, IARI Pusa, TechnoServe, IRRI (International Rice Research Institute), ICSSR (Indian Council of Social Science Research), TISS (Tata Institute of Social Sciences) Mumbai, NHRDF (National Horticultural Research and Development Foundation), ICAR-IIVR, Varanasi, ICAR-NRC Litchi Muzaffarpur, G.B. Pant University, Narendra Deo University, PANI Sansthan, CAIRN Energy, SATHI U.P., UNDP, Ministry of Environment & Forests (Govt. of India), and Gorakhpur Environmental Action Group.

Institutions & Infrastructure

SHDA has established an FPO - Lord Buddha Vegetable Producer Company Limited, Kushinagar, with 1,350 shareholders engaged in input management, seed production, and marketing of cereals and turmeric.

Genesis of Turmeric Promotion in Kushinagar

Turmeric cultivation in Kushinagar is not a recent phenomenon — it traces its roots back to the days of yore, when the crop formed an integral part of traditional farming systems across the region. Generations of farm families have grown turmeric for household use, local trade, and cultural practices. Its deep connection with the agrarian life of Eastern Uttar Pradesh made it both an economic and cultural crop, though largely confined to small patches and traditional varieties.

Building upon this historical base, the Sustainable Human Development Association began a systematic effort to revitalize and expand turmeric cultivation as part of its mission to identify sustainable livelihood options suited to the agro-climatic and socio-economic realities of the region. Characterized by small and marginal landholdings, low crop diversification, and high vulnerability to market and climate risks, Kushinagar's agriculture has traditionally been dominated by paddy and wheat. While these staples ensured food security, they offered limited income opportunities — particularly for women and land-constrained farmers.

During the 2015, SHDA's livelihood programs in Ramkola block highlighted the potential of turmeric as a high-value, low-risk crop capable of enhancing farm income without demanding significant changes to existing production systems. Turmeric's suitability to the alluvial soils of Kushinagar, its rain-fed adaptability, and its steady market demand made it a natural choice for scaling up.

With catalytic support from donor agencies, SHDA initiated a structured intervention to strengthen turmeric cultivation across 10 village panchayats of Ramkola block on a very small scale. The program began with varietal trials of improved varieties such as *Rajendra Sonia*, *Megha-1*, and *Lakadong*. These trials, conducted in collaboration with local Krishi Vigyan Kendras and progressive farmers, assessed yield performance, curcumin content, disease tolerance, and local adaptability.

The outcomes were encouraging. *Rajendra Sonia*, developed by Dr. Rajendra Prasad Central Agricultural University, Pusa, demonstrated exceptional promise in yield, rhizome quality, and curcumin content. Farmers quickly recognized its economic advantage, and many continued its cultivation even after the project phase — a testament to strong farmer ownership and confidence.

Although the initial phase faced challenges in scaling up due to limited institutional and financial support, SHDA maintained farmer engagement, providing technical guidance on seed selection, curing, and marketing. A new phase of growth began in 2023, when a philanthropy organization partnered with SHDA to strengthen the turmeric seed system and expand outreach to 1,020 farmers across 10 villages. This phase introduced improved agronomic practices, demonstration plots, and value addition, solidifying turmeric as a pillar of rural income diversification.

Over time, the initiative naturally evolved to include seed spices such as coriander, fenugreek, fennel, ajwain, and nigella, with technical guidance from ICAR–NRCSS, Ajmer. Together, these interventions laid the foundation for an integrated spice-based farming system in Kushinagar — one that leverages the district's agro-ecological strengths while enhancing farmer resilience and entrepreneurship.

Today, what began as a modest institutional effort has matured into a district-wide movement, reaffirming Kushinagar's legacy as a traditional turmeric-growing region and positioning it as an emerging hub for spice-based livelihoods in Eastern Uttar Pradesh — a living example of how innovation, partnership, and farmer participation can transform local agriculture sustainably.

Importance of Turmeric in Indian Agriculture and Economy

Turmeric (*Curcuma longa* L.) is a keystone spice crop in India — agriculturally, economically and culturally. Its significance is reflected in large cultivation area, high production volumes, strong export performance and important livelihood linkages for smallholders and rural women.

Key national figures

- Area & production (recent estimates): In 2022–23 India cultivated about 3.24 lakh hectares under turmeric and produced ≈ 11.61 lakh tonnes. [Press Information Bureau](#)
- Share of world production: India accounts for well over 70–75% of global turmeric production, making it by far the largest producer and exporter. [Press Information Bureau+1](#)
- Recent production trends: Official and expert summaries show Indian turmeric production fluctuating around 10–13 lakh tonnes in recent years (e.g., 13.34 lakh tonnes in 2021–22; 11.61 lakh tonnes in 2022–23), with area under cultivation near 3.0–3.5 lakh ha depending on season and estimates. [ANGRAU+1](#)

Major producing states and regional patterns

Turmeric is grown in 20+ states. The largest producing states historically include Maharashtra, Telangana, Karnataka, Tamil Nadu, and Andhra Pradesh, though regional importance shifts with varieties and crop cycles. State wise breakdowns and year-to-year estimates are published by the Spices Board / state agriculture departments. [Indian Spices+1](#)

Trade, exports and value chain

- Export volumes & value: India's exports of spices and spice products have been rising; turmeric (in raw, powder and oleoresin/curcumin forms) is a major export item. National spice export volumes reached record levels in recent years (for all spices) and turmeric/oleoresin/curcumin contribute significantly to that value chain. For example, spices & spice products exports crossed ~18 lakh tonnes valued ~39,994 crore (US\$4.72 billion) in FY 2024–25, with turmeric remaining one of the top exported spices. [Indian Spices+1](#)
- Value-added opportunities: Beyond raw rhizomes, turmeric processing into powder, oleoresins and curcumin extracts increases value capture. The global market for turmeric and curcumin derivatives has been expanding, creating opportunities for rural processing units and agribusinesses. [ICRIER+1](#)

Livelihoods and rural economy

Income and employment: Turmeric is a high-value crop that can significantly raise farm incomes compared with low-value cereals on small landholdings. It generates seasonal employment across cultivation, harvesting, curing, grading and processing — activities where women often participate strongly (curing, cleaning, grading), supporting rural livelihoods and women's economic empowerment. Production and processing linkages also support rural enterprise development (FPOs, small processors). [ANGRAU+1](#)

Strategic & policy relevance

Crop diversification & resilience: Turmeric is widely promoted in cropping systems to diversify income and improve resilience against price and climate shocks. Several government and institutional initiatives (Spices Board, ICAR, state horticulture departments) actively support improved varieties, seed systems, extension, and market linkages for turmeric. Directorate of Economics and Statistics+1

Relevance for Kushinagar

For a district such as Kushinagar in Uttar Pradesh, which has been traditionally oriented towards cereals and low-value crops, the emerging national context for turmeric—its scale, export potential, high domestic demand, and value-addition possibilities—makes turmeric an attractive crop choice. By aligning local agro-climatic suitability, improved varieties and value-chain linkages, Kushinagar has an opportunity to tap into these national and global trends to raise farmer incomes and build a resilient spice-based livelihood system.

Objectives of the publication

1. To document SHDA's journey and experiences

- Capture the evolution of turmeric promotion efforts by SHDA from initial varietal trials (2015–2018) to the scale-up phase (2023–2026).
- Highlight field-level innovations, farmer participation, and outcomes achieved in productivity, income, and empowerment.

2. To assess the potential of Kushinagar district for turmeric-based livelihoods

- Analyze the agro-climatic and soil suitability of Kushinagar for turmeric and allied spice crops.
- Identify opportunities for developing the district as a major turmeric production hub in Eastern Uttar Pradesh.

3. To provide a comprehensive overview of turmeric production in India

- Present national-level data on area, production, productivity, and exports.
- Compare the performance and institutional models of established turmeric clusters (Erode, Sangli, Nizamabad, Meghalaya, etc.) to draw lessons for Kushinagar.

4. To present scientific and technical guidance for turmeric and seed spice cultivation

- Disseminate best agronomic practices, varietal characteristics, and integrated crop management techniques.
- Introduce value addition and post-harvest management options to enhance profitability.

5. To evaluate the economic and social impacts of SHDA's interventions

- Assess the improvements in productivity, household income, women's participation, and local employment.
- Include evidence-based case studies and farmer testimonials demonstrating real livelihood change.

6. To strengthen market linkages and value chain integration

- Map existing and potential marketing channels and price realization opportunities.
- Explore strategies for branding, FPO-led aggregation, and partnerships with spice companies and e-commerce platforms.

7. To inform policy advocacy and institutional collaboration

- Highlight enabling government schemes (MIDH, PMFME, ODOP, etc.) and the role of research institutions (ICAR, KVKs, NHRDF).
- Suggest mechanisms for greater public-private-community collaboration for scaling up turmeric production.

8. To outline a strategic roadmap for making Kushinagar a “Turmeric Hub” of North India

- Propose actionable steps for cluster development, seed system strengthening, infrastructure creation, branding, and GI registration.
- Link turmeric promotion with broader goals of sustainable agriculture, rural entrepreneurship, and agro-tourism.

9. To expand knowledge on diversification through seed spices and ginger

- Present SHDA's experimental results and future potential of crops like coriander, fenugreek, ajwain, fennel, and nigella.
- Position these crops as complementary enterprises for income diversification and risk reduction.

Chapter 2: Status of Turmeric Production in India

Overview of Turmeric Production at the National Level

India is the world's largest producer, consumer, and exporter of turmeric, contributing approximately 70–80% of global output. The crop holds significant economic and cultural value, serving as a spice, natural dye, and key ingredient in traditional medicine and modern nutraceuticals.

Turmeric cultivation in India spans around 3–3.5 lakh hectares, with annual production ranging from 10 to 13 lakh tonnes in recent years. Productivity varies across states, averaging 3,500–3,700 kg/ha, depending on variety, agro-climatic conditions, and farming practices.

Major turmeric-growing states include Telangana, Maharashtra, Tamil Nadu, Karnataka, Odisha, and West Bengal, with regional clusters like Erode, Sangli, and Nizamabad achieving high yields through specialized agronomy, processing infrastructure, and market linkages.

India's turmeric is primarily consumed domestically ($\approx 85\%$), with the remainder exported to countries such as Bangladesh, UAE, the United States, and Malaysia, generating substantial foreign exchange. The global demand for turmeric and its derivatives is steadily increasing due to growing awareness of its health benefits and industrial applications.

Despite its prominence, challenges such as price volatility, post-harvest losses, variable quality, and limited processing infrastructure continue to affect the value chain. Strengthening production systems, promoting improved varieties, and linking farmers to markets remain key to enhancing productivity and income for turmeric cultivators nationwide.

Table — India: Turmeric area, production & productivity (2015-16 → 2024-25)

Agricultural Year	Area (ha)	Production (t)	Productivity (kg/ha)	Source / note
2015-16	220,000	760,000	3,455	Indian Spices / consolidated historical tables (Spice Board). Indian Spices
2016-17	235,000	820,000	3,489	IndianSpices / statewise tables. Indian Spices
2017-18	231,000	863,000	3,737	State/spice tables / compiled reports. (figures from compiled tables). Scribd+1
2018-19	253,000	973,000	3,846	IndianSpices / spice-wise annual tables. Indian Spices

201920	251,000	926,000	3,689	Indian Spices / sector PDFs (note: some sources report slight variation). Scribd+1
202021	350,000*	1,102,000	3,149	GOI/PJTSAU outlooks / 2020-21 advance estimate reported in outlook notes. (*area reported variably across sources; see caveat). PJT Agricultural University+1
202122	300,000	1,030,000	3,433	Major-spice tables / market outlooks (compiled) Indian Spices+1
202223	280,000	1,170,000	4,179	IndianSpices / 2022 - 23 major spice table (some years are final, some provisional). Indian Spices
202324	3.05 lakh (305,000)	1,054,000	3,656	ANGRAU (Turmeric Outlook 2023-24)—central 2nd AE / outlook. Angrau
202425	(2nd AE) 3.05-3.40 lakh range	1,204,000 (2nd AE reported Oct 2025)	~3,950 (implied)	PJTSAU / PJT-ANGRAU updates report 12.04 lakh t as 2nd advance estimate for 2024-25 (reports vary by cut/date). Use as provisional. PJT Agricultural University+1

Major turmeric-growing states and regions

Here's a detailed overview of the **major turmeric-growing states and regions in India**, based on the latest data (up to 2023–24) from the **Directorate of Arecanut and Spices Development (DASD), Kozhikode, Ministry of Agriculture & Farmers Welfare**, and **NHB/INDIASTAT** sources.

Major Turmeric-Growing States in India

Rank	State	Major Producing Districts / Regions	Share in National Production (%)	Approx. Area ('000 ha)	Approx. Production ('000 tonnes)	Productivity (t/ha)
1	Telangana	Nizamabad, Nirmal, Jagtial, Karimnagar, Warangal, Khammam	30–32%	46	280–300	6.0–6.5
2	Maharashtra	Sangli, Satara, Kolhapur, Hingoli, Nanded, Osmanabad	18–20%	45	180–200	4.0–4.5

3	Tamil Nadu	Erode, Salem, Coimbatore, Dindigul, Namakkal	12–13%	25	140–150	5.5–6.0
4	Karnataka	Chikkamagaluru, Belagavi, Hassan, Mysuru	8–9%	18	90–100	5.0–5.5
5	Andhra Pradesh	Guntur, Prakasam, Vizianagaram, Kadapa	6–7%	14	80–90	5.8–6.2
6	Odisha	Kandhamal, Koraput, Gajapati, Nabarangpur	5–6%	13	75–80	5.8–6.0
7	West Bengal	Uttar Dinajpur, Cooch Behar, Jalpaiguri, Bankura	4–5%	10	60–70	6.0–6.5
8	Assam	Karbi Anglong, Golaghat, Nagaon, Cachar	3–4%	9	50–55	5.5–6.0
9	Bihar	Samastipur, Muzaffarpur, Gopalganj, East Champaran, Purnea	2–3%	8	40–45	5.0–5.5
10	Uttar Pradesh	Kushinagar, Siddharthnagar, Deoria, Maharajganj, Bahraich	2–3%	7	35–40	5.0–5.3
11	Meghalaya	Ri Bhoi, West Garo Hills, Jaintia Hills	1–2%	4	15–20	4.5–5.0
12	Madhya Pradesh	Chhindwara, Mandla, Jabalpur	<1%	3	12–15	4.0–4.5

Important Regional Turmeric Belts in India

Region / Belt	States Covered	Special Characteristics
Nizamabad-Warangal Belt	Telangana	High-curcumin varieties, major export hub ("Nizamabad Turmeric").
Sangli-Satara Belt	Maharashtra	Known for quality turmeric and organized marketing; "Sangli Turmeric" is GI-tagged.
Erode-Salem Belt	Tamil Nadu	High yield, bright yellow color; "Erode Turmeric" is GI-tagged.
Kandhamal-Koraput Belt	Odisha	Organic, tribal-farming turmeric; "Kandhamal Turmeric" has GI recognition.
Guntur-Prakasam Belt	Andhra Pradesh	Strong domestic and export market linkages.
Karbi Anglong Belt	Assam	Organic and high-curcumin turmeric (GI-tagged "Karbi Anglong Turmeric").
Kushinagar-Siddharthnagar Belt	Eastern Uttar Pradesh	Emerging region with promising varieties like Rajendra Sonia.
Kalanamak-Turmeric Mixed Zone (North Bihar)	Bihar	Integrated farming with traditional crops; focus on Rajendra Sonia and Rajendra Sonali varieties.

Learning from Other States: Building a Roadmap for Turmeric Promotion In Uttar Pradesh

Turmeric is not only a spice — it is a livelihood crop, a natural medicine, and a powerful symbol of India's agri-heritage. Across India, many states have demonstrated how the right mix of policy support, farmer organization, value addition, and branding can turn turmeric into a source of rural prosperity. For districts like Kushinagar, which already show promising yields and strong farmer interest, these examples from other states provide valuable lessons for shaping future initiatives in Uttar Pradesh.

1. Andhra Pradesh and Telangana: Cluster Development and Farmer Aggregation

The states of Andhra Pradesh and Telangana are among India's largest turmeric producers. Their success is rooted in cluster-based cultivation, farmer producer organizations (FPOs), and dedicated turmeric boards. Modern processing and drying units have been established through public-private partnerships. These states demonstrate how collective action and infrastructure can significantly raise farmer incomes.

Lesson for Uttar Pradesh: Adopt a cluster approach by identifying contiguous turmeric-growing villages, forming FPOs, and establishing a district-level turmeric resource centre for capacity building, quality testing, and buyer linkage.

2. Maharashtra: Branding, GI Tagging, and Commodity Hedging

Maharashtra's Waigaon Turmeric received a Geographical Indication (GI) tag in 2017, recognizing its unique quality. The state promotes branding, district crop specialization, and price risk management through commodity hedging. Processing and export units supported by the Maharashtra State Agricultural Marketing Board (MSAMB) ensure value addition and stable prices.

Lesson for Uttar Pradesh: Explore GI registration for 'Kushinagar Turmeric' and link FPOs to e-NAM and commodity exchanges to improve price realization.

3. Tamil Nadu: Export Promotion and Organic Certification

Tamil Nadu focuses on export-oriented turmeric cultivation, particularly in Erode and Salem. Farmers receive support from APEDA for export certification, and spice parks provide facilities for grading, cleaning, and packaging.

Lesson for Uttar Pradesh: Develop Turmeric Export Hubs in Kushinagar, integrating backward linkages with farmers and forward linkages with export houses in Varanasi and Mumbai.

4. Meghalaya and Mizoram: Organic Value Chains and Farmer Branding

Under the Mission Organic Value Chain Development for North Eastern Region (MOVCDNER), these states have successfully created organic turmeric value chains. Farmers are linked to markets through aggregators, and organic certification enables premium pricing.

Lesson for Uttar Pradesh: Promote an Organic Turmeric Cluster in Kushinagar with certification and branding support under the State Horticulture Mission.

5. Himachal Pradesh: MSP and Processing under Natural Farming Scheme

In 2025, Himachal Pradesh introduced an MSP of 90 per kg for naturally grown turmeric under the 'PrakritikKheti Khushhal Kisan Yojana'. The scheme includes procurement, training, and branding of 'Himachal Haldi'.

Lesson for Uttar Pradesh: Introduce a price assurance and procurement model for turmeric growers, encouraging natural and low-cost farming practices.

6. Export Promotion and Global Opportunities

India contributes nearly 75% of global turmeric production and 60% of exports. With improved post-harvest management, curcumin extraction, and organic certification, export potential can increase significantly. Kushinagar can become new hubs for North India's turmeric export through coordinated efforts between APEDA, the MSME Department, and farmer organizations.

7. Recommendations for Government Stakeholders In Uttar Pradesh

- Develop a State-Level Turmeric Mission to coordinate production, processing, and marketing.
- Identify and support turmeric clusters in Kushinagar and other districts of Uttar Pradesh.
- Facilitate GI registration and branding of 'Kushinagar Turmeric'.
- Establish a Spice Processing and Export Hub in Eastern Uttar Pradesh.
- Encourage organic and natural farming through certification and procurement schemes.
- Strengthen FPOs with digital marketing and business support.
- Organize annual Buyer–Seller Meets and 'Turmeric Festival of Eastern UP'.

The Way Forward: A Message from SHDA

The Sustainable Human Development Association (SHDA) believes that turmeric can become a cornerstone of sustainable livelihoods in Eastern Uttar Pradesh. By learning from the successes of states like Telangana, Andhra Pradesh, and Maharashtra, Uttar Pradesh can establish itself as a new leader in high-quality, eco-friendly turmeric production. SHDA urges government departments, research institutions, and private stakeholders to collaborate on developing a holistic turmeric value chain—from field to export market. Together, we can ensure that the golden crop of turmeric brings prosperity, employment, and recognition to the farmers of Kushinagar and beyond.

Chapter 3

Agro-Climatic Suitability and Potential of Kushinagar Geographic and Climatic Profile of Kushinagar District

Kushinagar district, located in the north-eastern part of Uttar Pradesh, is an integral part of the Terai region of the Indo-Gangetic plains. It lies between latitude 26° 39' N to 27° 14' N and longitude 83° 24' E to 84° 15' E, encompassing a total geographical area of approximately 2,873 square kilometers. Administratively, the district is divided into 14 development blocks, including Ramkola, Khadda, Tamkuhi Raj, and Kasya, among others. The district headquarters is situated in Padrauna, while Kushinagar town holds immense cultural and historical significance as the sacred place of Lord Buddha's Mahaparinirvana.

Topography and Soils

The terrain of Kushinagar is generally flat and alluvial, typical of the Terai belt. The elevation ranges from 70 to 100 meters above mean sea level. The land is traversed by several rivers and rivulets, notably the Gandak, Rapti, and Little Gandak, which contribute to both soil fertility and periodic flooding.

The district's soils are predominantly alluvial, comprising sandy loam to clay loam textures, rich in organic matter but often low in nitrogen and phosphorus. These soils are highly fertile and suitable for diverse cropping systems, including paddy, wheat, sugarcane, and turmeric. However, due to its location in the floodplain, the area is also prone to seasonal waterlogging and erosion, particularly during the monsoon months.

Climate

Kushinagar experiences a humid subtropical climate characterized by three distinct seasons—summer, monsoon, and winter.

- **Summer (March to June):** Summers are generally hot and dry, with temperatures ranging from 30°C to 42°C, occasionally reaching up to 45°C in May and June.
- **Monsoon (June to October):** The southwest monsoon brings the bulk of the annual rainfall, averaging 1,000 to 1,200 mm per year. The rains are crucial for paddy cultivation but also cause recurrent flooding in low-lying areas.
- **Winter (November to February):** Winters are cool and dry, with temperatures ranging from 8°C to 20°C, accompanied by frequent fogs that sometimes affect visibility and crop growth.

The relative humidity remains high (70–85%) during the monsoon and early winter, while wind patterns are generally calm except during pre-monsoon storms.

Agro-Climatic Zone

Kushinagar falls under the Eastern Plain Zone (Zone-IV) of Uttar Pradesh's agro-climatic classification. The zone is characterized by fertile soils, ample groundwater

resources, and favorable climatic conditions for rice–wheat rotation, as well as diversification into pulses, sugarcane, oilseeds, and spices like turmeric. The presence of abundant water bodies and fertile alluvium offers high potential for integrated farming systems and agri-based livelihoods.

Environmental Considerations

Despite its high agricultural potential, Kushinagar faces environmental challenges such as recurrent floods, declining soil fertility, and groundwater depletion in certain pockets. Increasing climatic variability has also influenced cropping patterns, making climate-resilient agriculture a critical focus area for sustainable development interventions.

Soil Characteristics Suitable for Turmeric Cultivation

Turmeric is a rhizomatous spice crop that thrives best in fertile, well-drained soils with good moisture retention. The quality and yield of turmeric rhizomes are strongly influenced by soil type, fertility, and physical characteristics.

1. Ideal Soil Type

Turmeric performs well in a wide range of soils, from light loamy to heavy clay loam, provided they are well-drained and rich in organic matter. The ideal soils for high rhizome yield and curcumin content are:

- Sandy loam to clay loam soils with good friability.
- Alluvial soils commonly found in the Indo-Gangetic plains, including Kushinagar, are highly suitable because of their fertility and moderate texture.
- Red and lateritic soils, when adequately manured, also support good growth.

2. Soil Texture and Structure

A loose, friable structure allows easy rhizome expansion and aeration, while good moisture-holding capacity supports steady growth. Heavy, poorly drained soils can lead to rhizome rot, whereas overly sandy soils may result in low yields due to poor moisture retention.

3. Soil pH and Chemical Properties

- Optimum soil pH: 5.5 to 7.5 (slightly acidic to neutral).
- Turmeric is moderately tolerant to soil acidity but sensitive to high alkalinity or saline conditions.
- The crop requires balanced nutrient availability, particularly nitrogen (N) for vegetative growth, phosphorus (P) for root and rhizome development, and potassium (K) for curcumin synthesis and rhizome quality.

4. Soil Fertility and Organic Matter

Turmeric responds well to soils enriched with organic carbon and farmyard manure (FYM). Incorporation of 20–25 tonnes of FYM per hectare or composted green manure

before planting enhances soil microbial activity and rhizome development. Regular addition of organic residues maintains the soil's physical structure and fertility.

5. Drainage and Moisture Conditions

- Good internal drainage is essential to prevent water stagnation and rhizome rot caused by fungal pathogens such as *Pythium* and *Rhizoctonia*.
- Fields should be raised or gently sloped to facilitate runoff during heavy monsoon rains.
- Moisture conservation through mulching (using paddy straw or dry leaves) supports rhizome bulking and reduces weed growth.

6. Soil Suitability in Kushinagar District

- The soils of Kushinagar district—predominantly alluvial loam with moderate clay content—are highly favorable for turmeric cultivation. These soils:
- Have good water-holding capacity and fertility.
- Are slightly acidic to neutral in reaction (pH 6.0–7.2).
- Support high organic matter buildup due to intensive cropping and organic residue incorporation.
- Facilitate the cultivation of improved varieties such as Rajendra Sonia, known for its higher yield and curcumin content.

7. Soil Health Management Practices

To sustain productivity and quality in turmeric-based systems, the following practices are recommended:

- Crop rotation with legumes or green manure crops.
- Incorporation of organic manures and biofertilizers (*Azospirillum*, *Trichoderma*, PSB).
- Periodic soil testing to guide balanced nutrient application.
- Mulching and raised-bed cultivation to improve drainage and microclimate.

Table: Soil Parameters and Field Conditions for Turmeric Cultivation in Kushinagar District

Soil Parameter	Ideal Range/Condition	Suitability in Kushinagar	Remarks
Soil Type	Sandy loam to clay loam	Predominantly alluvial loam	Highly suitable for turmeric
Soil Texture	Well-drained, friable structure	Moderately fine-textured alluvial soils	Supports easy rhizome expansion
Soil pH	5.5 – 7.5 (slightly acidic to neutral)	6.0–7.2	Favourable for nutrient uptake
Organic Matter Content	High ($\geq 1\%$)	Moderate to high due to organic residue buildup	Enhances rhizome size and curcumin content
Soil Fertility	Medium to high NPK levels	Generally medium, can be improved with FYM and green manure	Balanced fertilization essential
Drainage Condition	Well-drained, no water stagnation	Good natural drainage in most blocks; minor waterlogging pockets	Raised beds recommended in low-lying areas
Moisture Retention	Moderate to high	Adequate due to loam texture and mulching practices	Critical during rhizome bulking stage
Soil Temperature (Optimum)	25°C – 30°C during growing period	Achieved naturally during May–September	Favourable for sprouting and rhizome growth
Salinity/Alkalinity	EC < 1.0 dS/m; non saline	Nonsaline; neutral alluvium	No limitation for turmeric cultivation

The Rajendra Sonia variety of turmeric, released by the Dr. Rajendra Prasad Central Agricultural University, Samastipur (Bihar), performs exceptionally well under the soil and climatic conditions of Kushinagar district. The district's alluvial loam soils, with moderate clay content, good organic matter, and slightly acidic to neutral pH, provide an ideal environment for robust rhizome growth and high curcumin content. The well-drained yet moisture-retentive nature of the soil supports healthy underground development, while balanced fertility levels and the use of organic manures enhance yield and quality. Field observations from SHDA's interventions in Ramkola block confirm that Rajendra Sonia outperforms local varieties in both rhizome yield (20–25%) and curcumin percentage (6–7%), validating the strong agro-ecological suitability of Kushinagar for large-scale turmeric production.

Existing Cropping Patterns and Potential for Diversification in Kushinagar District

Kushinagar district, located in the eastern part of Uttar Pradesh, lies in the fertile alluvial plains of the eastern Gangetic basin. The region is endowed with rich alluvial soils, adequate rainfall (averaging 1,000–1,200 mm annually), and a well-developed irrigation network. These factors make agriculture the mainstay of livelihoods for the majority of the population and support high cropping intensity across the district. With more than 80 percent of households dependent on agriculture, Kushinagar presents a typical landscape of eastern Uttar Pradesh—densely populated, fertile, and agriculturally vibrant.

The existing cropping pattern of the district is primarily dominated by paddy, wheat, and sugarcane, which occupy the largest share of cultivated area. Paddy is the major kharif crop, followed by wheat in the rabi season, while sugarcane serves as an important annual commercial crop. Farmers commonly follow rice–wheat or sugarcane-based rotations, which have sustained food security and cash income for decades. In addition to these, farmers cultivate maize, pulses (such as lentil and pigeon pea), oilseeds (mainly mustard), and a range of vegetables. The district exhibits a cropping intensity of over 150 percent, reflecting extensive utilization of land resources, yet it also indicates a narrow cropping base heavily dependent on a few water- and input-intensive crops.

Unlike many districts of Uttar Pradesh, Kushinagar has a long and culturally rooted association with turmeric cultivation. Oral histories and accounts from elderly farmers indicate that turmeric has been cultivated in this region for more than eight decades—since the time of their forefathers. Traditionally, every farming household used to grow a small patch of turmeric, primarily for household consumption, local barter, and religious uses. Over generations, this practice became embedded in local farming systems, making turmeric not merely a cash crop but a part of the community's agricultural identity.

The region's favorable soil texture, moderate rainfall, and humid subtropical climate have always supported turmeric cultivation. However, in the post-Green Revolution era, as farmers shifted toward high-yielding cereals and sugarcane due to assured procurement and industrial demand, the area under turmeric gradually declined. By the early 2000s, turmeric survived mainly as a traditional backyard crop. Yet, the knowledge and cultural memory of its cultivation persisted among the farming community—providing a strong foundation for its revival.

The revival of turmeric cultivation in Kushinagar began through organized interventions by local organizations such as the Sustainable Human Development Association (SHDA). Since 2015, SHDA, with technical support from ANDUAT, Kumarganj, Ayodhya and financial support from some philanthropic organizations, has reintroduced turmeric as a viable livelihood crop. Demonstrations of improved varieties such as 'Rajendra Sonia' from Central Agricultural University, Samastipur, along with better agronomic practices and collective marketing, have rekindled farmers' confidence in turmeric cultivation.

Opportunities for Developing Kushinagar as a Turmeric and Seed Spice Cluster

Kushinagar district in Eastern Uttar Pradesh holds tremendous potential to evolve as a leading turmeric and seed spice production cluster, comparable to the well-known spice-growing regions of Erode and Salem (Tamil Nadu), Sangli (Maharashtra), and Nizamabad (Telangana). The district's favorable agro-climatic conditions, fertile soils, and rich cultural legacy of turmeric cultivation form a strong foundation for developing a sustainable, high-value agricultural cluster in North India.

Kushinagar lies within the eastern Gangetic plains, characterized by fertile alluvial soils, good soil moisture retention, and a warm-humid subtropical climate receiving 1,000–1,200 mm annual rainfall — all of which are ideal for turmeric and seed spice cultivation. The district's sandy loam to clay loam soils ensure good rhizome growth, high curcumin content, and bright color, comparable to those in southern India's prime turmeric belts.

Turmeric cultivation in Kushinagar is not a recent phenomenon. Elderly farmers across Ramkola, Dudahi, NebuaNaurangia, Khadda, Vishunpura, and Kathkuiya blocks consistently recall that their forefathers cultivated turmeric for household use, traditional medicine, and local trade. This long-standing practice — sustained for more than eight decades — makes turmeric an integral part of the district's agricultural identity.

Recent years have witnessed a revival and commercialization of the crop, driven by improved varieties and scientific management practices. The Sustainable Human Development Association (SHDA) has played a pioneering role since 2015, initiating varietal trials in Ramkola and gradually extending demonstrations and farmer training to neighboring blocks. Among the tested varieties, Rajendra Sonia, developed by the Central Agricultural University, Samastipur, has shown high yield, rich color, and superior curcumin content.

Field demonstrations have recorded turmeric yields of 250–300 quintals per hectare, rivalling those of leading southern clusters. The crop's low input requirement, tolerance to intermittent waterlogging, and consistent price stability make it an attractive and climate-resilient option for smallholders. Turmeric's labor-intensive nature also provides opportunities for women's participation in cultivation, processing, and marketing activities.

Turmeric cultivation across Ramkola, Dudahi, NebuaNaurangia, Khadda, Vishunpura, and Kathkuiya blocks can collectively anchor the formation of a Kushinagar Turmeric Cluster. Expansion of the crop to over 2,000 hectares in the coming years is feasible with structured support in seed multiplication, input management, and post-harvest processing. Strengthening Farmer Producer Organizations (FPOs) and Self-Help Groups (SHGs) will help standardize production and improve bargaining power.

Kushinagar's agro-ecological conditions are also suitable for the cultivation of seed spices such as coriander, fenugreek, and fennel, particularly in the rabi season following paddy harvest. Promoting these spices alongside turmeric would diversify income and

strengthen the district's position as a composite spice production hub. Intercropping and rotation of turmeric with seed spices can improve pest resistance, soil health, and year-round farm employment.

Kushinagar's proximity to trade centers like Gorakhpur, Varanasi, and Patna, coupled with expanding road networks under the Purvanchal and Gorakhpur Link Expressways, offers excellent market connectivity. These logistics advantages can facilitate the establishment of aggregation points, curing and drying units, small-scale grinders, and packaging centers. Branding products like 'Kushinagar Turmeric' and 'Eastern Gangetic Seed Spices' can enhance market recognition.

The district's strong institutional ecosystem — including KVK Kushinagar, SHDA, the Department of Agriculture, and local FPOs — provides technical and organizational support for scaling the cluster. The initiative aligns with government programs such as One District One Product (ODOP), the National Mission on Spices (NMS), and the Spice Board of India's Cluster Development Programme, enabling targeted financial, technical, and market support.

Kushinagar stands at the threshold of becoming North India's foremost turmeric and seed spice hub. With its time-tested tradition, suitable agro-ecology, motivated farmers, and institutional backing, the district can replicate the success of southern turmeric clusters while setting a new benchmark for sustainable, inclusive agricultural development.

Comparative Potential of Kushinagar vs Major Turmeric Clusters in India

Parameter	Erode (TN)	Sangli (MH)	Nizamabad (TS)	Kushinagar (UP)
Soil Type	Red loam / Black soil	Black cotton soil	Red sandy loam	Alluvial sandy loam to clay loam
Annual Rainfall (mm)	700–900	600–800	700–900	1,000–1,200
Average Yield (q/ha)	250–300	280–320	240–290	250–300 (demonstrated)
Curcumin Content (%)	5–6	5–6	4.5–5.5	5–6 (Rajendra Sonia)
Traditional Cultivation	100+ years	100+ years	80+ years	80+ years (all blocks)
Market Connectivity	Excellent	Good	Good	Improving, major trade centers nearby

Chapter 4

SHDA's Journey in Promoting Turmeric Cultivation Varietal Trials and Performance Outcomes of Improved Turmeric Cultivars in Kushinagar, Uttar Pradesh

Background

Kushinagar district has a long-standing tradition of turmeric cultivation, deeply rooted in local farming practices. For decades, cultivation was primarily dependent on indigenous local varieties that, though resilient and culturally preferred, typically delivered modest yield levels averaging **about 60 quintals per acre**. Recognizing the opportunity to significantly enhance productivity and farmer income, the Sustainable Human Development Association (SHDA) initiated structured varietal evaluations between **2015 and 2017** to assess improved turmeric cultivars suited to the region's agro-ecological conditions.

Objectives of the Varietal Evaluation

The primary aim of the trials was to identify high-yielding, adaptable, and farmer-acceptable turmeric varieties for sustainable large-scale promotion. Specifically, the trials sought to:

- Assess yield performance under local soil and climatic conditions
- Examine compatibility with farmers' prevailing cultivation and resource conditions
- Evaluate market acceptability and post-harvest characteristics
- Analyze yield stability and consistency across farmer fields
- Determine economic advantage over traditional local cultivars

The broader purpose was to generate robust field-based evidence to support informed varietal recommendation and adoption among small and marginal farmers.

Experimental Approach

The trials were conducted directly in farmers' fields across multiple locations to capture realistic production conditions rather than controlled institutional environments. Prominent research-bred turmeric cultivars—**Rajendra Sonia, Rajendra Sonali, Narendra Haldi-1, Narendra Haldi-2, NDH-98, Megha-1, and Lakadong**—were evaluated and benchmarked against their scientifically recommended yield potential.

Observed Performance of Tested Varieties

Variety	Origin	Recommended Yield (qtls/acre)	Yield Achieved in Farmers' Fields (qtls/acre)
Rajendra Sonia	RAU Samastipur, Bihar	140–160	120
Narendra Haldi-1	NDUAT Ayodhya	150	125
Narendra Haldi-2	NDUAT Ayodhya	140	70
NDH-98	NDUAT Ayodhya	160	55
Lakadong*	North -East India	60	40
Rajendra Sonali	RAU Samastipur, Bihar	150	110
Megha -1	NDUAT Ayodhya	140	80

*Lakadong was evaluated for **one season only**, while other varieties underwent multi-season assessments.

Key Findings and Analytical Interpretation

1. Significant Yield Advantage Over Local Varieties

Despite natural yield variation owing to farmers' management conditions, input availability, and soil heterogeneity, several varieties demonstrated remarkable productivity enhancement over traditional local cultivars. Outstanding performers included:

- **Narendra Haldi-1:** 125 qtls/acre
- **Rajendra Sonia:** 120 qtls/acre
- **Rajendra Sonali:** 110 qtls/acre

These varieties recorded **almost double the yield** compared to local varieties, clearly establishing their economic superiority and suitability for livelihood enhancement.

2. Yield Stability as a Critical Determinant

Varieties such as **NDH-98** and **Narendra Haldi-2**, despite their high theoretical yield potential, exhibited inconsistent field-level performance across farmers' fields. This emphasizes that **research-station performance does not always directly translate into farmer-field success**, particularly under low-input or resource-constrained conditions.

3. Performance of Specialty Variety 'Lakadong'

Lakadong, widely recognized for its high curcumin content and premium market

positioning, was tested in Kushinagar under field conditions for **one cropping season**. The variety recorded a yield of **40 quintals per acre**, below its recommended potential. However, unlike other varieties evaluated over multiple seasons, Lakadong's assessment is currently based on **single-season data**, and therefore should be considered **indicative rather than conclusive**.

It is scientifically prudent to acknowledge that:

- Multi-season and multi-location trials may yield different results
- Performance may improve under refined management practices
- Agro-climatic specificity plays a critical role in Lakadong's expression

Thus, while preliminary results suggest Lakadong may be more suited to niche or specialized cultivation, **further extended evaluation is recommended** before finalizing its suitability for large-scale promotion in Kushinagar.

4. Rajendra and Narendra Series as Preferred Varieties for Scaling

Considering yield consistency, environmental adaptability, market acceptability, and farmer preference, **Rajendra Sonia, Rajendra Sonali, and Narendra Haldi-1** emerged as the most promising and scalable varieties. Their strong performance aligns effectively with the district's rainfall pattern, soil fertility profile, and farmers' existing knowledge base, offering **high return with minimized production risk**.

Implications for Farmer Livelihoods

Enhanced productivity of improved turmeric varieties directly strengthens farmer resilience and rural economic stability through:

- Increased marketable surplus
- Greater opportunities for value addition and enterprise development
- Improved bargaining capacity in markets
- Strengthened household income and nutritional security

These findings have provided SHDA a scientifically validated foundation to promote turmeric as a **high-potential livelihood crop** in Kushinagar.

Research Limitations and Scope for Further Study

- Lakadong requires **multi-season and multi-location validation** for more definitive performance interpretation.
- Future trials may include:
 - Curcumin content analysis alongside yield
 - Cost-benefit economics across varieties
 - Performance under improved agronomic packages
- Such evidence generation will further strengthen varietal recommendation policy and scaling strategy.

Future Roadmap

Building on these learnings, SHDA plans to:

- Promote **Rajendra Sonia, Rajendra Sonali, and Narendra-1** at scale
- Strengthen farmer training on scientific cultivation practices
- Integrate value chain initiatives including collective marketing and processing
- Encourage organic and residue-free production to access premium markets
- Document and expand trials to other geographies with similar conditions

The varietal trials undertaken by SHDA provide robust empirical evidence supporting the adoption of improved turmeric varieties in Kushinagar. The Rajendra and Narendra series varieties demonstrate strong suitability and offer clear productivity and income gains for farmers. Continued evidence-based promotion, combined with farmer capacity building and value chain integration, positions turmeric as a sustainable and transformative livelihood opportunity for the region.

Lessons Learned from Turmeric Varietal Trials in Kushinagar

The field-based varietal evaluation initiative in Kushinagar provided valuable empirical learning that extends beyond yield performance alone. The experience generated insights relating to technology suitability, farmer behavior, risk factors, and policy relevance. The following key lessons emerged:

1. Field Realities Are Different from Research Station Conditions

The trials confirmed that varieties showing superior yields in research stations do not automatically replicate similar performance under resource-constrained farmer field conditions. Factors such as soil heterogeneity, irrigation availability, input use, pest management, and farmers' agronomic skills significantly influenced yield outcomes. Therefore, on-farm adaptive research is essential before recommending varieties for large-scale adoption.

2. Yield Stability Is More Important than Maximum Yield

While some varieties like NDH-98 and Narendra Haldi-2 showed high theoretical yield potential, their inconsistent performance reduced farmer confidence. Conversely, Rajendra Sonia, Rajendra Sonali, and Narendra Haldi-1 demonstrated consistent yield across multiple farmers and seasons, which is more critical for farmer livelihoods. Farmers prefer reliability over record-breaking yield potential. Thus, stability and adaptability emerged as key varietal selection criteria.

3. Improved Varieties Can Substantially Enhance Farmer Income

The trials demonstrated clear productivity gains—almost doubling yield compared to traditional local varieties. This improvement translated directly into significant income enhancements and strengthened economic resilience. The experience validates that scientifically developed varieties, when contextually tested and adopted, can serve as powerful livelihood enhancement tools for small and marginal farmers.

4. Specialty Varieties Require Cautious Interpretation

Lakadong, a premium turmeric variety valued for high curcumin content, recorded lower yield under the tested conditions. However, the trial was conducted only for one cropping

season, unlike other varieties evaluated over multiple seasons. This highlighted an important lesson:

- Single-season data should not form the basis for strong conclusions.
- Specialty varieties may require specific agro-ecological environments, better agronomic management, and targeted value chain support to realize their potential.

Therefore, evidence must be interpreted with scientific caution, balancing both opportunities and limitations.

5. Farmer Participation Strengthens Technology Adoption

Conducting trials directly in farmers' fields ensured realistic assessment and also created strong farmer ownership. Farmers could visually compare varieties, observe differences in growth, maturity, yield, and quality, and assess labor and input requirements. This participatory approach helped:

- Build farmer trust
- Accelerate acceptance of superior varieties
- Promote peer-to-peer learning

Thus, participatory research emerged as a critical enabler of sustainable adoption.

6. Economic Evidence Is Essential for Scaling Decisions

Yield data alone is not enough to influence farmer decision-making. When supported with clear economic analysis—net returns, cost-benefit ratio, and income enhancement potential—farmers and stakeholders better understood the practical value of improved varieties. The strong B:C ratios of Rajendra Sonia, Rajendra Sonali, and Narendra Haldi-1 clearly justified prioritizing these varieties for scaling initiatives.

7. Context-Specific Recommendations are Necessary

The trials revealed that even within the same district, performance variation exists due to differences in micro-climate, soil fertility, and resource availability. Therefore, blanket varietal recommendations are not ideal. Instead, context-specific and evidence-backed recommendations provide safer and more effective pathways for farmer adoption.

8. Long-Term Institutional Support Enhances Impact

Short-term interventions may provide data, but sustained engagement ensures transformation. The experience showed that varietal promotion must be supported with:

- Quality seed systems
- Training and extension
- Access to markets
- Value addition opportunities

Integrated support mechanisms convert technological potential into livelihood impact.

9. Research-Development-Farmer Linkages are Powerful

Collaboration between SHDA, agricultural research institutions, and farmers ensured scientific rigor while keeping farmer realities central. This demonstrated that effective

agricultural development requires continuous dialogue between science and practice, strengthening the pathway from research to real-life application.

10. Evidence-Based Programming Builds Credibility

The initiative reinforced the importance of generating locally validated evidence before scaling. The rigor in data collection, critical analysis of results, acknowledgment of limitations (such as single-season Lakadong data), and transparent interpretation significantly strengthened institutional credibility. This approach positions SHDA as a responsible, knowledge-driven development organization.

Overall Learning

The varietal trial experience reaffirmed that improving turmeric productivity is not just a matter of introducing new varieties. It requires scientifically grounded evaluation, participatory engagement, economic justification, ecosystem support, and cautious interpretation of results. When these elements come together, improved varieties become powerful drivers of income enhancement, resilience building, and sustainable rural development.

Scale-up with 1020 farmers across 10 villages

Scaling Turmeric Productivity and Income Enhancement in Kushinagar: Evidence from SHDA's Intervention

Context and Rationale

Kushinagar district of Uttar Pradesh has a long tradition of turmeric cultivation; however, productivity and profitability remained limited due to dependence on local varieties, weak seed systems, traditional cultivation practices, and restricted market access. Despite favourable agro-climatic conditions, farmers were unable to harness the full potential of turmeric as a high-value livelihood crop. Recognising this opportunity, SHDA initiated a systematic intervention to strengthen varietal replacement, scientific cultivation practices, economic returns, and institutional support systems.

Building upon the evidence generated from multi-season varietal trials conducted between 2015 and 2017—where varieties such as Rajendra Sonia, Rajendra Sonali and Narendra Haldi-1 demonstrated superior yield stability and income advantage—SHDA launched a structured and scalable programme covering **1,020 farmers**, including **60 seed producers** and **960 associate farmers**. Each seed producer supported 15–16 neighbouring farmers, creating a farmer-led, decentralized seed multiplication and dissemination system.

Problem Landscape Prior to Intervention

The intervention was grounded in a well-documented set of livelihood and production constraints faced by turmeric farmers:

- **Limited access to quality seed rhizomes**, leading to poor plant vigour and reduced yield
- **Large yield gaps** resulting from non-scientific agronomic practices and weak soil fertility management
- **Inadequate knowledge and extension support**, restricting adoption of improved technologies

- **Significant post-harvest losses** due to traditional curing, boiling, and drying methods
- **Dependence on chemical inputs** without emphasis on soil health sustainability
- **Weak institutional support ecosystems** and minimal farmer–researcher linkages
- **Gender disparities** in benefits despite high female labour contribution
- **Inadequate storage and weak market linkages**, leading to distress selling
- **Limited access to finance and government schemes**, increasing vulnerability
- **Exclusion of land-poor and tenant households** from productive opportunities

These vulnerabilities created a cycle of low productivity, weak bargaining power, unstable income, and financial insecurity.

SHDA Intervention Strategy

SHDA's intervention was designed as a **comprehensive livelihood enhancement model**, integrating:

- Introduction and expansion of **high-yielding varieties**, primarily Rajendra Sonia
- Establishment of **seed producer–associate farmer networks**
- Structured capacity building on **scientific agronomy, irrigation, spacing, nutrient and pest management**
- Promotion of **organic inputs and soil health management**
- Strengthening **post-harvest management, curing practices, and village-level processing**
- Integration with the **Lord Buddha Vegetable Producer Company Limited (FPO)** for value addition and marketing
- Focus on **women's engagement, inclusion of land-poor households, and social security linkages**

This approach ensured technological improvement, institutional strengthening, and market empowerment simultaneously.

Baseline vs Current Status: Evidence of Impact

A detailed baseline conducted in February 2023 provided the reference framework for monitoring program outcomes. Two years later, significant improvements were recorded:

Indicator	Baseline 2023	Current 2025
No. of Farmers	1020	1011
Area (acres)	122.8	132.2
Total Production (qtls)	7597	9876
Productivity (qtls/acre)	59.9	74.6
Net Income (₹/acre)	51,516	1,08,968

Key Outcomes

- 25% increase in productivity
- Over 100% increase in net per-acre income
- Significant area expansion under turmeric

Market transformation supported these outcomes. Previously, local varieties fetched only ₹12–15/kg. With varietal improvement and quality enhancement, average prices reached ₹22/kg, while Rajendra Sonia realized ₹ 25/kg or more, significantly lifting farmer profitability.

Area Expansion: Indicator of Farmer Confidence

Turmeric area expanded from **122.07 acres at baseline to 155.28 acres in Year (2026) a 27.21% increase**. This growth reflects rising farmer confidence in the crop's profitability, strengthened seed availability, and improved production systems. Area expansion was gradual, sustained, and evidence-led, demonstrating programme credibility and long-term acceptance.

Economic Transformation and Profitability Trends

The programme brought dynamic changes to production economics.

Cost Changes

Parameter	Baseline	Present
Input Cost/acre	₹ 35,385	₹75,769

Cost increases were driven by improved seed, enhanced land preparation, scientific spacing, irrigation, better compost use, and labour — representing **investment-led cost increases**, not financial burden.

Profit Gains

Parameter	Baseline	Current
Net Profit/acre	₹51,469	₹1,08,968

Despite higher costs, farmers gained an additional **₹57,499 per acre**, meaning **profit more than doubled**—demonstrating that improved practices are economically sustainable.

Projected Performance and Future Outlook

With already 26% productivity gain, SHDA is firmly on track to achieve the committed 40% increase, equivalent to productivity of ~82.9 qtls/acre. Net returns are projected to reach ₹1.20–1.22 lakh per acre, assuming stable market conditions and full adoption of best practices.

These projections are supported by:

- Current growth trends
- Improved crop condition

- Strengthened soil health practices
- Consolidated farmer knowledge
- Improved pest and disease resilience

Institutional Strengthening Through FPO Integration

The **Lord Buddha Vegetable Producer Company Limited (FPO)** emerged as a cornerstone of sustainability. Its role includes:

- Primary processing through women groups.
- Centralized polishing, grinding and hygienic packaging.
- Assured marketing and value chain integration
- Organized seed marketing and varietal replacement
- Expansion into seed spices
- Enhanced bargaining power and price realization

This institutional backbone ensures sustainability beyond project duration.

Inclusive and Socially Responsive Strengthening

The programme consciously addressed vulnerabilities of:

- Landless and land-poor households
- Tenant farmers
- Women producers
- Persons with disabilities
- Socially excluded communities

Through entitlements, credit facilitation, MNREGA linkages, crop insurance, Kisan Credit Card support, disability benefits, and social protection access, the intervention strengthened socio-economic resilience.

Overall Programme Significance

The SHDA intervention in Kushinagar demonstrates a scientifically grounded, economically viable, socially inclusive, and institutionally sustainable model for turmeric-based livelihood promotion.

It:

- Bridged the yield gap
- Doubled farmer income
- Strengthened seed sovereignty
- Built farmer leadership
- Enhanced women's participation
- Established robust processing and marketing structure
- Created scalable potential for district-wide expansion

The programme has not only met but, in several dimensions, exceeded expectations. The synergy of improved varieties, scientific practices, organized seed systems, empowered farmers, and strong FPO support has transformed turmeric into a high-return, resilient livelihood option in Kushinagar. This initiative now stands as a replicable and scalable model for other turmeric-growing regions seeking productivity, profitability, and farmer dignity

Productivity and income gains achieved

The turmeric promotion initiative in Ramkola Block of Kushinagar district has demonstrated remarkable progress in enhancing both productivity and farmer income within a relatively short period. Anchored around improved varietal introduction, strengthened seed systems, scientific cultivation practices, and better market integration, the programme has translated technical interventions into measurable socio-economic outcomes for farming households.

A baseline assessment conducted in 2023 across 1,020 participating farmers revealed that turmeric cultivation was largely dependent on traditional, low-yielding local varieties with limited scientific crop management. The average productivity at that stage was **59.2 quintals per acre**, and average net income stood at **₹51,516 per acre**. These figures reflected not only inherent yield gaps but also structural limitations in seed quality, agronomic practices, and post-harvest handling.

With the introduction of the **Rajendra Sonia** variety, establishment of a decentralized seed multiplication system through 60 trained seed producers, and widespread adoption of improved cultivation practices by 960 associated farmers, substantial improvement has been achieved. By 2025, average productivity had increased to 74.6 quintals per acre, marking a 26 percent rise over the baseline. In absolute terms, total production across the intervention area rose from 7,597 quintals to 9,876 quintals, confirming both productivity enhancement and expansion in the cultivated area from 122.07 acres to 155.28 acres. This 27 percent expansion reflects growing farmer confidence in turmeric as a profitable and reliable livelihood option.

More impressive, however, is the impact on farmer income. Net income per acre increased from ₹51,516 to ₹1,08,968, representing over 100 percent income enhancement within two years. This income rise is attributed to the combined effects of higher yield and improved price realization. Prior to intervention, local turmeric fetched ₹12–15 per kg, whereas Rajendra Sonia secured ₹25 per kg and above, with an overall market improvement stabilizing average prices around ₹22 per kg. Thus, price advantage played a catalytic role alongside productivity gains.

Although input costs increased—from ₹35,385 to ₹75,769 per acre—due to procurement of improved seed, enhanced labour use, scientific land preparation, soil management, irrigation, and organic input application, the economic returns far outweighed the additional investment. Net profit more than doubled, highlighting that higher cost translated into far higher profitability, proving the economic viability and sustainability of improved technology adoption.

Looking ahead, field performance trends, strengthened crop management practices, and improving soil health indicate a realistic pathway toward achieving a 40 percent

productivity enhancement target by the end of the third project year. This translates to an expected productivity of around 82–83 quintals per acre and projected net income in the range of ₹1.20–1.22 lakh per acre, assuming stable market conditions.

In summary, the intervention has successfully transformed turmeric cultivation in Ramkola from a traditional subsistence activity into a high-productivity, high-income, market-responsive value chain opportunity. The demonstrated productivity increase, doubling of farmer income, strong seed systems, and institutional support mechanisms together validate the programme model as scalable, sustainable, and replicable across similar agro-ecological contexts.

Farmer experiences and success stories

Success Story: Transforming Livelihood through Turmeric Cultivation – The Journey of Farmer Gama

Farmer Profile

Name	:	Gama
Village	:	Rampur Bagaha
Block	:	Ramkola
District	:	Kushinagar, Uttar Pradesh
Total Landholding	:	2.5 acres
Major Crops	:	Sugarcane, Paddy, Wheat, and Turmeric
Family Members	:	5

Background

Before 2023, Gama, a smallholder farmer from Rampur Bagaha village, cultivated traditional crops such as sugarcane, paddy, and wheat, earning a modest income that barely sustained his family. Although he experimented with turmeric cultivation in 2022–23, his effort was limited to a small plot of 0.05 acre under a local variety, which yielded 2.5 quintals of raw turmeric, bringing him a net profit of only ₹1,270. Limited knowledge of improved practices and poor seed quality restricted his potential to scale up production.

SHDA's Intervention

In 2023–24, the Sustainable Human Development Association (SHDA), initiated a turmeric livelihood enhancement program in Ramkola block. Gama was identified as one of the progressive farmers for the intervention. Key supports provided included:

- Distribution of quality seed rhizomes of 'Rajendra Sonia', a high-yielding, high-curcumin variety developed by Rajendra Agricultural University, Pusa.
- Training on scientific package of practices (PoP) through experts from Krishi Vigyan Kendra (KVK), Kushinagar, and SHDA's in-house agronomists.
- On-field demonstrations on land preparation, seed treatment, integrated nutrient management, and post-harvest handling.
- Linkages for marketing and awareness on value addition.

Impact and Transformation

Year	Area (acre)	Variety	Production (quintals)	Net Profit (₹)
2022–23	0.05	Local	2.5	1,270
2023–24	0.24	Rajendra Sonia	32	43,334
2024–25	0.75	Rajendra Sonia	120	1,93,836
2025-26	1.00	Rajendra Sonia	—	(standing crop with excellent growth)

Within just two years of intervention, Gama expanded his turmeric area from 0.05 acre to 0.75 acre, increasing his income from ₹1,270 to ₹1,93,836 — a 152-fold rise in net profit. His confidence in turmeric as a commercial crop grew substantially, and in 2025–26, he dedicated a full acre to turmeric cultivation.

Current Status and Outlook

Today, Gama is recognized as a progressive turmeric grower in his village. His farm serves as a model demonstration site for other farmers. The standing crop for 2025–26 shows vigorous vegetative growth, promising even higher yields. He actively motivates neighboring farmers to adopt improved varieties and scientific practices promoted by SHDA. Gama also plans to engage in seed rhizome production and participate in collective marketing through farmer producer organizations (FPOs) facilitated by SHDA.

Key Takeaways

- Income enhancement: 152× increase in net profit within two years.
- Area expansion: From 0.05 acre to 1 acre, demonstrating high scalability potential.
- Technology adoption: Transition from local variety to high-yielding 'Rajendra Sonia'.
- Institutional linkage: Collaboration among SHDA, KVK Kushinagar, and local farmers.
- Livelihood resilience: Turmeric proved a profitable, low-risk crop even under fluctuating conditions.

“Turmeric has changed my life. Earlier I struggled to make ends meet, but now my family's income and confidence have both grown. I am proud to be a turmeric farmer.”

- Gama, Farmer, Rampur, Bagaha

Conclusion

Gama's journey illustrates the transformative power of sustainable agriculture and

scientific empowerment. The intervention has not only improved his household income but also inspired a movement among small and marginal farmers in Ramkola block to diversify into turmeric cultivation. This success demonstrates how community-based interventions backed by institutional partnerships can drive inclusive rural prosperity — aligning with the vision of doubling farmers' income and promoting sustainable livelihoods in eastern Uttar Pradesh.



Success Story: Empowering Farmers through Turmeric: The Success Journey of Ramraksha

Farmer's Profile

Name	:	Ramraksha
Village	:	Badahara Babu
Block	:	Ramkola
District	:	Kushinagar, Uttar Pradesh
Total Landholding	:	2.5 acres
Major Crops	:	Sugarcane, Paddy, Vegetables, Wheat, and Turmeric
Family Members	:	7

Background: Struggling with Low Returns

Before 2023, turmeric cultivation for Ramraksha was limited and largely traditional. Using a local variety, he cultivated only 0.15 acre in 2022–23, producing 6.5 quintals with a modest net profit of ₹5,616. The yield was low, post-harvest losses were high, and he lacked access to quality seed and technical know-how. Despite suitable soil and climatic conditions, turmeric remained a minor crop in his farm portfolio.

Intervention by SHDA

In 2023–24, the Sustainable Human Development Association (SHDA), identified Badahara Babu village under its Turmeric Livelihood Promotion Initiative. As part of this intervention, SHDA provided quality planting material of the improved variety “Rajendra Sonia” and organized on-field training and demonstrations on the scientific package of practices (PoP). Experts from Krishi Vigyan Kendra (KVK), Kushinagar, along with SHDA's technical team, guided farmers on seed treatment, use of organic manures, irrigation management, and post-harvest practices. This marked a major turning point in Ramraksha's turmeric journey.

Impact: Year-on-Year Growth in Productivity and Income

Year	Area (acre)	Variety	Production (quintals)	Net Profit (₹)
2022–23	0.15	Local	6.5	5,616
2023–24	0.24	Rajendra Sonia	22.5	22,020
2024–25	0.28	Rajendra Sonia	34.0	59,120
2025–26	0.40	Rajendra Sonia	Harvest due Feb 2026	—

Over three years, Ramraksha expanded turmeric cultivation from 0.15 to 0.40 acre, achieving more than fivefold increase in yield and over tenfold rise in net profit. Encouraged by these outcomes, turmeric has now become a key cash crop on his farm.

Ripple Effect: A Local Source of Quality Seed

The success of Ramraksha's turmeric field has inspired farmers from Badahara Babu and nearby villages. They have started procuring Rajendra Sonia seed rhizomes directly from him for the next planting season. As a result, turmeric area in the cluster villages is steadily expanding, creating a local model of seed self-reliance and farmer-to-farmer dissemination. This grassroots seed multiplication effort is helping scale up improved turmeric cultivation across the region — a direct outcome of SHDA's intervention and capacity-building approach.

Visible Outcomes

Enhanced Productivity: Improved yield and curcumin content with Rajendra Sonia variety.

Strengthened Knowledge: Training on seed treatment, organic inputs, and crop management improved crop health.

Income Enhancement: Net profit increased more than tenfold between 2022–23 and 2024–25.

Seed Self-Reliance: Ramraksha now acts as a local seed resource farmer for others.

Wider Adoption: Farmers in nearby villages are expanding turmeric cultivation inspired by his success.

Farmer's Voice

"Earlier I used to grow turmeric only for household needs. After SHDA's training and seed support, my income from turmeric has grown many times. Now other farmers come to me for Rajendra Sonia seed. Turmeric has truly changed my life."

— Ramraksha, Farmer, Badahara Babu, Kushinagar

Conclusion

The story of Ramraksha reflects how knowledge, quality seed, and institutional support can transform smallholder livelihoods. Through SHDA's consistent guidance, partnership with KVK Kushinagar, he has not only enhanced his own income but also emerged as a lead farmer and seed promoter in his village. This model demonstrates the potential of community-led scaling of improved turmeric varieties like Rajendra Sonia in eastern Uttar Pradesh — paving the way for sustainable spice-based livelihoods and rural prosperity.



From Tradition to Transformation: How Turmeric Cultivation Changed Jawahir's Livelihood in Kushinagar

In Khotahi village of Ramkola Block, Kushinagar district, farmer Jawahir, who owns just 1.5 acres of land, has long depended on conventional crops such as sugarcane, paddy, wheat, and vegetables to support his family of eight members. Despite his hard work, the family's annual income remained only INR 87,000, limiting their ability to improve living conditions or invest in better farming practices.

Baseline Situation

In 2022–23, Jawahir cultivated turmeric on 0.2 acre using a local variety. The crop yielded 10 quintals, and despite his efforts, the income remained modest with a net profit of INR 10,800. Like many small farmers in Eastern Uttar Pradesh, he had limited access to quality seeds, scientific guidance, and assured markets.

Intervention and Capacity Building

The turning point came in 2023–24, when the Sustainable Human Development Association (SHDA), selected Jawahir under its livelihood enhancement initiative. He received:

- High-quality seed of improved turmeric variety Rajendra Sonia
- Hands-on training on scientific Package of Practices (PoP)
- Continuous technical guidance from KVK Kushinagar experts and SHDA's technical team

This intervention not only improved his farming practices but also built confidence to adopt modern, climate-resilient, and market-oriented agriculture.

Impressive Results and Income Enhancement

- The impact was remarkable. In 2024–25:
- Area increased to 0.24 acre
- Production doubled to 22 quintals
- Net profit rose sharply to INR 38,605

Encouraged by success, Jawahir further expanded turmeric cultivation to 0.50 acre in 2025–26 with the same variety. The crop currently stands with excellent vegetative growth, and the farmer is confidently expecting a substantial increase in income after harvest in February 2026.

Beyond an Individual Success: A Community-Level Impact

Jawahir's success has gone beyond his household. Farmers from his village and neighboring areas are now:

- Visiting his fields to learn best practices
- Procuring quality seed directly from him
- Gradually expanding their turmeric cultivation, contributing to area expansion of Rajendra Sonia variety in the region

This demonstrates how a well-designed intervention can transform an individual farmer into a local resource person and change leader.

A Model of Sustainable Rural Livelihoods

This success story clearly highlights:

- The power of quality seeds + scientific knowledge + institutional support
- The potential of turmeric as a high-value livelihood crop in flood-prone Eastern Uttar Pradesh
- A scalable, replicable model for agricultural development institutions, ICAR institutes, SAUs, CSR partners, and donor agencies

Jawahir's journey from subsistence farming to confident, progressive farmer symbolizes the core objective of SHDA's livelihood program—empowering small farmers, enhancing income, building resilience, and strengthening rural prosperity.



From Subsistence to Prosperity: The Inspiring Journey of Farmer Radheyshyam Through Turmeric Cultivation

Radheyshyam, a small farmer from Deolia Mania Chhapra village in Ramkola Block of Kushinagar district, has long depended on his limited 0.64 acres of land to support his family of seven members. Like many farmers in Eastern Uttar Pradesh, he cultivated sugarcane, paddy, wheat, vegetables, and a small portion of turmeric, working hard every season yet receiving modest returns. In 2022–23, he cultivated turmeric on 0.4 acre using a local variety, producing 33 quintals and earning a net profit of INR 30,500. While this helped his household, Radheyshyam knew that with better support and knowledge, turmeric could play a much stronger role in improving his livelihood.



A new chapter began when the Sustainable Human Development Association (SHDA), reached his village. Under SHDA's livelihood enhancement initiative, Radheyshyam was provided high-quality planting material of the improved turmeric variety Rajendra Sonia, along with focused training on scientific cultivation

practices. Experts from KVK Kushinagar and SHDA's technical team guided him closely, helping him understand better crop management, disease control, soil nutrition, and other essential practices. This intervention did not simply supply inputs; it built trust, confidence, and a new vision for agriculture in Radheyshyam's life.

Empowered by knowledge and motivated by institutional support, Radheyshyam decided to scale up turmeric cultivation. In 2024–25, he expanded the crop to 0.75 acre, even taking additional land on lease to enhance production. The results were transformational. His total turmeric production rose to 95 quintals and his net profit increased to an impressive INR 1,85,905. For a small farmer with limited landholding, this income shift was life-changing. It strengthened his financial stability, increased his confidence, and transformed his perception of agriculture from subsistence to enterprise.

Encouraged by this remarkable success, Radheyshyam further expanded turmeric cultivation to 0.8 acre in 2025–26, continuing with the Rajendra Sonia variety. The

standing crop currently shows excellent vegetative growth, and he confidently looks forward to a rewarding harvest in February 2026. With growing experience and improved financial capacity, he is now planning to initiate primary processing of turmeric in the coming season, moving towards value addition and better market returns. This reflects not just growth in income, but evolution in mindset — from farmer to agripreneur.

The impact of Radheyshyam's journey has extended well beyond his own household. His success has inspired farmers in his village and neighboring areas, who now regularly visit his fields to learn and observe. Many farmers are procuring quality seed from him and expanding the area under Rajendra Sonia turmeric,



leading to wider community-level adoption and livelihood improvement. He has emerged as a progressive farmer, a local resource person, and a change leader within his region.

Radheyshyam's story demonstrates the power of timely institutional support, quality seeds, scientific training, and continuous handholding in transforming smallholder agriculture. It highlights turmeric as a high-value and climate-resilient livelihood opportunity for Eastern Uttar Pradesh and presents a strong, scalable model for ICAR institutes, State Agricultural Universities, donor agencies, and CSR partners committed to strengthening rural livelihoods. His journey is a powerful testimony that when the right technology and trust reach the right farmer, agriculture becomes a pathway not just to survival, but to dignity, confidence, and prosperity.

Technology Adoption Leading to Livelihood Enhancement Evidence from Lalji's Turmeric Farming Journey



Lalji, a small farmer from Urdaha village in Ramkola Block of Kushinagar district, lives with his family of eight members and manages farming on his limited 0.24 acres of land. Like most smallholders in the region, he cultivated sugarcane, paddy, wheat, vegetables and a small portion of turmeric to support his family. In 2022–23, he grew turmeric on 0.30 acre using a local

variety, producing only 8 quintals and earning a modest net profit of INR 9,020. Limited productivity, lack of quality seed and inadequate technical guidance restricted his returns, even though his interest and potential in turmeric cultivation were high.

A major change came when the Sustainable Human Development Association (SHDA), extended its livelihood enhancement initiative to his village. Lalji received high-quality seed of the improved turmeric variety Rajendra Sonia, along with practical training on scientific package of practices. Experts from KVK Kushinagar and SHDA's technical team guided him closely in crop management, disease control, soil nutrition and improved agronomic practices. This support not only introduced better technology but also built his confidence to expand turmeric cultivation as a serious income-generating opportunity.

Motivated by the learning and inspired by visible results on the field, Lalji expanded turmeric cultivation to 0.32 acre in 2024–25, even taking additional land on lease. The outcome was remarkable. His production increased to 36 quintals and his net profit rose significantly to INR 61,200. For a small farmer with such limited landholding, this transformation was truly meaningful. It strengthened his financial stability, boosted his morale and demonstrated the real potential of turmeric as a high-income crop.

Encouraged by success, Lalji continued cultivation of Rajendra Sonia variety in 2025–26 on 0.28 acre. The current standing crop exhibits excellent vegetative growth, and he is confidently expecting a good harvest in February 2026. His journey reflects not just an increase in production and profit, but a shift from subsistence farming to confident, planned and market-oriented agriculture. Today, farmers from his own and neighboring villages visit his field, procure quality seed from him and are gradually expanding the area under Rajendra Sonia turmeric. Lalji has emerged as a progressive farmer and a local role model.



Lalji's story powerfully demonstrates how access to quality seed, scientific guidance and consistent institutional handholding can transform the livelihoods of small and marginal farmers. It highlights turmeric as a promising, high-value and climate-resilient crop for Eastern Uttar Pradesh and presents a highly replicable and scalable model for ICAR institutes, State

Agricultural Universities, CSR initiatives and donor agencies committed to strengthening rural livelihoods. His success reflects the dignity, resilience and potential of small farming communities when the right support reaches them at the right time.

Transforming Livelihoods Through Scientific Turmeric Cultivation The Success Story of Motilal



Motilal, a progressive farmer from Chandarpur village in Ramkola Block of Kushinagar district, supports a large family of 13 members through agriculture on his 3-acre landholding. His farming system included sugarcane, paddy, wheat, vegetables, and turmeric, but like many farmers of Eastern Uttar Pradesh, he practiced traditional cultivation methods that limited

productivity and income opportunities. In 2022–23, turmeric was cultivated only as a small crop on 0.10 acre using local variety, resulting in just 7 quintals of produce and a modest net profit of ₹10,800. Despite his interest, lack of quality seed, knowledge of scientific practices, and exposure to improved varieties prevented him from realizing the true potential of turmeric.

The turning point came in 2023–24 when Sustainable Human Development Association (SHDA) launched an intervention to promote turmeric as a sustainable livelihood opportunity. Under this programme, SHDA provided quality planting material of improved varieties, along with intensive training on scientific Package of Practices. Experts from KVK Kushinagar and SHDA's technical team regularly guided Motilal through demonstrations, field training, and continuous advisory support. This structured support system enhanced his confidence and motivated him to adopt improved agricultural practices.

The impact of this intervention was clearly visible. In 2024–25, Motilal cultivated 0.24 acre under the Narendra-1 variety and achieved outstanding productivity, harvesting 48 quintals of turmeric and earning a remarkable net profit of ₹75,395. Encouraged by the results, he significantly expanded turmeric cultivation to 1.36 acres in 2025–26. The standing crop is currently showing excellent vegetative growth and is expected to deliver a very good harvest in February 2026, promising higher income and improved livelihood security for his family.

Today, Motilal is not only a successful turmeric farmer but has also emerged as a lead farmer and local seed resource provider. Farmers from his village, nearby villages, and even neighboring blocks now procure Narendra-1 seed from him and are expanding turmeric cultivation in their fields. His success has inspired confidence among fellow farmers, strengthened the local seed system, and contributed to scaling turmeric production in the region. Motilal's journey demonstrates how timely institutional support, access to quality inputs, and scientific knowledge can transform agriculture, enhance farmer incomes, and promote community-driven growth. His story is a strong example of a scalable, replicable, and impactful model for promoting sustainable and profitable agriculture in Eastern Uttar Pradesh and similar regions.

Seeds of Prosperity: The Inspiring Journey of Farmer Sudheer Kushwaha through Turmeric Cultivation

Farmer's Profile

Name	:	Sudheer Kushwaha
Village	:	Badahara Babu
Block	:	Ramkola
District	:	Kushinagar, Uttar Pradesh
Total Landholding	:	2.0 acres
Major Crops	:	Sugarcane, Paddy, Vegetables, Wheat, and Turmeric
Family Members	:	6

A Modest Beginning

For years, Sudheer Kushwaha practiced traditional farming, growing staple crops such as paddy, wheat, and sugarcane. In 2022–23, he experimented with a small patch of 0.06 acre of turmeric, using a local variety. The outcome was discouraging — 1.5 quintals of production and a net loss of ₹75. Low yield, poor-quality seed, and lack of scientific management made turmeric cultivation unviable. Despite his efforts, the crop did not contribute meaningfully to household income, and he almost decided to discontinue it.

Catalyst of Change: SHDA's Intervention

In 2023–24, a new opportunity arrived when the Sustainable Human Development Association (SHDA), launched its Turmeric Livelihood Promotion Initiative in Badahara Babu. Sudheer received certified seed rhizomes of the improved variety “Rajendra Sonia” and hands-on training on scientific Package of Practices (PoP). Special sessions by experts from Krishi Vigyan Kendra (KVK), Kushinagar, and SHDA's technical team introduced him to improved agronomic practices—soil health management, proper spacing, seed treatment, organic inputs, and efficient irrigation. This combination of quality seed, knowledge, and confidence marked a new beginning in Sudheer's farming journey.

Turning Point: From Loss to Profit

The impact was swift and significant. Within one cropping season, Sudheer expanded turmeric cultivation from 0.06 acre to 0.24 acre, and his production soared to 37 quintals, earning a net profit of ₹54,712. Encouraged by this remarkable turnaround, he further increased his turmeric area to 0.28 acre in 2024–25, harvesting 33 quintals and earning a net profit of ₹55,915.

Year	Area (acre)	Variety	Production (quintals)	Net Profit (₹)
2022-23	0.06	Local	1.5	-75
2023-24	0.24	Rajendra Sonia	37.0	54,712
2024-25	0.28	Rajendra Sonia	33.0	55,915
2025-26	0.50	Rajendra Sonia	Harvest due Feb 2026	

Expanding Horizons: From Learner to Leader

In just three years, Sudheer has emerged as a progressive farmer and seed resource provider in his locality. His healthy turmeric crop fields are now demonstration plots for others, attracting farmers from Badahara Babu and nearby villages, who visit to learn cultivation techniques and procure Rajendra Sonia seed rhizomes directly from him. This farmer-to-farmer exchange has led to widespread adoption of improved turmeric variety in the region, transforming the area into a vibrant turmeric-growing cluster. Sudheer now stands as a role model, symbolizing how small and marginal farmers can uplift their livelihoods through scientific practices and institutional support.

Visible Impacts

- **Revival of a Non-Performing Crop:** Transformed turmeric from a loss-making crop to a profitable enterprise.
- **Income Growth:** From a loss of ₹75 to over ₹55,000 net profit in two years.
- **Adoption of Improved Variety:** Rajendra Sonia has proven high-yielding and curcumin-rich.
- **Knowledge Empowerment:** Practical exposure to scientific PoP enhanced confidence and productivity.
- **Seed Dissemination:** Sudheer has become a local seed supplier, accelerating adoption across villages.
- **Sustainable Model:** Demonstrates the power of farmer-led scaling of improved varieties.

Farmer's Reflection

"I once thought turmeric was not worth growing. But after receiving quality seed and training from SHDA, it has become my most profitable crop. Many farmers now visit my field to learn and buy Rajendra Sonia seed. This change has given me both income and identity."

— **Sudheer Kushwaha, Farmer, Badahara Babu, Kushinagar**

Conclusion

Sudheer's journey reflects the transformative power of quality seed, scientific knowledge,



and institutional partnership. Through SHDA's intervention a farmer who once faced losses has become a community influencer and local seed entrepreneur. His experience highlights a scalable and replicable model for sustainable spice-based livelihoods — strengthening the turmeric economy and empowering smallholders in Eastern Uttar Pradesh.

Transforming Livelihoods through Scientific Turmeric Cultivation

The Success Story of Farmer Ramchandar

Background

Ramchandar, a resident of Kusmha village, Ramkola Block, Kushinagar District, supports a family of ten members through agriculture on his limited 1-acre landholding. His cropping system traditionally comprised sugarcane, paddy, wheat, vegetables, and a small area under turmeric. Despite his hard work, limited access to quality planting material and scientific knowledge restricted his productivity and income.

Baseline Situation (2022–23)

In 2022–23, turmeric cultivation was limited to 0.2 acre under local variety. Limited yield potential, lack of improved cultivation practices, and inadequate market linkage resulted in only 12.5 quintals production with a net profit of INR 18,250. Turmeric cultivation remained a side activity rather than a major livelihood option.

SHDA Intervention: Building Knowledge, Inputs, and Market Linkages

- In **2023–24**, Sustainable Human Development Association (SHDA) intervened with a structured livelihood enhancement approach. The initiative focused on:
- Introduction of Rajendra Sonia high-yielding turmeric variety
- Ensuring availability of quality seed rhizomes
- Training on scientific Package of Practices (POP)
- Continuous mentoring by experts from KVK, Kushinagar along with SHDA technical team
- Awareness on disease & pest management, spacing, soil nutrition, irrigation, and

post-harvest handling

This intervention significantly strengthened the farmer's technical capability and confidence to scale turmeric cultivation.

Remarkable Improvement in Productivity and Income

Motivated by the results, Ramchandar doubled the turmeric cultivation area to 0.4 acre in 2024–25. Adoption of improved variety and better practices led to a remarkable transformation. He produced 41 quintals of turmeric with a net profit of INR 62,480, more than three times the baseline year income from turmeric.

Production and Income Trend

Year	Area Under Turmeric (Acre)	Variety	Production (Quintals)	Net Profit (INR)
2022-23 (Baseline)	0.2	Local	12.5	18,250
2024-25 (Post Intervention)	0.4	Rajendra Sonia	41	62,480
2025-26 (Current Crop)	0.4	Rajendra Sonia	Harvest due Feb 2026	Expected High Income

Current Status and Emerging Leadership Role (2025–26)

The standing crop for 2025–26 shows excellent vegetative growth, indicating another promising harvest. Encouraged by sustained success, Ramchandar has retained the enhanced area under turmeric. His improved farm practices and results have positioned him as a demonstration farmer in the region.

Farmers from Kusmha and neighboring villages/blocks now visit him to learn best practices and procure quality seed rhizomes. He has emerged as a local seed resource farmer, contributing to the expansion of high-yielding turmeric cultivation in the region. Local traders are also engaging with him for procurement of rhizomes both for seed purpose



and processing/marketing, enhancing his market connectivity.

Impact Beyond Individual Household

- Enhanced household income and livelihood stability
- Establishment of a reliable seed supply chain at local level
- Promotion of scientific turmeric cultivation among farming communities
- Contribution toward regional crop diversification and climate-resilient agriculture



Conclusion

The journey of Ramchandar demonstrates how focused technical support, access to quality inputs, and market orientation can transform smallholder agriculture. SHDA's intervention has not only strengthened his economic resilience but has also created a model for scalable, sustainable livelihood enhancement through turmeric cultivation in

Eastern Uttar Pradesh.

Empowering Women Farmers and Rural Youth Through Scientific Turmeric Cultivation: The Success Story of Ms. Shyam Devi and Her Son, Mr. Banshi

Background

Ms. Shyam Devi, a resident of Deolia Mania Chhapra village, Ramkola Block, Kushinagar, manages agriculture across 2.5 acres to support a family of seven members. Traditionally engaged in crops like sugarcane, paddy, wheat, vegetables, and turmeric, she faced challenges of low productivity and limited income due to lack of quality planting materials and scientific guidance. Alongside her, her son Mr. Banshi, an



energetic rural youth, played a significant role in farm operations but had limited exposure to improved agricultural techniques.

Baseline Situation (2022–23)

In 2022–23, turmeric was cultivated on 0.33 acre using a local variety, yielding 27 quintals and generating INR 32,400 net profit. Productivity remained moderate, market access was limited, and turmeric farming was not yet positioned as a major livelihood enhancer for the household.

SHDA Intervention: Strengthening Capacity of Women Farmers and Youth

In 2023–24, Sustainable Human Development Association (SHDA) intervened with a focused, science-led livelihood enhancement program. Recognizing the leadership potential of both Shyam Devi and her son Banshi, SHDA ensured they were jointly involved in every training opportunity and decision-making process.

Key interventions included:

- Provision of high-yielding Rajendra Sonia turmeric variety
- Training on scientific Package of Practices (POP)
- Continuous technical mentoring from KVK Kushinagar experts and SHDA technical team
- Guidance on nutrient management, irrigation, IPM, spacing, mulching, and post-harvest handling
- Market exposure and awareness regarding grading, curing, and selling strategies

This partnership between mother and son created a strong team that blended experience, discipline, and youthful enthusiasm.

Remarkable Productivity and Income Enhancement

With improved knowledge and confidence, Shyam Devi — supported closely by Banshi — cultivated 0.24 acre under Rajendra Sonia in 2024–25. Together, they meticulously followed scientific practices, ensured timely intercultural operations, and strengthened crop management. The result was 44 quintals of production and a net profit of INR 85,999, more than doubling earlier earnings and validating scientific turmeric farming as a profitable enterprise.

Year	Area Under Turmeric (Acre)	Variety	Production (Quintals)	Net Profit (INR)
2022–23(Baseline)	0.33	Local	27	32,400
2024–25 (Post Intervention)	0.24	Rajendra Sonia	44	85,999
2025–26 (Current Crop)	0.32	Rajendra Sonia	Harvest due Feb 2026	Expected Higher Income

Current Status and Household Leadership Transformation (2025–26)

Encouraged by success, they expanded turmeric cultivation to 0.32 acre in 2025–26. The standing crop currently shows excellent vegetative growth, reflecting strong yield potential. Today, Shyam Devi has emerged as a leading woman farmer, while Banshi has



grown into a confident, knowledgeable young agri-entrepreneur. Together, they have become a strong mother-son leadership model in agriculture.

Farmers from their village, neighbouring villages, and adjoining blocks now procure quality Rajendra Sonia seed rhizomes from them. This has positioned their household as a reliable local seed resource centre. Market linkages have also

strengthened, with traders approaching them for procurement both for seed and processing purposes.

Special Qualities Strengthening the Case Study

- **Women Empowerment:** Enhances leadership role of a rural woman farmer in productive decision-making.
- **Rural Youth Engagement:** Demonstrates how engaging youth like Banshi strengthens adoption of modern agriculture.
- **Seed System Strengthening:** Establishes a trusted local seed supply hub.
- **Superior Quality & Yield:** Adoption of Rajendra Sonia ensures productivity, disease tolerance, and better processing recovery.
- **Replicable & Scalable Model:** Practical model for Eastern Uttar Pradesh and similar agro-climatic regions.
- **Household Resilience:** Builds economic stability and confidence.

Broader Impact

- Higher and sustained farm income
- Promotion of climate-resilient crop diversification
- Strengthened local seed ecosystem
- Demonstration effect encouraging replication
- Advancement of women and youth leadership in agriculture

Conclusion

The success of Ms. Shyam Devi and her son, Mr. Banshi, reflects how scientific agriculture, quality inputs, technical mentoring, and family participation can transform livelihoods. Through SHDA's intervention, this household has not only improved income but has become a beacon of inspiration, demonstrating a sustainable, community-driven model of turmeric-based livelihood enhancement in Kushinagar.

Enhancing Farmer Income through Improved Turmeric Variety 'Rajendra Sonia': The Case of Mr. Ramharakh, Kushinagar

Turmeric cultivation has been a part of agricultural tradition in Kushinagar district for decades; however, most farmers continued cultivating local varieties using conventional methods, resulting in moderate yields and limited income. Recognizing the potential of the region and the scope for improvement, Sustainable Human Development Association (SHDA) initiated an intervention to introduce improved turmeric technologies supported by scientific guidance and capacity building. The journey of Mr. Ramharakh, a farmer from Chandarpur village in Ramkola Block, reflects the transformational impact of this initiative.

Farmer Background

Mr. Ramharakh belongs to a large joint family of 18 members and manages 2.0 acres of agricultural land. Like most farmers in the region, he cultivated sugarcane, paddy, wheat, vegetables, and a small area under turmeric using local varieties. Until 2022–23, turmeric cultivation was practiced traditionally, with limited awareness of improved package of practices, resulting in moderate productivity and income levels.

Problem Situation

Prior to intervention, the farmer used local turmeric variety and lacked access to improved seeds, scientific agronomic knowledge, and technical support. This restricted productivity enhancement and limited income optimization from turmeric, despite its high market potential. There was a clear need to improve seed quality, production technology, and farmer capacity.

Intervention by SHDA

In 2023–24, SHDA initiated structured support to the farmer by providing quality planting material of high-yielding turmeric variety 'Rajendra Sonia'. Hands-on capacity building was conducted through the technical team of SHDA and experts from KVK Kushinagar, focusing on improved Packages of Practices including scientific spacing, nutrient management, timely weeding, irrigation, crop protection, and better post-harvest management. Continuous handholding ensured that recommended practices were implemented effectively.

Performance of Technology

Following the intervention, significant improvement was recorded in area coverage, production, and income from turmeric cultivation. Motivated by results, the farmer expanded the turmeric area in subsequent years.

Year-wise Performance of Turmeric Cultivation

Year	Variety	Area (Acre)	Production (Quintal)	Net Profit (INR)	Remarks
2022-23 (Baseline)	Local Variety	0.20	16	20,800	Traditional practices
2024-25	Rajendra Sonia	0.24	28	49,300	Scientific POP adopted
2025-26*	Rajendra Sonia	0.34	-	Harvest due Feb 2026	Excellent standing crop

*Harvesting is scheduled in February 2026; current field conditions reflect excellent vegetative growth and promising yield potential.

Output

With the introduction of Rajendra Sonia variety and adoption of scientific production methods, the farmer improved both the scale and efficiency of turmeric cultivation. He is now confidently managing improved cultivation practices and has emerged as a progressive turmeric grower.

Outcome

A remarkable improvement in productivity and profitability was recorded:

- Approximately 44% increase in area compared to baseline
- Nearly 75% increase in production in the first cycle after intervention
- Net income more than doubled, significantly enhancing household earnings

Impact and Community Spillover

The success of Mr. Ramharakh has created a strong demonstration effect in the region.

Farmers from the same village, neighboring villages, and nearby blocks have started procuring seeds from him and expanding turmeric cultivation under the Rajendra Sonia variety. He has emerged as a lead farmer and seed resource, thereby promoting varietal spread and scaling of improved technology adoption at community level. This has strengthened livelihood opportunities and contributed to enhanced agricultural resilience in the locality.



Farmer's Experience

The farmer expresses high satisfaction with the intervention, acknowledging the role of improved seed, scientific training, and regular technical guidance in transforming his turmeric enterprise. Encouraged by results, he has increased the turmeric sowing area and is optimistic about higher returns in coming seasons.

Conclusion

The success story of Mr. Ramharakh clearly demonstrates that introduction of improved turmeric variety supported by scientific production practices and institutional guidance can significantly enhance productivity, profitability, and livelihood security. This experience is highly replicable and holds strong potential for scaling across turmeric-growing regions with support from ICAR institutes, SAUs, KVKs, donor agencies, and development organizations.

Transforming Livelihood through Improved Turmeric Variety 'Rajendra Sonia': The Success of Mr. Dharmendra Maurya, Kushinagar

Turmeric has traditionally been grown in Kushinagar district of Uttar Pradesh, largely with local varieties and conventional practices. While the crop holds high commercial value, lack of improved seed material and scientific management has limited productivity and profitability for small and marginal farmers. Recognizing this opportunity, Sustainable Human Development Association (SHDA), with technical support from KVK Kushinagar, initiated efforts to introduce improved turmeric technologies to enhance farmer income. The progress of Mr. Dharmendra Maurya, a farmer from Kusmha village in Ramkola Block, reflects the success and potential of this initiative.

Farmer Background

Mr. Dharmendra Maurya belongs to a seven-member household and cultivates 1 acre of land. His farming system is diversified, with sugarcane, paddy, wheat, vegetables, and turmeric as the major crops. Until 2022–23, turmeric cultivation was carried out on a small scale using local varieties, primarily for supplemental income, with limited exposure to scientific cultivation practices.

Problem Situation

Before intervention, turmeric was grown using traditional techniques, local seeds, and without systematic nutrient and crop management. This resulted in limited productivity and lower income returns, despite favorable agro-climatic potential. There was a clear demand for improved planting material, scientific Package of Practices (POP), and technical guidance.

Intervention by SHDA

In 2023–24, SHDA initiated targeted support to the farmer:

- Introduced high-yielding turmeric variety 'Rajendra Sonia'
- Supplied quality seed material
- Conducted intensive capacity-building sessions
- Provided continuous guidance through KVK experts and SHDA technical team
- Emphasized scientific POP such as improved spacing, nutrient scheduling, irrigation, weeding, and better crop care

This structured intervention aimed at enhancing both productivity and profitability.

Performance of Technology

Following the intervention, remarkable changes were observed in area expansion, production scale, and farm income. Motivated by improved economics, the farmer significantly expanded the turmeric area in subsequent years.

Year-wise Performance of Turmeric Cultivation

Year	Variety	Area (Acre)	Production (Quintal)	Net Profit (INR)	Remarks
2022-23 (Baseline)	Local Variety	0.08	5.5	9,900	Traditional cultivation
2024-25	Rajendra Sonia	0.24	30	53,950	Scientific POP applied
2025-26*	Rajendra Sonia	0.72	-	Harvest due Feb 2026	Excellent standing crop

*Harvesting scheduled in February 2026; standing crop exhibits excellent vegetative growth and promising yield potential.

Output

The farmer successfully adopted improved turmeric production technologies and shifted from subsistence-level cultivation to commercial-scale production. His technical capacity and confidence have significantly strengthened.

Outcome

- Nine-fold increase in cultivation area from baseline (0.08 acre to 0.72 acre)
- Substantial rise in production and profitability
- Income more than quintupled, ensuring stronger livelihood stability
- Farmer emerged as a progressive turmeric grower

Impact and Community Spillover

The success of Mr. Dharmendra has created a strong demonstration effect. Farmers from his village, neighboring villages, and nearby blocks are now:

- Visiting his fields
- Procuring quality seed material from him
- Expanding cultivation of Rajendra Sonia variety

He has emerged as a **lead farmer and community seed resource**, contributing to varietal spread, technology dissemination, and enhanced agricultural income at the community level.



Farmer's Experience

The farmer expresses high satisfaction with the intervention, acknowledging that improved seed, scientific POP, and technical handholding have significantly transformed his turmeric enterprise. He is optimistic about higher returns from the standing crop and is motivated to continue expansion.

Conclusion

The success story of Mr. Dharmendra Maurya clearly demonstrates that strategic varietal replacement supported by scientific guidance and institutional support can substantially enhance productivity and farmer income. This model is highly scalable and relevant for replication across turmeric-growing regions, strengthening rural livelihoods with support from ICAR institutes, SAUs, KVKs, donor agencies, and development organizations.

Transforming Livelihoods Through Turmeric Cultivation **The Success Story of Mr. Arjun, Village Urdaha,** **Ramkola Block, Kushinagar**

Mr. Arjun, a resident of Urdaha village in Ramkola block of Kushinagar district, supports a large family of 13 members with agriculture as the primary livelihood source. On his one-acre landholding, he traditionally cultivated sugarcane, paddy, vegetables, wheat, and turmeric. Like many small and marginal farmers of the region, turmeric was initially a secondary crop for him, grown on a very small patch with limited returns.

Baseline Situation

During 2022–23, Mr. Arjun cultivated turmeric on 0.08 acre using a local variety. The yield was only 5 quintals, and the net profit was merely ₹2,000. Limited knowledge of scientific cultivation practices, lack of improved seed varieties, and inadequate exposure to efficient post-harvest management restricted his income and motivation to expand turmeric cultivation.

SHDA's Intervention

In 2023–24, SHDA intervened with a clear vision of enhancing productivity and farmer income through improved turmeric cultivation practices. Mr. Arjun was provided quality seed of the high-yielding Rajendra Sonia variety. He received intensive training on scientific Package of Practices (PoP), including seed treatment, appropriate spacing, nutrient management, irrigation scheduling, and primary processing techniques. Experts from KVK Kushinagar, along with SHDA's in-house technical team, continuously guided and mentored him throughout the cultivation cycle.

Remarkable Productivity and Income Gains

Encouraged by technical support and improved planting material, Mr. Arjun increased the turmeric cultivation area to 0.24 acre in 2024–25. The results were outstanding—he harvested 31 quintals of turmeric and earned a net profit of ₹50,825, marking a significant leap from his baseline income.

The success motivated him further to scale up turmeric cultivation to 0.64 acre in 2025–26. The standing crop is showing excellent vegetative growth, and harvesting is expected in February 2026. Based on current crop health, the farmer expects substantially higher yield and income than previous years.

A Farmer Becomes a Resource Person

Beyond personal economic gain, Mr. Arjun's field has now become a learning site for neighbouring farmers. Farmers from his own village, nearby villages, and adjoining blocks are visiting his field, interacting with him, and procuring Rajendra Sonia seeds. This has resulted in large-scale replication of improved turmeric cultivation in the region, contributing to area expansion and strengthening local seed systems.

Progress of Turmeric Cultivation by Mr. Arjun

Year	Area Under Turmeric	Variety Used	Total Production (Quintals)	Net Profit (INR)	Status/Remarks
2022-23 (Baseline)	0.08	Local variety	5	2,000	Very low productivity and returns
2024-25	0.24	Rajendra Sonia	31	50,825	Significant increase in production and income
2025-26	0.64	Rajendra Sonia	Harvest due Feb 2026	To be assessed	Standing crop with excellent growth; farmer expects high income

Conclusion

The journey of Mr. Arjun demonstrates how access to quality seeds, scientific knowledge, and consistent institutional support can transform smallholder agriculture. His transition from subsistence-level turmeric producer to a progressive, knowledge-sharing farmer not only improved his household income but also inspired many others to adopt improved turmeric cultivation. SHDA's intervention has thus catalyzed both livelihood enhancement and community-level agricultural transformation in Ramkola block of Kushinagar.



Empowering Women Farmers Through Turmeric Cultivation

The Inspiring Story of Mrs. Sonmati, Ahirauli Kusmhi, Ramkola Block, Kushinagar

Mrs. Sonmati, a progressive woman farmer from Ahirauli Kusmhi village in Ramkola block of Kushinagar district, manages agricultural activities on her 2-acre landholding to support her family of nine members. Like many farming households of the region, she cultivated sugarcane, paddy, wheat, vegetables, and a small patch of turmeric as a supplementary crop. However, limitations in improved seed availability and scientific cultivation practices restricted productivity and income.

Baseline Situation

During 2022–23, turmeric was cultivated on just 0.04 acre using local seed variety. The production was only 3 quintals, resulting in a very modest net profit of ₹1,300. Low productivity and poor returns discouraged investment in turmeric expansion.

SHDA's Intervention

In 2023–24, SHDA identified the potential for turmeric-led livelihood enhancement and extended technical and institutional support to Mrs. Sonmati. She was provided high-yielding **Rajendra Sonia** turmeric seed along with intensive capacity building on scientific Package of Practices (PoP). Experts from KVK Kushinagar, along with SHDA's technical team, trained her on improved planting, nutrient and water management, pest management, and better post-harvest handling.

Outstanding Productivity and Income Enhancement

Motivated by assured technical guidance and improved seed variety, she expanded turmeric cultivation to **0.24 acre in**

2024–25. The results were remarkable—she harvested **32 quintals**, earning a substantial **net profit of ₹67,010**, marking a transformational leap from her baseline income.

Encouraged by success, she further expanded turmeric cultivation to 0.26 acre in 2025–26. The standing crop is currently exhibiting excellent vegetative growth and will be harvested in February 2026. Based on present crop performance, she confidently expects higher yield and income compared to previous years.

Becoming a Catalyst for Community Change

Beyond benefiting her own household, Mrs. Sonmati has emerged as a local champion of improved turmeric cultivation. Her success has motivated farmers from her village,



neighbouring villages, and nearby blocks to adopt the Rajendra Sonia variety. Many farmers now procure seed from her, contributing to local seed security and expansion of improved turmeric cultivation in the region.

Progress of Turmeric Cultivation by Mrs. Sonmati

Year	Area Under Turmeric (Acre)	Variety Used	Total Production (Quintals)	Net Profit (INR)	Status/Remarks
2022-23 (Baseline)	0.04	Local variety	3	1,300	Low productivity and minimal income
2024-25	0.24	Rajendra Sonia	32	67,010	Remarkable improvement in yield and profitability
2025-26	0.26	Rajendra Sonia	Harvest due Feb 2026	To be assessed	Standing crop with excellent growth; high income expected

Conclusion

The journey of Mrs. Sonmati beautifully reflects how empowering women farmers with quality inputs, knowledge, and institutional support leads to livelihood transformation. Her success showcases the potential of turmeric as a profitable enterprise and demonstrates SHDA's impactful role in improving incomes, strengthening community seed systems, and promoting sustainable agriculture in Kushinagar.



A Remarkable Journey of Growth and Prosperity

The Outstanding Success Story of Mr. Rambriksha, Deoria Babu, Ramkola Block, Kushinagar

Mr. Rambriksha, a progressive farmer from Deoria Babu village in Ramkola block of Kushinagar district, supports a family of nine members with agriculture as his primary source of livelihood. On his one-acre landholding, he traditionally cultivated sugarcane, paddy, wheat, vegetables, and a small patch of turmeric. However, like many smallholder farmers, limitations in access to improved seed varieties and scientific cultivation practices restricted productivity and income from turmeric.

Baseline Situation: Modest Production and Low Returns

During 2022–23, he cultivated turmeric on 0.10 acre using local seed variety. The yield remained only 6 quintals, and the net profit was as low as ₹800, making turmeric a marginal crop with very limited economic value.

SHDA's Strategic Intervention

In 2023–24, SHDA identified his interest and potential, and extended comprehensive support. He was provided **high-quality Rajendra Sonia seed variety**, along with rigorous training on scientific Package of Practices. Experts from KVK Kushinagar and SHDA's technical team guided him at every stage—right from land preparation and seed treatment to nutrient management, disease prevention, irrigation, and primary processing techniques.

Extraordinary Transformation in Just One Year

Encouraged by technical assurance and quality seed, Mr. Rambriksha expanded cultivation to 0.25 acre in 2023–24. The results were extraordinary—he harvested 55 quintals of turmeric and earned a net profit of ₹84,032, which was a massive leap compared to his baseline earnings.

Scaling Up to a Commercial Level

The success not only boosted his confidence but also transformed his outlook toward turmeric cultivation as a profitable enterprise. Motivated by exceptional returns, he further expanded the turmeric area to 1.50 acre in 2024–25 by also taking land on lease. The performance



remained outstanding—he generated a net profit of ₹2,62,580, positioning himself as a commercial-scale turmeric producer in the region.

Emerging as a Local Leader and Seed Resource Farmer

Today, Mr. Rambriksha is not just a successful farmer but also a role model for others. Farmers from his village, neighbouring villages, and even adjoining blocks visit his field to learn from his experience. Many farmers procure Rajendra Sonia seeds from him, leading to expansion of turmeric area and strengthening of local seed systems. His journey has created a powerful ripple effect of change across the farming community.

Progress of Turmeric Cultivation by Mr. Rambriksha

Year	Area Under Turmeric (Acre)	Variety Used	Total Production (Quintals)	Net Profit (INR)	Status/Remarks
2022–23 (Baseline)	0.10	Local variety	6	800	Very low yield and minimal income
2023–24	0.25	Rajendra Sonia	55	84,032	Huge increase in production and profit
2024–25	1.50	Rajendra Sonia	—	2,62,580	Commercial-level cultivation; outstanding profitability
2025–26	0.40	Rajendra Sonia	Harvest due Feb. 2026	To be assessed	Standing Crop with Excellent growth; high income expected

Conclusion

The journey of Mr. Rambriksha stands as a shining example of how access to quality inputs, scientific knowledge, and institutional support can transform smallholder agriculture into a profitable enterprise. His tremendous achievement in expanding area, production, and income demonstrates the true potential of turmeric cultivation in Kushinagar and highlights SHDA's impactful role in driving livelihood enhancement and rural prosperity.



Women's Participation and Social Inclusion

Women in Kushinagar district have historically been integral to turmeric cultivation, contributing significantly to planting, weeding, harvesting, cleaning, boiling, drying, and storage activities. Despite their extensive involvement, their role has largely remained informal and undervalued, with limited access to training, improved technologies, or direct market participation. The SHDA turmeric promotion programme consciously sought to reposition women from invisible contributors to recognised knowledge holders and key actors within the production system, while simultaneously promoting broader social inclusion among vulnerable and land-poor households.

A central focus of the programme has been capacity building of women farmers. Women were systematically included in farmer meetings, technical orientations, and on-field demonstrations related to improved seed selection, scientific spacing, soil health management, nutrient application, integrated pest-disease control, and better post-harvest handling practices. Special attention was given to ensuring that training inputs were practical, locally relevant, and accessible to women's time schedules and learning contexts. Through this, women not only enhanced their technical understanding of turmeric cultivation but also gained confidence in decision-making related to the crop.

At present, women continue to be engaged in primary processing using traditional household-level methods such as conventional boiling practices, sun drying, and cleaning. While these methods are culturally embedded and widely practiced, they often lead to inconsistencies in quality, colour, and curcumin retention. Recognising this limitation, the programme has planned to strengthen women's



role in post-harvest value addition under the forthcoming second phase. Provision of improved boiling utensils and enhanced curing facilities is proposed, along with advanced practical training on scientific boiling, hygienic drying, and quality maintenance standards. This forward-looking strategy will enable a transition from traditional handling to more standardised and market-compliant processing, thereby enhancing both product quality and women's economic returns.

Institutional integration has been another key dimension of inclusion. Women

participants are increasingly being connected to the Farmer Producer Organisation (Lord Buddha Vegetable Producer Company Ltd.), which anchors aggregation, processing, and marketing functions. This linkage provides women with structured backward and forward support, ensures fair price mechanisms, and enhances their visibility within formal market systems. Over time, this is contributing to a gradual shift in household and community perceptions, recognising women as informed agricultural contributors rather than only as family labourers.

Beyond gender inclusion, the programme adopts a broader social justice lens, ensuring participation of land-poor households, tenant farmers, labour families, and vulnerable groups including persons with disabilities. By encouraging their involvement in seed multiplication activities, nursery work, primary handling tasks, aggregation processes, and awareness building on improved technologies, the programme extends livelihood benefits beyond landholders. Convergence efforts are also underway to improve access to government schemes, social protection measures, and financial services, thereby addressing long-standing exclusion and vulnerability.

Importantly, women's involvement in training, exposure visits within project area, and farmer group interactions has led to tangible social change. Women are increasingly participating in discussions on crop planning, investment priorities, and utilisation of agricultural income. This shift in agency is contributing to enhanced self-confidence, household recognition, and collective solidarity among women.

In essence, the turmeric promotion initiative has demonstrated that women's empowerment and social inclusion are not parallel components but central pillars of sustainable agricultural development. By equipping women with knowledge, preparing



them for greater leadership in post-harvest value chains, strengthening institutional linkages, and integrating marginalised households, the programme is fostering a more equitable, resilient, and socially inclusive rural livelihood ecosystem in Ramkola Block. With the upcoming phase poised to provide improved processing infrastructure, women's role is expected to evolve further from skilled cultivators to strategic value chain leaders—ensuring

both economic advancement and social dignity.

Chapter 5

Technical Aspects of Turmeric Cultivation Recommended varieties (with characteristics and yield potential)

Variety	Origin (Institute)	Duration (days)	Fresh yield potential (t/ha)	Curcumin (%)	Key traits / notes	Best adaptation zones	Trial suitability (why)
Rajendra Sonia (RH-10)	RPCAU, Pusa (Bihar)	200–210	40–45	7.5–8.0	Dwarf (100–110 cm). Resistant to leaf spot/leaf blotch. High curcumin—good medicinal/oleoresin markets.	North Indian plains, irrigated & rainfed terraces	Excellent: high curcumin and strong yields; useful demo in Kushinagar/Gopalganj
Rajendra Sonali	RPCAU, Pusa	215–220	50–55	6–7	Dwarf (~90–100 cm). Slightly longer duration; very high fresh-yield potential.	Irrigated plains where longer season allowed	Good for yield focused trials where buyers accept slightly lower curcumin
IISR Prabha	ICAR-IISR (Calicut)	200–220	35–40	~6.5	High fresh yield and good market quality; adaptation to peninsular regions but performs broadly	Peninsular zones, southern plains	Good for comparison with Rajendra lines on yield vs. quality
IISR Prathibha	ICAR-IISR	~200 – 220	30–40	~6.0	Disease tolerant selection from IISR trials	Southern and intermediate zones	Good to include for disease prone blocks
IISR Alleppey Supreme	ICAR-IISR / Kerala	210	19–20	~5.3–5.6	Well-known Kerala type; good polished quality and market preference in colour	Kerala-like soils; coastal/tropical areas	Include if market prefers Alleppey-style turmeric or for comparison of quality traits
CO1 (Madras/Coimbatore)	TNAU / Coimbatore lines	early/medium	20–30	~4.0	Robust, larger rhizomes, adapted to southern irrigated plains, drought tolerant	Southern irrigated plains (TN, KA)	Useful control variety from TN; benchmark for southern agronomy
Suvarna / Suguna / Sudharsana (IISR selections)	ICAR-IISR	200–220	25–35	5–7	Developed for general good yield, disease tolerance and quality	Peninsular & adaptable zones	Good as locally recommended IISR lines
BSR-1 / BSR-2 (state lines)	State trials / multi-location lines	variable	20–40	variable	Promising in local trials (Telangana/AP) —check specific BSR line	State-adapted zones	Useful as locally adapted entries in demo strips

Land Preparation, Seed Treatment, and Planting Practices for Turmeric Crop

1. Land Preparation

Turmeric requires well-drained, fertile loam or sandy loam soil rich in organic matter. Water stagnation adversely affects rhizome development. The land should be ploughed 2–3 times, incorporating 20–25 tonnes of well-decomposed FYM per hectare. Raised beds of 1.0–1.2 m width and 15–20 cm height are ideal, with drainage channels between beds to prevent waterlogging.

2. Seed Rhizome Preparation and Treatment

Select healthy, disease-free mother rhizomes (20–25 g each) from 6–8-month-old plants. Use 2,500–3,000 kg of rhizomes per hectare depending on spacing and variety.

Treatment Type	Formulation & Concentration	Duration / Method	Purpose / Remarks
Fungicidal treatment	Mancozeb 0.3% or Carbendazim 0.2%	Soak rhizomes for 30 min, shade dry before planting	Controls rhizome rot and leaf spot
Biocontrol treatment	Trichoderma harzianum @ 10 g/kg rhizome	Coat rhizomes before planting	Enhances root health, prevents fungal disease
Hot water treatment	50–52°C for 30 minutes	Before fungicide dipping	Controls scale insects and nematodes
Bio-safe alternative	Neem extract or Pseudomonas fluorescens @ 5 g/kg rhizome	As ecofriendly seed protection	Reduces chemical use

3. Planting Practices

Plant turmeric between April and June, depending on rainfall. Spacing of 45×30 cm or 45×25 cm is optimal. Plant rhizomes 5–7 cm deep with buds facing upwards. Mulch immediately after planting using green leaves or paddy straw @ 10–12 tonnes/ha.

4. Irrigation Management

Provide first irrigation immediately after planting if rainfall is insufficient. Subsequent irrigation every 7–10 days during dry periods is recommended. Avoid waterlogging through proper drainage management.

Nutrient Management and Organic Inputs for Turmeric

Effective nutrient management is essential for improving turmeric yield and maintaining soil health in the alluvial and flood-prone soils of Kushinagar district. The following

stepwise narrative presents a simple, field-friendly approach combining organic and inorganic inputs to ensure sustainable production.

Step 1. Soil Testing

Purpose	Method	Key Points
To assess soil fertility status	Collect soil samples from 6–8 inches depth before sowing	Focus on organic carbon, P, K, Zn, and pH

Step 2. Field Preparation (2–3 weeks before planting)

Activity	Quantity/Method	Benefits
Apply Farmyard Manure (FYM)	8–12 tonnes/ha	Improves soil texture and moisture holding
Apply Compost	4–6 tonnes/ha	Enhances soil organic matter
Raised Beds/Ridges	Construct before planting	Prevents waterlogging and rhizome rot

Step 3. Sett (Seed Rhizome) Preparation

Activity	Material	Procedure	Benefits
Biological treatment	Trichoderma harzianum	Dip setts for 15–30 minutes	Prevents root and rhizome rot
Biofertilizer coating	Azospirillum / PSB	Coat setts before planting	Enhances N fixation and P uptake

Step 4. Basal Application at Planting

Nutrient Source	Rate per ha	Method
Nitrogen (N)	30–50 kg	1/3rd of total dose as basal
Phosphorus ($P_2 O_5$)	40–60 kg	Full basal dose
Potassium ($K_2 O$)	40–75 kg	50% as basal
Organic Inputs	2–4 t vermicompost + 200–300 kg neem cake	Mix into soil before planting

Step 5. Top Dressing – First Split (45–60 DAP)

Input	Rate	Application Method
Nitrogen	30–40 kg/ha	Side placement or banding between rows
Biofertilizer	Azospirillum 2 kg/ha	Apply with FYM and cover with soil
Organic Mulch	5–6 tonnes/ha	Conserves moisture and releases nutrients gradually

Step 6. Second Split Application (90–100 DAP)

Input	Rate	Method
Nitrogen	Remaining 30–40 kg/ha	Applied near root zone before earthing-up
Potash	25–40 kg K ₂ O/ha	To improve rhizome size and colour
Vermiwash or Panchagavya	Foliar spray @ 5% solution	Boosts plant vigour and nutrient uptake

Step 7. Foliar Nutrition and Bio-stimulant Use

Material	Concentration	Frequency
Seaweed extract	2–3 ml/litre	Once in 30 days after 60 DAP
Liquid biofertilizer (Azotobacter/PSB)	100 ml/15 L water	Monthly spray till 150 DAP
Micronutrient mix (Zn, Fe, B)	0.5% solution	Once at 90 DAP for deficiency correction

Step 8. Green Manuring and Intercrops

Crop	Sowing Time	Purpose
Dhaincha / Sunhemp	Before turmeric planting	Fixes atmospheric nitrogen
Cowpea / Moong	Intercropped at ridges	Improves organic matter and provides extra income

Step 9. Use of Bio-inputs for Soil Enrichment

Input	Rate	Effect
Jeevamrit / Beejamrit	500 L/ha	Enhances soil microbial activity
Trichoderma-enriched compost	2 tonnes/ha	Controls soilborne pathogens
Phosphate Solubilizing Bacteria (PSB)	2 kg/ha	Improves phosphorus availability

Step 10. Organic Residue Management

Material	Method	Purpose
Crop residues	Incorporate after harvest	Adds organic matter and nutrients
Rhizome waste	Compost with cow dung	Use in next crop cycle
Weed biomass	Use as mulch	Reduces soil temperature and erosion

Step 11. End-season Soil Rejuvenation

Input	Rate	Timing
Biochar or Ash	500 kg/ha	After harvest to retain nutrients
Compost + Microbial consortium	2 tonnes/ha	Restores soil biological balance
Green manure crop	Sow in off-season	Improves soil structure for next crop

Step 12. Nutrient Monitoring and Record Keeping

Activity	Frequency	Purpose
Leaf colour chart / observation	Monthly	To assess nitrogen sufficiency
Soil nutrient test	After each crop cycle	Plan next season fertilizer schedule
Farmer logbook	Continuous	Tracks input use, yield, and soil health trends

These practices collectively enhance nutrient efficiency, improve turmeric yield quality, and maintain long-term soil health under Kushinagar conditions.

Integrated Pest and Disease Management (IPDM) in Turmeric – District Kushinagar Context

Turmeric (*Curcuma longa* L.) is a long-duration crop that remains in the field for 8–9 months and is prone to several pests and diseases, especially in the humid and high-rainfall conditions of Kushinagar district. Adopting an Integrated Pest and Disease Management (IPDM) approach—combining cultural, biological, organic, and need-based chemical measures—is essential to minimize yield loss and ensure sustainable production.

1. Preventive Measures – The Foundation of IPDM

Practice	Description	Purpose
Healthy Seed Rhizomes	Select mature, pest and disease-free rhizomes from healthy mother plants.	Avoids primary infection source.
Seed Treatment (Biological)	Dip rhizomes in <i>Trichoderma harzianum</i> or <i>Pseudomonas fluorescens</i> (10 g/L water) for 30 min.	Prevents early fungal/bacterial infections.
Seed Treatment (Chemical)	In case of heavy disease history, treat rhizomes with Mancozeb 0.3% for 30 min, shadedry before planting.	Broad-spectrum protection against fungal pathogens.
Crop Rotation	Rotate with pulses or legumes every 2–3 years.	Breaks pest and disease cycles.
Drainage and Raised Beds	Prepare ridges/beds to prevent standing water.	Reduces rhizome rot and wilt risk.

2. Major Diseases and Their Integrated Management

Disease	Symptoms	Integrated Management
Rhizome Rot (<i>Pythium</i> , <i>Fusarium</i>)	Yellowing of leaves, decayed rhizomes, foul smell.	- Use <i>Trichoderma</i> - treated seed. - Mix neem cake (200–300 kg/ha) with <i>Trichoderma</i> - Improve drainage. - Chemical option: Drench with Metalaxyl-M + Mancozeb (0.25%) or Copper oxychloride (0.3% at 20–25 day intervals if disease persists. - Use resistant varieties like Rajendra Sonia. - Spray Neem oil 3% or Bordeaux mixture 1% at

Leaf Spot (<i>Colletotrichum capsici</i>)	Brown necrotic spots with yellow halo.	- early stage. - Chemical option: Spray Carbendazim 0.1% or Propiconazole 0.1% at-15day intervals (max 2 sprays). - Use disease free seed.
Bacterial Wilt (<i>Ralstonia solanacearum</i>)	Sudden wilting, vascular browning.	- Solarize soil before planting. - Apply <i>Pseudomonas fluorescens</i> (2.5 kg/ha). - Chemical option: Drench with Copper oxychloride 0.3% or Streptocycline 200 ppm in severely affected patches.

3. Major Insect Pests and Their Management

Pest	Symptoms	Integrated Management
Shoot Borer (<i>Conogethes punctiferalis</i>)	Boreholes on pseudostems, drying of central shoot.	- Remove infested shoots. - Use light traps (1 per acre). - Spray Neem oil 3% or Beauveria bassiana 5 g/L. - Chemical option: If severe, spray Lambda cyhalothrin 0.004% or Chlorantraniliprole 0.006%, 2-3 times at 15-day intervals.
Rhizome Scale (<i>Aspidiellahartii</i>)	Scales on stored rhizomes, discoloration.	- Treat rhizomes with neem oil (3%) before storage. - Store in dry, aerated rooms. - Chemical option: Dip in Malathion 0.1% for 10 min before drying and storage.
Leaf Roller/Webber (<i>Udaspesfolus</i>)	Leaves folded and eaten by larvae.	- Handpick and destroy affected leaves. - Encourage natural predators (ladybird beetles). - Organic option: Spray <i>Bacillus thuringiensis</i> (Bt) @ 2 g/L. - Chemical option: Spray Cypermethrin 0.02% at 15 - day intervals if severe.

4. Nutrient-Linked Disease Suppression

Practice	Input	Role
Balanced Fertilization	Apply recommended NPK + organic manures.	Reduces susceptibility to diseases.
Micronutrient Sprays	Zinc sulphate (0.5%), Borax (0.2%).	Enhances plant defense and chlorophyll formation.
Neem Cake / Castor Cake	200 300 kg/ha	Acts as both fertilizer and biocontrol agent.

5. Biological and Organic Alternatives

Input	Application	Function
<i>Trichoderma harzianum</i> / <i>Pseudomonas fluorescens</i>	2.5–5 kg/ha with compost	Suppresses soil-borne pathogens.
Neem oil / Neem Seed Kernel Extract (NSKE)	3–5% foliar spray	Controls sucking pests, acts as repellent.
<i>Beauveria bassiana</i> / <i>Metarhizium anisopliae</i>	5 g/L foliar spray	Controls caterpillars and borers biologically.
Panchagavya / Jeevamrit	3% foliar spray at 30 - day intervals	Improves immunity and vigor.

6. Integrated Spray Schedule (Indicative for Kushinagar Conditions)

Crop Stage	Target Problem	Suggested Practice
45–60 DAP	Early fungal leaf spots	Spray Neem oil 3% or Car bendazim 0.1%.
90 DAP	Shoot borer incidence	Spray <i>Beauveria bassiana</i> or Lambda cyhalothrin 0.004%.
120 DAP	Secondary leaf spot	Alternate Bordeaux mixture 1% with Propiconazole 0.1%.
150–180 DAP	Rhizome rot onset (high humidity)	Soil drench with <i>Trichoderma</i> + FYM; if severe, Metalaxyl -M + Mancozeb 0.25%.

7. Monitoring and Decision Support

Activity	Frequency	Purpose
Field scouting and pest counts	Every 10 – 15 days	Early detection and threshold-based decision.
Yellow/Light traps	1 per acre	Monitor adult pest activity.
Record keeping	Continuous	Track pesticide use, pest trends, and yield impact.

8. Post-Harvest Disease Management

- Curing and Drying: Boil rhizomes for 30–45 min, dry under shade for 10–12 days.
- Storage: Store in dry, ventilated sheds on bamboo mats or gunny bags.
- Dusting: Mix turmeric powder + ash (1:1) for natural protection.
- Chemical storage treatment: If necessary, dip rhizomes in Malathion 0.1% and dry before storage.

Integrated Pest and Disease Management (IPDM) in turmeric promotes preventive, eco-friendly, and economically viable crop protection. In Kushinagar's humid climate, combining cultural practices, bio-control agents, and selective chemical interventions offers the most effective approach. This integrated model not only reduces yield losses but also ensures residue-safe turmeric and long-term soil and environmental health.

Irrigation and Weed Management in Turmeric Crop (Context: Kushinagar District)

Turmeric is a long-duration crop that requires an assured and timely supply of water for achieving high yield and quality. In the agro-climatic conditions of Kushinagar district, where the monsoon is erratic and rainfall is often concentrated within a few months, the crop is highly sensitive to both waterlogging and prolonged dry spells. Effective irrigation and weed management therefore play a crucial role in ensuring healthy rhizome development and higher curcumin content.

Irrigation Management

Stage of Crop Growth	Period (Days after Planting)	Irrigation Requirement	Key Co nsiderations
Germination stage	0–30 days	Light irrigation at 5-7 day intervals	Moisture helps sprouting of rhizomes; avoid stagnation to prevent rhizome rot.
Vegetative growth stage	30–120 days	Irrigate every 7-10 days depending on rainfall	Critical for tiller formation and leaf expansion. Mulching helps conserve moisture.
Rhizome bulking stage	120–210 days	Irrigate at 10-12 day intervals	Adequate moisture is essential for rhizome enlargement; ensure good drainage.
Maturity stage	210–240 days	With hold irrigation 15–20 days before harvest	Allows rhizomes to mature and harden; eases harvesting operations.

Recommended Practices for Kushinagar Conditions:

- Raised bed or ridge-furrow planting is strongly recommended in heavy or poorly drained soils to prevent water logging during monsoon.
- Mulching with green leaves or crop residues (4–5 tonnes/ha) immediately after planting conserves soil moisture and suppresses weed growth.
- Where available, drip irrigation can be introduced to save water (up to 40%) and ensure uniform moisture.

During dry spells after monsoon withdrawal, two to three supplemental irrigations are crucial for sustaining rhizome growth

Weed Management

Weeds compete with turmeric for nutrients, moisture, and sunlight, particularly during the first 90 days after planting. In Kushinagar, high humidity and fertile soils favor rapid weed growth, necessitating integrated approaches combining cultural, mechanical, and chemical methods.

Weed Control Method	Description	Timing/Remarks
Manual weeding and earthing up	First hand weeding at 30–40 days; second at 60–70 days; followed by earthing up	Uplifting soil around plants promotes rhizome expansion and prevents lodging.
Mulching	Use of dry leaves, paddy straw, or sugarcane trash	After each weeding or rainfall; suppresses new weed growth and conserves moisture.
Mechanical weeding	Inter-row rotary weeders or wheel hoes where spacing allows	Reduces drudgery and saves labor time.
Chemical control (when labour is scarce)	Pre-emergence application of Pendimethalin @ 1.0 kg a.i./ha within 2–3 days after planting; Post-emergence spot treatment with Glyphosate @ 1.0 kg a.i./ha on weeds between rows (not on crop)	Use only under supervision; ensure adequate soil moisture during application.
Integrated approach	Mulching + one hand weeding + earthing up	Found most effective and eco-friendly in Kushinagar conditions.

In summary, sustainable irrigation and weed management in turmeric require local adaptation to soil type, rainfall pattern, and available water resources. The experience of farmers in Kushinagar highlights that moisture conservation through mulching and ridge planting, combined with timely weeding and judicious irrigation, ensures both productivity and quality in turmeric cultivation.

Post-Harvest Management and Curing Techniques of Turmeric

Turmeric harvesting marks the culmination of nearly nine months of careful cultivation. The post-harvest stage—comprising cleaning, boiling, curing, drying, polishing, and storage—is equally crucial for ensuring good color, aroma, and curcumin content. In the context of Kushinagar district, where SHDA has promoted turmeric cultivation as a profitable smallholder enterprise, strengthening village-level post-harvest practices—especially through women's involvement—has emerged as a key driver for value addition and local employment.

1. Harvesting

- Turmeric crop is ready for harvest **7–9 months after planting**, once leaves start yellowing and drying.
- Harvesting is best done **during dry weather** to avoid soil adhesion on rhizomes.
- Rhizomes are lifted using a hand hoe or digging fork, cleaned, and separated into **mother rhizomes** (for seed) and **finger rhizomes** (for curing).

Women's Role:

In most Kushinagar villages, women participate in harvesting, sorting, and cleaning. Their meticulous handling minimizes rhizome damage and ensures better recovery for seed and market use.

2. Cleaning and Sorting

Step	Activity	Purpose / Note
Washing	Remove adhering soil and roots	Clean rhizomes improve boiling efficiency.
Sorting	Separate healthy, disease free rhizomes	Ensures quality and uniform curing.
Cutting	Large mother rhizomes cut into smaller pieces (5–6 cm)	Helps uniform boiling and drying.

Women's self-help groups (SHGs) often take lead in these steps, performing initial washing and grading at the household or community level.

3. Boiling / Curing

Curing (boiling) converts raw turmeric into the dry, marketable form by gelatinizing starch, fixing the bright yellow color, and developing aroma.

Traditional Method (Village Practice):

- Rhizomes are boiled in aluminum or mild steel pans with water (2:1 water-to-rhizome ratio).
- Boiling continues for 45–60 minutes, until froth appears and internal color turns uniform yellow.
- Over-boiling should be avoided—it dulls color and reduces curcumin content.

Improved Method (Recommended by SHDA):

To enhance efficiency and product quality, SHDA recommends the adoption of steam-based or perforated drum boiling units. These units ensure uniform heat distribution, significantly improving the consistency of processed turmeric while reducing fuel consumption by nearly 30–40 percent. Moreover, when managed collectively by Self-Help Groups (SHGs), these units help reduce drudgery, lower operational costs, and ensure better quality control.

Women's Role in Processing:

Women members of SHGs are increasingly being trained to handle crucial post-harvest processes such as boiling and drying. Their precision in timing and careful attention to uniformity play a vital role in achieving superior product color and aroma—both of which are key determinants of market value. SHDA already operates its own processing unit, and efforts are underway to orient and train women farmers to utilize this facility more effectively. While women are presently involved in these activities, their engagement is gradually expanding as awareness, confidence, and technical skills increase. Over time, this is expected to strengthen women's leadership in processing, improve product quality, and contribute to higher household incomes.

Women's self-help groups (SHGs) often take lead in these steps, performing initial washing and grading at the household or community level.

4. Drying

After boiling, rhizomes are spread on clean drying floors or bamboo mats.

Drying Method	Duration	Key Points
Sun drying	10–15 days	Spread thin (5 –7 cm layer), turn periodically. Protect from dew and rain.
Solar dryers (improved)	4–6 days	Faster, hygienic drying; reduces dust contamination and retains bright color.

5. Polishing

Polishing removes rough surfaces and gives turmeric a bright, attractive finish.

Traditional Method: Rubbing dried rhizomes manually in gunny bags or earthen pots.

Improved Method: Using a mechanical drum polisher powered by a small motor—saves labor and gives uniform shine.

Women's Involvement:

Mechanical polishers managed by women SHGs can serve multiple nearby villages, creating micro-enterprises. This not only enhances value addition but also provides off-season income.

Activity	Details / Recommendations
Grading	Based on size, color, and luster; remove shriveled or damaged rhizomes.
Packaging	Use clean, dry jute bags lined with polythene. Label variety and harvest year.
Storage	Store in cool, dry, well -ventilated room on wooden pallets, away from moisture.

Proper grading and storage ensure longer shelf life and better price realization at local mandis or through collective SHG marketing.

Stage	Good Practice	Women's Contribution
Harvesting	Timely lifting, gentle cleaning	Careful handling reduces damage
Boiling	Controlled, uniform curing	Maintains color and aroma
Drying	Use of solar dryers	Ensures hygiene and quality
Polishing	Mechanized or manual	Adds value and market appeal
Storage & Marketing	Grading and branding	SHG led collective marketing

In conclusion, efficient post-harvest management of turmeric—anchored in women's participation—has the potential to transform rural households in Kushinagar. By shifting processing activities from middlemen to the village level, communities not only will retain more value locally but also empower women as custodians of quality and entrepreneurship in the turmeric value chain.

Key Technical Parameters

Step	Parameter / Duration	Good Practice
Harvesting	7–9 months after planting	Yellowing leaves, dry weather preferred
Boiling	45–60 minutes	Avoid over - or under -boiling
Drying	10–15 days (sun) or 18 hrs (dryer)	Moisture content $\leq 10\%$
Polishing	10–15 min (mechanical)	Use clean drum polisher
Storage	Dry, cool, ventilated room	Bags on wooden pallets

Following standard post-harvest and curing techniques ensures high-quality turmeric with bright color, rich aroma, and better market value. Promoting **village-level processing and women-led SHG units** can make turmeric production a sustainable and community-driven enterprise, as demonstrated under SHDA's turmeric program in Kushinagar.

Value Addition and Product Diversification of Turmeric

Introduction

Turmeric (*Curcuma longa* L.) is not only a major spice crop but also a valuable raw material for the food, cosmetic, dye, and pharmaceutical industries. While farmers in districts like Kushinagar have traditionally sold raw turmeric rhizomes, substantial income opportunities lie in value addition and product diversification. Through simple processing and small-scale enterprises, farmers—especially women's Self-Help Groups (SHGs)—can convert raw turmeric into a range of high-value products, ensuring better price realization and rural employment.

1. Value Addition Chain of Turmeric

Stage	Product	Market Level	Approx. Value Increase
Raw rhizomes	Fresh turmeric	Farm gate	—
Boiled & dried rhizomes	Dried turmeric fingers	Local trader level	+20-25%
Ground product	Turmeric powder	Retail / SHG processing	+60-70%
Extracted compounds	Oil, oleoresin, curcumin	Industrial / export	+200-400%

2. Primary Value Addition at Village Level

a. Turmeric Powder Production

This is the most common and feasible form of value addition at the community level.

Process Flow:

Cleaning → Boiling → Drying → Polishing → Grinding → Sieving → Packaging

• Key Points:

- Use mechanical grinders to produce uniform fine powder.
- Maintain hygienic conditions and moisture below 10%.
- Pack in airtight laminated pouches or HDPE jars.
- Branding and labeling enhance market appeal (village brand or SHG label).

Women's Role:

Women-led SHGs can handle small-scale grinding and packaging units (capacity: 20–30 kg/hour).

These units require minimal investment and generate consistent local employment, especially for landless women.

3. Secondary Level Value Addition

a. Turmeric Oil Extraction

- Turmeric oil is obtained through steam distillation of dried rhizome powder.
- The oil contains turmerone and zingiberene, responsible for fragrance and medicinal properties.
- It is used in aromatherapy, perfumery, and cosmetics.

Yield: 3–5 kg oil per tonne of dried rhizome.

Shelf Life: Up to one year when stored in airtight, dark bottles.

b. Oleoresin Extraction

- Oleoresin represents the complete flavor and aroma profile of turmeric.
- It is extracted using organic solvents such as ethanol or acetone.

- Used widely in food processing, bakery, confectionery, and pharmaceutical industries.

Yield: 8–12% of dried rhizome weight.

Curcumin content: 30–40% in high-quality oleoresin.

4. Curcumin Extraction

Curcumin is the main bioactive compound responsible for turmeric's color, antioxidant, and medicinal properties.

It is used in nutraceuticals, health supplements, and natural dyes.

Standard Extraction Process:

1. Drying and grinding of turmeric to fine powder.
2. Solvent extraction (commonly ethanol or acetone).
3. Filtration and evaporation of solvent to obtain crude extract.
4. Purification and crystallization to yield concentrated curcumin ($\geq 95\%$).

Industrial Use:

Curcumin commands a high export value due to its demand in natural health and pharmaceutical industries.

Establishing small-scale curcumin extraction units requires technical expertise and higher capital, best suited for cooperative or FPO-led ventures.

5. Innovative Turmeric-Based Products

Category	Examples	Potential Enterprise Type
Food Products	Turmeric tea, turmeric milk mix, turmeric pickle	SHG or micro -enterprise
Health & Wellness	Herbal capsules, immunity drinks, turmeric soap	FPO / Cooperative
Natural Dye & Cosmetics	Turmeric face pack, handmade soap, natural dye paste	Women's groups / cottage industry
Agro-industrial Uses	Turmeric extract for bio-preservatives and natural colorants	Medium -scale processing unit

Such diversification not only increases market options but also reduces dependence on raw rhizome sales.

6. Role of Women and SHGs in Value Addition

- Women's involvement in turmeric value chains in Kushinagar and nearby districts will ensure multiple benefits:
 - Formation of processing clusters and SHG-based units for grinding, packaging, and branding.

- Adoption of low-cost grinders, sealers, and labeling machines supported by livelihood programs.
- Participation in training on hygiene, quality standards, and FSSAI registration.
- Direct sales through local haats, exhibitions, and farmer markets under SHDA's facilitation.

This women-led model will strengthen the local rural economy and ensured equitable benefit sharing across the turmeric value chain.

7. Quality Standards and Safety

Product	Molsture (%)	Curcumin (%)	Other Quality Parameters
Dried rhizomes	≤10	2.5–4.0	Free from moulds and pests
Turmeric powder	≤8	3.0–4.5	Free from adulterants
Turmeric oil	—	—	Color: pale yellow; Aroma: characteristic
Curcumin extract	—	≥95	Purity confirmed by HPLC method

Compliance with **FSSAI** and **AGMARK** standards ensures market credibility and export readiness.

8. Pathway for Rural Enterprise Development

Stepwise Model for SHDA Villages:

1. Organize SHG-based processing centers at block level.
2. Facilitate common boiling–drying–polishing units for quality consistency.
3. Introduce village-level branding and packaging for turmeric powder.
4. Develop linkages with industrial buyers for oil and oleoresin.
5. Promote training and certification in food safety and product marketing.

Value addition and product diversification in turmeric offer tremendous opportunities for income enhancement and women's empowerment. By transforming raw rhizomes into powder, oil, oleoresin, and curcumin, farming communities can move up the value chain—from producers to processors and entrepreneurs.

The experience of SHDA in Kushinagar shows that community-level processing, women's participation, and FPO led marketing can make turmeric cultivation both profitable and sustainable.

Chapter 6

Economic and Social Impact Comparative Yield and Income: Before vs. After Interventions

A baseline study (February 2023) under the turmeric promotion project covered 1,020 farmers across 10 villages in Ramkola block, Kushinagar. The study assessed the existing status of turmeric cultivation in terms of area, yield, and income. Following two years of focused interventions—improved seed systems, capacity building, and market linkages—the project brought measurable progress in both productivity and profitability.

Key Results at a Glance

Indicator	Baseline (2023)	Achivement (2025)	Change (%)
No. of farmers	1,020	1,011	-0.9%
Area under turmeric (acres)	122.8	132.2	+7.7% (~8%)
Total production (qtls)	7,597	9,876	+30%
Average yield (qtls/acre)	59.9	74.6	+24.5% (~25%)
Average net income (₹/acre)	₹ 51,516	₹ 1,08,968	+111.5% (~112%)

The data highlights a significant leap in productivity and profitability. Yield increased by 25%, driven by the adoption of the *Rajendra Sonia* variety and scientific crop management. Net income doubled, mainly due to reduced input costs, better post-harvest handling, and collective marketing.

Factors Behind the Success

- **Improved Seed Systems** – Widespread adoption of the *Rajendra Sonia* variety led to uniform, high-quality produce.
- **Scientific Cultivation Practices** – Use of organic manures, balanced fertilizers, and efficient irrigation improved crop health.
- **Women's Participation** – Active involvement of women farmers in post-harvest processing added value and quality.
- **Market Integration** – Collective marketing and linkages with local traders enhanced price realization.

“Farmers in Ramkola have witnessed a 100% rise in income and a 25% rise in yield within just two years—proving that improved seeds, scientific practices, and value-chain integration can transform smallholder livelihoods.”

Employment Generation and Women's Economic Empowerment-

The turmeric initiative in Ramkola block has proven that agricultural development, when community-led and inclusive, can be a strong driver of rural employment and women's

empowerment. The introduction of the Rajendra Sonia variety and scientific crop management practices has not only improved yields but also expanded work opportunities within villages, ensuring that benefits reach every household, especially women.

Strengthening Rural Employment through Production Activities

Turmeric cultivation is a labor-intensive enterprise that generates employment across multiple stages of production. With improved seed quality, timely agronomic operations, and better crop management, the project has created a steady rise in on-farm labour demand.

Each acre of turmeric now requires 20–25 additional labour days compared to traditional crops such as wheat or paddy. Activities like *land preparation, sowing of seed rhizomes, organic manure application, weeding, earthing-up, irrigation, and harvesting* have provided substantial and regular work within the community.

These increased opportunities have particularly benefited landless labourers and smallholders, offering an assured income source during peak agricultural months.

Women as Key Contributors In Production

Women's participation has been integral at every stage of turmeric cultivation. From seed selection and bed preparation to weeding, irrigation, and harvesting, women have demonstrated remarkable efficiency and commitment. Their organized participation has been a major factor behind the high-quality crop output seen in project villages.

Many women farmers, previously limited to household or casual work, are now recognized as primary cultivators managing their own turmeric plots. Training and regular exposure on field management, nutrient use, and pest control have built strong technical confidence among them.

Gradual Entry into Post-Harvest Work

While large-scale processing is still in its early stages, women's involvement in *curing, drying, and cleaning* of turmeric has begun at the community level. These small but growing activities are helping women's groups develop new skills and are laying the foundation for future village-based value addition enterprises.

Empowerment Beyond Income

The project's most visible outcome has been the enhanced self-reliance of rural women. Income from turmeric cultivation is increasingly managed by women themselves, enabling them to contribute to family decisions on education, health, and household investments. Their growing confidence in agricultural leadership is transforming gender roles within farming households.

“Turmeric farming has given women farmers in Ramkola a new identity — not just as labourers, but as skilled cultivators contributing equally to their family income and community progress.”

Changes in Cropping Systems and Farmer Perception

A visible transformation in the farming landscape of Ramkola block has been the shift

from sugarcane to turmeric cultivation. Traditionally, sugarcane was the preferred crop owing to its assured market through local mills. However, delayed payments, rising labour costs, declining soil fertility, and heavy water requirements made it increasingly unsustainable for small and marginal farmers.

With the introduction of the Rajendra Sonia variety and scientific practices under the SHDA initiative, turmeric has emerged as a viable and profitable alternative. Farmers have realized that turmeric offers better economic returns with lower input costs and reduced risk of delayed payment. Its shorter crop duration and soil-enriching properties have also motivated many to diversify their cropping systems.

Comparative Input–Output Highlights

On average, turmeric cultivation requires nearly 25–30% lower input cost compared to sugarcane, especially in terms of irrigation, fertilizers, and labour. While sugarcane takes around 14–16 months to mature, turmeric completes its cycle within 8–9 months, allowing farmers to plan an additional short-duration crop or land rest.

Per-acre net income from turmeric has been observed at around ₹1.05–1.10 lakh, compared to ₹70,000–80,000 from sugarcane, with less dependency on external agents or mills for sale. Farmers also noted that turmeric's by-products and rhizome residues enhance soil organic matter, improving fertility for the next season.

This comparative advantage has gradually reshaped farmer perception. Turmeric is now seen not merely as a niche or experimental crop but as a mainstream, sustainable, and profitable option for smallholders. Farmers acknowledge its economic reliability, soil health benefits, and timely cash flow, marking a significant departure from the long-standing dependence on sugarcane.

“From sugarcane's long waiting period to turmeric's assured income — farmers in Ramkola are redefining sustainability through smart crop diversification.”

Chapter 7

Market Linkages and Value Chain Development Current marketing channels in Eastern Uttar Pradesh

1. Village-Level Traders and Local Aggregators

Village-level traders continue to be the most dominant marketing channel for turmeric in Eastern Uttar Pradesh. A majority of farmers sell their produce—either in fresh form or after rudimentary drying—directly to local traders soon after harvest. These traders operate at the village or block level and aggregate turmeric from multiple farmers before supplying it to larger markets or processors. The primary reason for farmers' dependence on this channel is the immediate availability of cash and the absence of alternative organized buyers in close proximity.

However, price determination in this channel is largely unilateral, with traders setting prices based on prevailing local demand, anticipated market trends, and visual assessment of quality. Farmers have limited access to price information and negligible bargaining power. Improved varieties and better agronomic practices rarely translate into higher prices, as turmeric is generally treated as an undifferentiated commodity.

2. Marketing through Small and Local Processing Units

A small proportion of turmeric produced in Eastern Uttar Pradesh is marketed directly to local processing units such as spice grinders, masala manufacturers, pickle producers, and ayurvedic or herbal product units. These buyers generally prefer dried turmeric with good colour and low moisture content, offering slightly better prices compared to local traders.

Despite this advantage, the scale of this marketing channel remains limited. Demand from local processors is irregular and volume-specific, making it unsuitable for absorbing large quantities of turmeric. Transactions are mostly informal, without long-term procurement arrangements, and farmers often lack the capacity to meet consistent quality and supply requirements.

3. Emerging Role of Farmer Producer Organisations (FPOs)

Farmer Producer Organisations and NGO-supported farmer collectives represent an emerging but still underdeveloped marketing channel for turmeric in Eastern Uttar Pradesh. Where FPOs are active, efforts are being made to aggregate turmeric collectively and negotiate better prices with traders or processors. This approach has demonstrated potential for improving farmers' share in the final price.

However, most FPOs face significant constraints due to inadequate post-harvest infrastructure. The absence of facilities for scientific boiling, drying, polishing, grading, and storage limits their ability to supply standardized, market-ready turmeric. Additionally, limited working capital and weak market linkages restrict their capacity to engage with bulk buyers or institutional markets at scale.

4. ODOP-Linked and Branded Turmeric Marketing

Under the One District One Product (ODOP) initiative, turmeric has received some attention in selected districts of Eastern Uttar Pradesh. The initiative has supported activities related to branding, packaging, participation in exhibitions, and promotion of turmeric powder and value-added products. These efforts have helped improve visibility of local turmeric in select markets.

Nevertheless, ODOP-linked turmeric marketing remains niche in nature. Production volumes are small, farmer participation is limited, and market access is largely confined to exhibitions and localized outlets. The initiative has yet to create a sustained and scalable marketing platform that directly benefits a large number of turmeric growers.

5. Direct-to-Consumer Marketing Initiatives

Direct-to-consumer marketing of turmeric is slowly emerging in Eastern Uttar Pradesh, primarily through weekly rural haats, local retail shops, and informal digital platforms such as WhatsApp-based sales. This channel allows farmers or collectives to capture higher margins by eliminating intermediaries and selling value-added products such as turmeric powder.

However, the reach of direct marketing remains limited due to challenges related to processing, packaging, branding, and compliance with food safety standards. Only a small number of progressive farmers or supported collectives are currently able to operate in this space, and volumes remain too small to significantly influence the broader turmeric market.

6. Overall Market Structure and Key Challenges

Overall, turmeric marketing in Eastern Uttar Pradesh remains largely commodity-driven and intermediary-dominated. The absence of organized procurement systems, limited processing and storage infrastructure, and weak quality-based pricing mechanisms constrain farmers' ability to realize better returns. Inter-state trade exists, but farmers rarely participate directly, with most value captured by traders and intermediaries.

Strengthening collective marketing systems, promoting community-level primary processing, and developing direct linkages with processors, brands, and institutional buyers are essential to transforming the turmeric value chain. Such interventions are critical for enabling turmeric farmers in Eastern Uttar Pradesh to move beyond subsistence-level marketing and achieve sustainable income enhancement.

7. Linking Market Constraints to SHDA's Achievements and Impact

SHDA's interventions have focused on strengthening the production base and farmer capacity as a prerequisite for market transformation. Through the promotion of improved turmeric varieties, scientific agronomic practices, integrated nutrient and pest management, and regular field-level training, SHDA has enabled farmers to achieve higher productivity, better crop uniformity, and improved quality.

These achievements have created a foundation for the next phase of impact, where collective marketing, primary processing, and value addition can be systematically introduced. By organizing farmers, building their technical and managerial capacities, and facilitating linkages with processors and markets, SHDA aims to transition turmeric

cultivation from a subsistence-oriented activity to a more commercially viable and income-enhancing livelihood option.

8. Policy and Development Perspective

From a policy and development standpoint, the turmeric value chain in Eastern Uttar Pradesh exhibits clear structural inefficiencies. The dominance of informal marketing channels, lack of quality-based pricing mechanisms, and limited post-harvest infrastructure constrain farmers' ability to integrate into organized markets. Regulated mandis have not emerged as effective platforms for turmeric due to low crop prioritization and the absence of standardized grading systems.

There is a strong case for targeted public and institutional investment in decentralized post-harvest infrastructure, promotion of FPO-led aggregation, and facilitation of direct market linkages with processors and institutional buyers. Convergence with schemes related to FPO promotion, ODOP, food processing, and rural livelihoods can play a catalytic role in strengthening the turmeric value chain.

In this context, SHDA's approach—combining improved production practices with collective action and market-oriented strategies—aligns well with broader policy objectives of enhancing farmer incomes, promoting value addition, and building resilient agri-based livelihoods in Eastern Uttar Pradesh.

Role of FPOs and SHGs In Aggregation and Collective Marketing

Farmer Producer Organisations (FPOs) and Self-Help Groups (SHGs) have the potential to play a transformative role in strengthening turmeric marketing systems in Eastern Uttar Pradesh, particularly in districts like Kushinagar where landholdings are small and production is highly fragmented. By aggregating produce from individual farmers, these collective institutions can overcome scale-related constraints that limit farmers' direct access to remunerative markets.

In the context of turmeric, aggregation through FPOs enables the pooling of dried turmeric fingers produced by member farmers, creating marketable volumes that attract traders, processors, and institutional buyers. Collective aggregation reduces transaction costs related to transport and marketing, enhances bargaining power, and allows for more transparent price discovery. Importantly, FPOs provide a platform for introducing basic quality standards related to moisture content, drying practices, and varietal uniformity—elements that are largely absent in individual farmer sales.

SHGs, particularly women-led groups, play a complementary role in the turmeric value chain. At the village level, SHGs are well positioned to undertake labour-intensive post-harvest activities such as cleaning, boiling, drying, polishing, grinding, and packaging of turmeric. Through collective action, SHGs can manage small-scale processing units and produce value-added products such as turmeric powder, thereby retaining a greater share of value within the community. This role is especially significant in enhancing women's participation and income from turmeric-based livelihoods.

The combined engagement of FPOs and SHGs strengthens vertical and horizontal integration within the turmeric value chain. While FPOs focus on aggregation, bulk marketing, and external market linkages, SHGs contribute through decentralized processing and value addition. Together, they enable traceability, branding, and gradual

movement towards quality-based marketing, which is essential for accessing premium markets.

However, the effectiveness of FPOs and SHGs in turmeric marketing depends on adequate institutional support. Key challenges include limited access to working capital, lack of post-harvest infrastructure, insufficient managerial capacity, and weak buyer linkages. Addressing these gaps through capacity building, infrastructure support, and convergence with government schemes and development programmes is critical.

In SHDA's intervention areas, strengthening FPO–SHG convergence is emerging as a strategic pathway for sustainable turmeric marketing. By organizing farmers into FPOs for aggregation and engaging SHGs for processing and value addition, SHDA aims to build inclusive, community-led marketing systems that enhance farmer incomes, promote women's economic empowerment, and ensure long-term sustainability of turmeric-based livelihoods.

Price realization and challenges

Price realization for turmeric farmers in Eastern Uttar Pradesh remains a critical concern and is shaped by a combination of market structure, timing of sale, and limited value addition. In most cases, farmers sell turmeric immediately after harvest, either in fresh or partially dried form, to meet urgent household cash requirements. This results in distress sales at prices that do not adequately reflect production costs, improvements in crop management, or varietal quality.

The absence of organized procurement systems and quality-based pricing mechanisms further constrains farmers' earnings. Turmeric is largely marketed as an undifferentiated commodity, with little or no premium for improved varieties, better colour, or higher curcumin potential. Farmers often lack access to reliable market information and depend on local traders for price signals, placing them in a weak negotiating position.

Seasonal price fluctuations present an additional challenge. Prices tend to be lowest during peak harvest periods, when market arrivals are high and farmers have limited storage options. Inadequate post-harvest infrastructure—such as scientific drying yards, storage facilities, and working capital—forces farmers to sell early rather than hold produce for better prices. Transport costs, commissions, and weight losses during drying further erode net returns.

Where collective marketing through FPOs and SHGs has been introduced, some improvement in price realization has been observed. Aggregation of dried turmeric allows for bulk sales and modest negotiation leverage, while primary processing and value addition through SHGs enable access to higher-value markets. However, these gains are often constrained by limited scale, inconsistent quality, and weak buyer linkages.

Overall, while turmeric cultivation holds significant income potential, price realization in Eastern Uttar Pradesh continues to be undermined by structural market challenges. Addressing these issues requires a combination of farmer aggregation, investment in post-harvest and processing infrastructure, access to working capital, and the development of stable market linkages. Improving price realization is therefore not only a marketing challenge but a key determinant of the sustainability and scalability of turmeric-based livelihoods.

Potential for branding Rajendra Sonia turmeric as a regional identity product

The promotion of the improved turmeric variety *Rajendra Sonia* in Eastern Uttar Pradesh, particularly in districts like Kushinagar, presents a strong opportunity for developing a region-specific branded product. Rajendra Sonia is known for its high yield potential, attractive colour, and suitability for processing, making it well aligned with emerging market preferences for quality turmeric and turmeric-based products. However, at present, these varietal advantages are not reflected in market prices, as turmeric continues to be sold largely as an undifferentiated commodity.

Branding Rajendra Sonia turmeric as a regional identity product can help bridge this gap between production quality and market value. With consistent cultivation practices promoted under SHDA's interventions, farmers are increasingly producing turmeric with uniform characteristics in terms of colour, finger size, and overall quality. This uniformity provides a critical foundation for branding, traceability, and quality assurance—key requirements for accessing premium retail and institutional markets.

There is significant potential to position Rajendra Sonia turmeric from Eastern Uttar Pradesh as a distinctive product linked to its agro-climatic conditions, traditional cultivation knowledge, and community-based production systems. Collective action through FPOs can enable aggregation of varietal-pure turmeric, while SHGs can support standardized processing, hygienic packaging, and local branding. Together, these institutions can ensure consistency and credibility, which are essential for building consumer trust.

Government initiatives such as ODOP, along with growing consumer demand for safe, traceable, and high-curcumin turmeric, further strengthen the case for regional branding. By developing a common brand identity—supported by quality protocols, basic certification, and storytelling around farmer collectives and women-led processing—Rajendra Sonia turmeric can move beyond bulk markets into niche and premium segments.

In the long term, branding Rajendra Sonia turmeric as a regional identity product has the potential to enhance price realization, reduce dependence on volatile commodity markets, and create recognition for Eastern Uttar Pradesh as a quality turmeric-producing region. For SHDA, this represents a strategic pathway to translate agronomic success into sustained market advantage and inclusive livelihood enhancement.

Strategies for linking with processors, spice companies, and e-commerce platforms

Strengthening market linkages with processors, organized spice companies, and e-commerce platforms is critical for moving turmeric farmers in Eastern Uttar Pradesh beyond local trader-dominated markets. For SHDA-supported turmeric clusters, these linkages represent an opportunity to ensure stable demand, better price realization, and sustained value addition.

Linkages with local and regional processors form the first and most immediate step. Small and medium spice processors, ayurvedic units, and masala manufacturers require consistent supplies of dried turmeric with uniform quality. FPOs can play a central role in aggregating varietal-pure Rajendra Sonia turmeric and supplying it in bulk, while

adhering to agreed quality parameters such as moisture content, colour, and cleanliness. Entering into forward purchase agreements or informal supply arrangements with processors can help farmers reduce market uncertainty and price volatility.

Engagement with established spice companies requires a more structured approach. These companies typically seek traceability, consistency, and compliance with basic food safety standards. SHDA can facilitate this process by supporting FPOs in developing quality protocols, batch-wise aggregation, and simple documentation systems. SHG-led processing units can contribute by ensuring standardized drying, grinding, and packaging practices. Pilot supplies and sample-based negotiations can serve as entry points for longer-term partnerships.

E-commerce platforms offer an emerging but promising channel for value-added turmeric products, particularly turmeric powder. This strategy is best suited for branded products produced through SHG-managed processing units under FPO coordination. Linking with e-commerce platforms requires attention to packaging, labelling, shelf-life, pricing, and logistics. While volumes may initially be modest, online platforms can help build brand visibility, access urban consumers, and test market response without heavy dependence on intermediaries.

Across all three channels, phased engagement is essential. Initial efforts should focus on local and regional buyers, gradually expanding to organized companies and digital platforms as volumes, quality consistency, and institutional capacity improve. Capacity building in negotiation, contract management, working capital access, and compliance will be key to sustaining these linkages.

For SHDA, facilitating these market connections is not merely a commercial activity but a strategic intervention to integrate farmers into higher-value segments of the turmeric value chain. By systematically linking FPOs and SHGs with processors, spice companies, and e-commerce platforms, SHDA can help ensure that gains achieved in production translate into durable income enhancement and market resilience.

Chapter 8

Comparative Analysis with Established Turmeric Hubs **Overview of Erode, Sangli, Nizamabad, Kandhmaland Meghalaya models**

Learning from Established Turmeric Hubs in India: Comparative Market and Processing Models

Across India, turmeric production systems have evolved into distinct regional hubs, each shaped by its market structure, processing intensity, institutional arrangements, and quality orientation. A comparative understanding of these models—Erode (Tamil Nadu), Sangli (Maharashtra), Nizamabad/Armoor (Telangana), Kandhmal (Odisha) and Lakadong (Meghalaya)—offers valuable insights for emerging turmeric regions such as eastern Uttar Pradesh.

Erode (Tamil Nadu): Processing-Led Commercial Hub

Erode represents India's most mature, volume-driven turmeric economy, anchored in dense clusters of private processing units and a strong trader ecosystem. The market is dominated by local traders and commission agents, alongside small and medium processors engaged in boiling, drying, polishing, powdering, and occasionally curcumin extraction. Farmers in this system largely participate as suppliers of cured dry turmeric, with limited influence over branding or downstream value addition.

Price realisation in Erode is closely linked to processing quality and lot uniformity rather than varietal differentiation alone. Average-quality dry turmeric typically trades in the ₹70–90/kg range, while well-processed, uniform lots fetch ₹100–130/kg. Premiums are available for curcumin-tested or specialty lots, though these are mostly accessed by organised buyers. The processing infrastructure is decentralised but dense, consisting of village- or cluster-level boiling drums, drying yards or solar dryers, polishing drums, grinders, and basic grading equipment.

The Erode model demonstrates how processing density and an active trader network can drive large volumes and liquidity. However, quality inconsistency and farmer dependence on intermediaries limit collective bargaining power and long-term price stability.

Sangli (Maharashtra): Aggregation and Cluster-Based Market Power

Sangli illustrates a more institutionally organised turmeric economy, where aggregation through Farmer Producer Organisations (FPOs) and cluster-based Special Purpose Vehicles has reshaped market dynamics. Farmers are members of organised collectives that negotiate with large wholesale traders, processors, exporters, and institutional buyers, resulting in improved price discovery and reduced volatility.

Bulk commercial turmeric in Sangli typically trades between ₹75–95/kg, while cluster-aggregated and graded lots command ₹95–120/kg. Export-quality consignments can exceed ₹120/kg. The backbone of this model is the Common Facility Centre (CFC), often supported by government cluster schemes. These centres house improved boiling

tanks, mechanical dryers, polishing and grading machines, bulk storage godowns, and basic laboratory facilities for moisture and colour testing.

The Sangli experience underscores that institutional aggregation and scale can be more impactful than individual farm-level processing. Organised volumes, standardised quality, and collective negotiation significantly enhance farmer market power.

Nizamabad / Armoor (Telangana): Research–Extension-Driven Quality Improvement

The turmeric belt of Nizamabad and Armoor is characterised by strong linkages between farmers, agricultural research institutions, and extension systems. Here, productivity and quality improvements stem primarily from the adoption of improved varieties and standardised curing practices rather than large-scale processing infrastructure.

Farmers are active participants in technology adoption, supported by research stations and, in some cases, NABARD-backed FPOs. Traders and processors increasingly source quality-specific lots, reflecting growing recognition of the impact of scientific curing and moisture control. Standard dry turmeric prices remain in the ₹70–90/kg range, but research-linked quality lots can fetch ₹95–115/kg. Premiums linked to geographical identity or branding are emerging, though not yet consistent.

Processing infrastructure in this region is less dense than in Erode or Sangli, but technically more guided. Village-level setups typically include improved curing units, controlled drying platforms, small polishing units, and access to testing laboratories through research institutions. This model demonstrates that income gains are possible through better agronomy and post-harvest practices without necessarily expanding cultivated area.

Meghalaya (Lakadong): Niche, Premium, Identity-Based Hub

The Lakadong turmeric system of Meghalaya represents a fundamentally different pathway—one that prioritises quality identity, traceability, and premium positioning over scale. The market is anchored in cooperatives and producer groups, often supported by state marketing agencies, with strong links to organic buyers, premium spice brands, and e-commerce platforms.

Farmers are custodians of a naturally high-curcumin variety and operate within a strong collective identity framework. Raw Lakadong turmeric commands prices between ₹120–180/kg, while certified and branded turmeric powder can achieve retail-equivalent values of ₹250–400/kg. Processing infrastructure is deliberately small-scale but quality-focused, incorporating low-temperature boiling units, solar or controlled dryers, hygienic polishing systems, and small grinders with packaging facilities.

The Lakadong model highlights the potential of niche, high-value markets that reward discipline, traceability, and collective branding. However, limited scale and high quality compliance requirements constrain rapid expansion.

Kandhamal (Odisha): GI-Anchored, Tribal and Institution-Led Turmeric Hub

Kandhamal represents a distinct institutional–identity–driven turmeric model, rooted in

tribal livelihoods, geographical indication (GI) protection, and cooperative marketing. Unlike volume-oriented hubs, the Kandhamal system emphasises quality assurance, collective ownership, and ethical market positioning, making it a nationally recognised example of inclusive value chain development.

Turmeric cultivation in Kandhamal is dominated by small and marginal tribal farmers, many of whom practise low-input or near-organic farming by default. The GI tag for *Kandhamal Haladi* has played a catalytic role in creating market recognition, enabling producers to differentiate their turmeric based on origin, colour intensity, and aroma rather than sheer volume.

Price realisation for Kandhamal turmeric reflects this differentiated positioning. Raw dry turmeric generally trades in the range of ₹90–130/kg, while GI-labelled, certified, or institutionally marketed turmeric powder fetches ₹180–300/kg, depending on quality grade, branding, and market channel. Premiums are strongest when sales are routed through cooperatives, FPOs, or state-supported marketing platforms rather than open trader markets.

Processing infrastructure in Kandhamal is community-owned and institutionally managed, often supported by government and development agencies. Common Facility Centres house scientific boiling units, solar or mechanical dryers, polishing machines, grinders, and hygienic packaging units. Importantly, processing is tightly linked with quality protocols, traceability, and batch-level aggregation to protect the GI identity.

The Kandhamal model demonstrates that geographical identity, strong institutions, and public investment can compensate for remoteness and limited scale. However, it also shows that GI-based systems require continuous governance, compliance, and market stewardship to prevent dilution of quality and brand value.

Cross-Cutting Insights

Together, these models reveal that no single pathway defines success in turmeric value chains. Erode demonstrates the power—and inherent limits—of processing-led commercialisation driven by dense infrastructure and trader networks. Sangli highlights the stabilising role of institutional aggregation, where collective scale and organised market engagement enhance farmer bargaining power. Nizamabad underscores the importance of strong research–extension linkages in improving productivity and quality through scientific varietal selection and standardised post-harvest practices. Meghalaya illustrates how identity-driven, premium markets, anchored in high-curcumin varieties and disciplined collective branding, can dramatically raise value per unit even at smaller scales. Kandhamal further enriches this landscape by showing how geographical indication (GI), community-owned institutions, and public investment can convert a remote, tribal production system into a nationally recognised, trust-based turmeric brand.

For emerging turmeric regions, the strategic challenge lies in selectively combining these lessons—building processing capacity without sacrificing quality (Erode), strengthening farmer institutions and collective market negotiation (Sangli and Kandhamal), leveraging research and extension partnerships for consistent quality enhancement (Nizamabad), and exploring differentiated or premium market segments where agro-ecological

conditions and social organisation permit (Meghalaya and Kandhamal). The most resilient turmeric economies are those that balance scale with quality, commercial efficiency with institutional strength, and market access with local identity.

Cross-Hub Comparison (Diagnostic Summary)

Dimension	Erode	Sangli	Nizamabad	Meghalaya	Kandhamal
Core strength	Processing density	Aggregation & markets	Research linkage	Premium identity	GI + institutional identity
Farmer organisation	Weak	Strong	Moderate	Strong	Strong (cooperatives/FPOs)
Price driver	Volume + traders	Scale + collectives	Quality practices	Curcumin & branding	GI, trust & traceability
Processing scale	High, fragmented	Cluster-level	Village-level	Small, premium	Community -owned CFCs
Market orientation	Domestic bulk	Domestic & export	Domestic quality markets	Niche & organic	Ethical, GI & institutional markets
Replicability in Kushinagar	Medium	High	High	Selective	Selective (institution-led)

Implications for Kushinagar (Why this matters)

- **What Kushinagar should borrow**
- **From Erode:** Decentralised, village- or cluster-level processing units (boiling, drying, polishing) to reduce distress sales and improve basic value addition at the local level.
- **From Sangli:** Strong FPO-led aggregation, collective storage, and organised market negotiation to improve price discovery and reduce trader dependence.
- **From Nizamabad:** Research-backed varietal selection, scientific curing, and moisture management protocols, supported through continuous extension services.
- **From Meghalaya:** Selective premium positioning for a limited segment of farmers and lots, focusing on quality differentiation rather than scale-based expansion.
- **From Kandhamal:** Institution-led branding and community-owned processing infrastructure, with emphasis on traceability, standard protocols, and place-based identity to build long-term market trust.

This blended approach allows Kushinagar to pursue scale with stability, quality with credibility, and market growth without excluding smallholders—avoiding over-reliance on any single model while building a resilient turmeric value chain.

Indicative Equipment List for a Kushinagar Village-Level Unit

(Replicable, donor- and govt-friendly)

- Boiling tanks (2–3 units)
- Solar / improved drying system
- Polishing drum
- Grinder (optional in early phase)
- Moisture meter & weighing scales
- Packaging tools (later phase)

Designed to serve 50–100 farmers per unit, scalable over time.

Lessons Applicable to Kushinagar (Eastern Uttar Pradesh)

1. Processing must be local, but professionally managed Lesson from Erode

Erode shows that farmers gain only when processing (boiling, drying, polishing, grinding) happens close to production—but with **standard protocols**.

Application in Kushinagar

- Establish 2–3 decentralised village-level processing units (not many small ad-hoc machines).
- Introduce uniform SOPs for boiling duration, drying moisture (<8–9%), polishing and grading.
- SHDA can manage quality control through trained youth or SHG members.

Why this matters

Without quality consistency, Kushinagar turmeric will remain a low-price raw commodity.

2. Aggregation through institutions, not individuals Lesson from Sangli

Strong FPOs/cluster SPVs enable aggregation, bargaining power, and access to schemes.

Application in Kushinagar

- Route turmeric marketing only through SHGs/FPOs, not individual sales.
- Create a single district-level aggregation window during peak season.
- Start with informal aggregation → evolve into an FPO-led marketing entity.

Why this matters

Fragmented selling keeps prices suppressed and blocks entry to bulk buyers.

3. Variety selection + post-harvest decide income more than acreage Lesson from Nizamabad

Research-backed varieties and extension support improved recovery and quality.

Application in Kushinagar

- Continue with Rajendra Sonia, but standardise seed quality and spacing.
- Partner with KVK / SAU for trials on:
 - o Dry recovery percentage
 - o Colour retention
 - o Curcumin content

- Train farmers on curing and drying—not just cultivation.

Why this matters

Even with good yields, poor curing can reduce farmer income by 15–25%.

4. Don't chase GI immediately—build quality identity first

Lesson from Meghalaya (Lakadong)

Lakadong succeeded because quality and traceability came *before* branding.

Application in Kushinagar

- First build a “Kushinagar Clean Turmeric” identity (quality-led, not GI-led).
- Focus on: uniform colour, low moisture, clean processing, traceable batches.
- GI or regional branding can be explored after 3–4 seasons of consistency.

Why this matters

Premature branding without quality damages credibility and buyer trust.

5. Institutions must protect quality, not just facilitate sales

Lesson from Kandhamal

Kandhamal demonstrates that quality-linked institutions, not markets alone, sustain long-term price premiums. The GI tag worked only because cooperatives and FPOs controlled processing, enforced protocols, and safeguarded traceability. Where institutional discipline weakened, premiums eroded.

Application in Kushinagar

- Build institution-owned processing and branding systems, not trader-anchored ones.
- Define and enforce batch-level traceability (village → processing unit → buyer).
- Assign SHGs/FPOs responsibility for quality compliance, grading decisions, and market routing.
- Engage government schemes and development partners to support community-managed Common Facility Centres, not private monopolies.

Why this matters

Without strong institutions acting as quality custodians, any premium positioning—whether district branding or future GI—will collapse under market pressure and side-selling.

6. Premium niche is possible—but only for a subset of farmers Lesson from Lakadong

Not all farmers need to be in premium markets.

Application in Kushinagar

- Identify 15–20% progressive farmers for premium segments (organic / residue-free).
- Remaining farmers can supply bulk markets with improved quality.
- SHDA can manage dual market strategy: bulk + premium.

Why this matters

Trying to push all farmers into premium markets increases risk and exclusion.

7. Price stability comes from relationships, not spot markets

Lesson from Sangli & Erode

Long-term buyers reduce price volatility.

Application in Kushinagar

- Develop 2–3 assured buyers (regional processors, spice brands, bulk traders).
- Start with informal MoUs rather than rigid contracts.
- Use SHDA as a neutral facilitator in the first 2 seasons.

Why this matters

Spot-market dependence exposes farmers to sudden price crashes.

8. Women's collectives are ideal for turmeric value addition

Cross-cutting lesson

Across hubs, grading, polishing and packing are labour-intensive but skill-based.

Application in Kushinagar

- Assign SHGs responsibility for:
 - Sorting and grading
 - Packaging
 - Record-keeping and traceability
- Pay service charges to SHGs, creating non-farm income for women.

Why this matters

Turmeric offers one of the strongest entry points for women-led agri-enterprises.

9. Scale gradually: “proof before expansion”

Lesson across all hubs

Every successful hub scaled after 2–3 years of consolidation.

Application in Kushinagar

- Year 1–2: quality, processing, aggregation
- Year 3: branding, external buyers, packaging
- Year 4+: diversification (powder, blends, institutional buyers)

Why this matters

Fast scaling without systems leads to collapse and farmer distrust.

“For Kushinagar, the turmeric opportunity lies not only in acreage expansion, but also in organised aggregation, local processing, and quality-led market integration—learning from India's leading turmeric hubs.”

From Potential to Hub: Strategic Pathways for Building Kushinagar as a Sustainable Turmeric Region

Lessons, Pathways, and the Critical Role of Donors and Government

India's established turmeric hubs in Erode (Tamil Nadu), Sangli (Maharashtra), and Nizamabad (Telangana) demonstrate that successful turmeric regions are not built merely on high acreage or production volumes. Rather, they emerge through long-term investments in quality, processing infrastructure, institutional aggregation, research linkages, and market integration. Kushinagar district of Eastern Uttar Pradesh, with its favourable agro-climatic conditions, availability of labour, and SHDA's proven grassroots engagement, presents a similar—yet currently under-realised—opportunity to evolve into a regionally significant turmeric hub.

From Production Geography to Value Geography

In South Indian hubs, turmeric has transitioned from being a subsistence crop to a value-oriented commodity, supported by:

- Dense local processing ecosystems (Erode),
- Organised aggregation and cluster-based marketing (Sangli), and
- Research-backed varietal improvement and quality enhancement (Nizamabad).

Kushinagar today stands at a comparable inflection point. While farmers have successfully adopted improved varieties such as *Rajendra Sonia* and achieved yield gains, value capture remains limited due to fragmented post-harvest handling, weak aggregation, and dependence on spot markets. Bridging this gap requires strategic external support, where donors and government act as enablers rather than mere financiers.

The Strategic Role of Donor Agencies

Donor agencies—particularly foundations, CSR initiatives, and bilateral development partners—play a pivotal early-stage role in hub development, as evidenced in South Indian clusters. In the context of Kushinagar, donor support can be most transformative in the following areas:

1. De-risking Early Investments

- Funding decentralised processing units (boiling, drying, polishing, grinding) at the village or cluster level.
- Supporting quality-control systems, moisture testing, and grading protocols that farmers cannot initially afford.

This mirrors the catalytic investments that enabled Erode's processing ecosystem to emerge.

2. Institution Building and Capacity Development

- Strengthening SHGs and FPOs to function as aggregation and marketing institutions.
- Supporting professional management, accounting systems, and compliance capacity within farmer collectives.

Such investments allow community institutions in Kushinagar to evolve into entities capable of negotiating with bulk buyers and processors—similar to Sangli's cluster SPVs.

3. Market Linkage Pilots

- Supporting pilot contracts with processors, spice companies, and institutional buyers.
- Enabling branding, packaging, and traceability trials before commercial scaling.

Donors can absorb early risks in market experimentation, enabling farmers to move beyond raw produce sales.

The Enabling Role of Government

While donors catalyse innovation, government support is indispensable for scale, sustainability, and legitimacy. Lessons from South Indian turmeric hubs underline the importance of coordinated public investment, which can be strategically deployed in Kushinagar through:

1. Infrastructure and Cluster Development

- Recognition of Kushinagar as a **potential turmeric cluster** under state or central schemes.
- Convergence of resources for common facility centres (CFCs), storage, and logistics infrastructure.

2. Research, Extension, and Quality Enhancement

- Formal partnerships with KVKs, State Agricultural Universities, and ICAR institutions for varietal trials, curcumin testing, and post-harvest training.
- Integration of turmeric-specific advisory services into extension systems.

This mirrors the Nizamabad model, where research–farmer linkages significantly improved quality outcomes.

3. Policy Convergence and Scheme Alignment

- Aligning turmeric promotion with existing schemes related to FPO promotion, agri-processing, MSMEs, and women's livelihoods.
- Facilitating access to credit, subsidies, and certification mechanisms for farmer collectives.

Government support at this stage ensures that gains achieved through donor-funded pilots are institutionalised and expanded.

SHDA as the Bridging Institution

A defining feature across successful turmeric hubs is the presence of a strong intermediary institution that bridges farmers, markets, donors, and the state. In Kushinagar, SHDA is uniquely positioned to play this role, given its long-term presence, trust with communities, and experience in turmeric promotion.

SHDA's role includes:

- Anchoring community institutions (SHGs/FPOs),
- Ensuring quality discipline across the value chain,

- Facilitating convergence between donor investments and government schemes, and
- Translating field learnings into scalable models.

A Phased Pathway to a Kushinagar Turmeric Hub

Transforming Kushinagar into a turmeric hub is not an immediate outcome but a phased process, much like the evolution of South Indian hubs:

- **Phase I (Foundation):** Quality standardisation, decentralised processing, aggregation.
- **Phase II (Consolidation):** Market linkages, buyer relationships, institutional strengthening.
- **Phase III (Expansion):** Branding, diversification, and regional recognition.

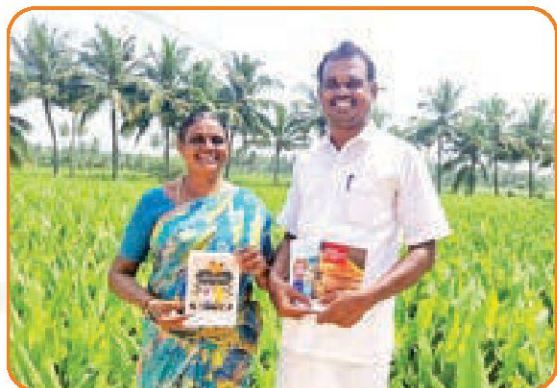
Each phase requires complementary donor and government support, coordinated through SHDA's implementation and facilitation role.

Conclusion: A Shared Investment In Regional Transformation

The experience of South Indian turmeric hubs demonstrates that regional agri-livelihood transformation is possible when community initiative is matched by sustained institutional support. Kushinagar possesses the ecological potential, farmer interest, and implementation capacity to follow a similar trajectory.

What is now required is intentional and intensive support from donor agencies and government, not as parallel actors, but as partners in a shared vision—to transform Kushinagar from a turmeric-growing district into a recognised turmeric hub of Eastern India, delivering resilient incomes, women-led enterprises, and inclusive rural growth.

Snapshots from major turmeric growing regions in India including Kushinagar



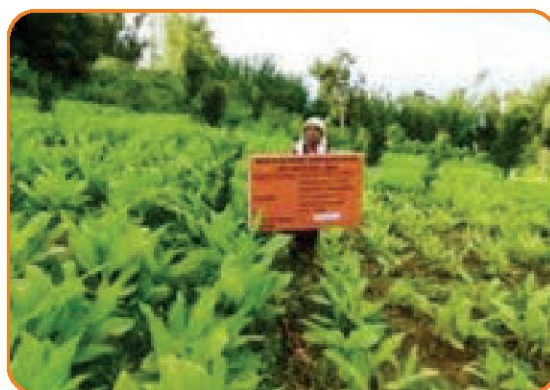
**Turmeric plot in Erode region- Google image
(Indo-German Biodiversity Program)**



**Turmeric plot In Nizamabad region-
Google image (The news minute.avif)**



**Turmeric plot In Sangli region-
Google Image (The Hindu)**



**Turmeric plot In Meghalaya region-
Google image (The Organic Magazine)**



**Turmeric plot in Kandhamal region-
Google image (India Together)**



**Turmeric plot in Kushinagar region
(from SHDA field)**

Chapter 9

Institutional Support and Policy Environment

Government Schemes Supporting Turmeric Cultivation and Entrepreneurship

The Government of India and state governments have launched several targeted schemes to promote horticulture, spice cultivation, and agri-entrepreneurship, which directly benefit turmeric farmers and entrepreneurs in regions like Kushinagar. These initiatives provide financial assistance, technical support, and market linkages, thereby enhancing productivity, value addition, and income generation. Key schemes include:

1. National Horticulture Mission (NHM)

The NHM provides comprehensive support for the development of horticulture crops, including turmeric. Assistance is available for the establishment of new turmeric gardens, high-density planting, irrigation, soil health management, and post-harvest infrastructure. Subsidies are provided for setting up processing units, storage facilities, and marketing support.

2. Spice Board India Programs

Turmeric, being a major spice crop, falls under the purview of the Spice Board of India. The Board offers schemes for quality improvement, integrated pest management, organic certification, and branding. Financial assistance is provided for spice processing units, packaging, and value-added product development, helping farmers move up the value chain.

3. Paramparagat Krishi Vikas Yojana (PKVY) / Organic Farming Schemes

Under PKVY and related organic farming initiatives, turmeric farmers are encouraged to adopt sustainable and chemical-free practices. The schemes provide financial support for organic certification, bio-inputs, and capacity-building programs, enhancing market access and premium pricing for certified organic turmeric.

4. Pradhan Mantri Fasal Bima Yojana (PMFBY)

Crop insurance under PMFBY mitigates the risks associated with crop failure due to pests, diseases, or extreme weather. Turmeric farmers can secure coverage for their crops, ensuring financial stability and reducing vulnerability to climatic uncertainties.

5. Rashtriya Krishi Vikas Yojana (RKVY)

RKVY supports innovative and state-specific agricultural interventions. Farmers and farmer groups cultivating turmeric can access funds for irrigation systems, farm mechanization, training programs, and market linkage initiatives, promoting efficient and profitable cultivation practices.

6. Micro, Small and Medium Enterprises (MSME) Support Schemes

Entrepreneurs processing turmeric into value-added products can benefit from

MSME schemes, which offer financial assistance for setting up processing units, upgrading machinery, working capital, and marketing support. Schemes such as the Credit Linked Capital Subsidy Scheme (CLCSS) and Prime Minister's Employment Generation Programme (PMEGP) are particularly relevant.

These government schemes collectively create an enabling environment for turmeric farmers and entrepreneurs by reducing input costs, improving productivity, enhancing product quality, and facilitating access to markets. Strategic utilization of these programs can significantly strengthen the turmeric value chain in Kushinagar, fostering economic resilience and livelihood improvement.

Role of research institutions (ICAR, universities)

Research institutions, including the Indian Council of Agricultural Research (ICAR) and state agricultural universities, play a pivotal role in strengthening turmeric cultivation and entrepreneurship. Their interventions span from developing improved varieties to providing scientific guidance and technical support to farmers and entrepreneurs.

1. Development of Improved Varieties:

ICAR and affiliated universities focus on breeding high-yielding, disease-resistant, and quality turmeric varieties suited to diverse agro-climatic conditions. These improved varieties increase productivity, ensure consistent quality, and enhance farmers' income potential.

2. Crop Management and Technology Transfer:

Research institutions generate and disseminate best practices for soil management, nutrient application, pest and disease control, and sustainable cultivation techniques. Demonstration trials and farmer field schools help translate scientific knowledge into practical, farm-level solutions.

3. Post-Harvest Technology and Value Addition:

ICAR and universities support research on processing, storage, and value addition of turmeric. This includes guidance on grading, drying, powdering, and extraction of bioactive compounds, enabling farmers and small-scale entrepreneurs to enhance product quality and market competitiveness.

4. Capacity Building and Training:

Research institutions organize training programs, workshops, and extension activities for farmers, women self-help groups, and young entrepreneurs. These initiatives strengthen technical knowledge, encourage adoption of modern practices, and foster innovation in turmeric-based businesses.

5. Market-Oriented Research:

Through studies on quality standards, consumer preferences, and supply chain optimization, research institutions provide critical insights to improve market linkages. This helps farmers and processors align production with demand, ensuring better prices and sustainable livelihoods.

Impact:

By integrating scientific research with on-ground interventions, ICAR and universities play

a key role in transforming turmeric cultivation from traditional practices to a more efficient, profitable, and market-oriented enterprise. Their expertise underpins the long-term growth of the turmeric sector, particularly in emerging regions like Kushinagar.

Collaboration with Krishi Vigyan Kendras (KVKs)

Krishi Vigyan Kendras (KVKs) serve as vital grassroots-level agricultural extension centers, bridging the gap between research institutions and farmers. By collaborating with KVKs, turmeric farmers and entrepreneurs in regions like Kushinagar gain access to practical knowledge, hands-on training, and technology demonstrations that are tailored to local agro-climatic conditions.

1. Technology Demonstration and On-Farm Trials:

KVKs conduct on-farm trials of improved turmeric varieties, cultivation techniques, and integrated pest and nutrient management practices. These demonstrations allow farmers to observe benefits first hand and adopt innovations with confidence.

2. Farmer Training and Capacity Building:

Through workshops, training programs, and farmer field schools, KVKs impart skills on modern turmeric cultivation, post-harvest handling, value addition, and quality management. Special programs are also conducted for women self-help groups and young entrepreneurs to promote inclusive participation in turmeric enterprises.

3. Extension Support and Advisory Services:

KVKs provide continuous advisory services, including soil testing, disease and pest diagnostics, and crop management guidance. This hands-on support helps farmers optimize input use, improve yields, and reduce production risks.

4. Linkages with Research and Market:

KVKs act as conduits between research institutions (like ICAR and universities) and farmers, ensuring that innovations reach the field quickly. They also facilitate connections with local markets, cooperatives, FPOs and government schemes, enabling farmers and small-scale processors to enhance income and profitability.

Impact:

Collaborating with KVKs strengthens the practical adoption of scientific innovations, promotes sustainable turmeric cultivation, and empowers farmers and entrepreneurs with knowledge and market linkages. Their role is critical in translating research into tangible benefits for the turmeric value chain at the village and block levels.

Financing and Credit Linkages for Turmeric Entrepreneurs

Access to finance is a key enabler for turmeric entrepreneurs, enabling them to invest in quality inputs, processing infrastructure, value addition, and market expansion. Both government-backed and institutional financing mechanisms provide critical support to farmers, women entrepreneurs, and small-scale processors in regions like Kushinagar.

1. Bank Credit and Priority Sector Lending:

Commercial banks and regional rural banks extend credit to turmeric cultivators and processors under priority sector lending, offering working capital and term loans at subsidized rates. These loans cover expenses such as planting material, irrigation

systems, farm machinery, and post-harvest processing units.

2. Government Subsidy-Linked Programs:

Schemes such as Pradhan Mantri Mudra Yojana (PMMY) and Prime Minister's Employment Generation Programme (PMEGP) provide subsidized credit and financial support for setting up small-scale turmeric processing enterprises. Entrepreneurs can access collateral-free loans for equipment, packaging, and marketing.

3. NABARD Support and Cooperative Financing:

The National Bank for Agriculture and Rural Development (NABARD) offers refinancing, microfinance linkages, and capacity-building support to farmer producer organizations (FPOs) and self-help groups engaged in turmeric production and processing. Cooperative banks and FPOs also act as facilitators for collective credit access.

4. Venture Capital and Agri-Entrepreneurship Funds:

Some state governments and financial institutions provide venture capital or seed funding for innovative turmeric-based startups, particularly for value-added products like turmeric powder, extracts, and nutraceuticals. These schemes encourage entrepreneurship and market-driven expansion.

5. Strengthening Financing and Credit Linkages for Turmeric Entrepreneurs In Kushinagar & Eastern Uttar Pradesh

Kushinagar district and adjoining Eastern Uttar Pradesh are emerging as a promising turmeric production belt, driven by adoption of improved varieties like Rajendra Sonia and increasing farmer interest in commercial cultivation. However, limited access to affordable finance for cultivation, primary processing, storage, value addition, and working capital remains a major constraint. Strengthening institutional financing and structured credit linkages can significantly accelerate enterprise growth, farmer income, and regional economic development.

Current Financing Ecosystem

Institutional credit is available through commercial banks (SBI, BOB, Union Bank, Central Bank), Regional Rural Banks (Purvanchal Gramin Bank), cooperative banks, and NABARD. Key instruments include Kisan Credit Cards, term loans, working capital finance, and NABARD refinancing. However, uptake remains restricted due to documentation barriers, limited enterprise preparedness, and lack of structured DPR-based financing.

Quantified Credit Needs Across the Value Chain

1. Cultivation & Seed Production

- Investment: ₹65,000–₹80,000 per acre
- Credit need: ₹60,000–₹1 lakh per acre (KCC / crop loan)
- Interest: ~4–7% with subvention
- Repayment: Single installment post-harvest (10–12 months)

2. Primary Processing & Value Addition Units

- Micro units: ₹6–10 lakh
- Medium units: ₹15–25 lakh
- Semi-automated units: ₹35–50 lakh
- Tenure: 5–7 years | EMI: ₹32,000–₹40,000/month for ₹20 lakh loan
- Schemes: PMFME, PMEGP, AIF, CGTMSE

3. Storage & Drying Infrastructure

- Solar dryers: ₹3–6 lakh
- Mechanical dryers: ₹8–15 lakh
- Godowns (100 MT): ₹18–25 lakh
- Schemes: Agri Infrastructure Fund, NABARD support, bank term loans

4. FPO & Cluster-led Investments

- FPO cluster enterprises: ₹40 lakh–₹1.5 crore
- Financing mix: Equity + subsidy + term finance + working capital

Key Policy Opportunities

- Promote AIF-backed infrastructure finance for drying, storage, and primary processing
- Expand PMFME support for micro and small turmeric enterprises
- Encourage FPO-based collective financing models with SFAC/NABARD support
- Enable buy-back and anchor-led financing partnerships with spice companies
- Promote warehouse receipt financing and digital lending innovations

Credit Plus Support Requirements

- Enterprise development training
- Financial literacy and bank documentation support
- DPR preparation assistance
- Support for FSSAI, Udyam, GST compliance
- Insurance and risk mitigation products

Role of SHDA and Institutional Partners

SHDA can catalyze the ecosystem by:

- Identifying bankable entrepreneurs and preparing DPRs
- Facilitating linkages with PMFME, PMEGP, and AIF
- Supporting loan mobilization through district-level coordination
- Strengthening FPO-led business planning and enterprise financing

Indicative Outcomes in 2–3 Years

- 500–700 farmers annually accessing crop finance

- 10–20 micro and small enterprises financed per year
- 2–3 FPO-led processing units operational

₹10–₹25 crore annual institutional credit flow into the turmeric value chain

Impact:

Through these financing and credit linkages, turmeric entrepreneurs can enhance productivity, invest in processing and value addition, and strengthen market engagement. Adequate financial access not only improves individual livelihoods but also supports the broader development of a sustainable turmeric value chain in regions like Kushinagar.

Structured financing, aligned subsidies, and strong institutional facilitation can transform Kushinagar and Eastern UP into a competitive turmeric enterprise ecosystem—ensuring higher farmer incomes, local employment generation, and sustainable rural economic growth.

Chapter 10

Way Forward for Developing Kushinagar as a Turmeric Hub: A Cluster-Based and Value Chain Roadmap

- Strategic roadmap for scaling up
- Cluster-based development approach
- Strengthening seed systems and value chain infrastructure
- Branding and GI-tagging possibilities
- Integration with rural entrepreneurship

Strategic Roadmap for Scaling Up

Kushinagar has emerged as one of the most promising regions in Eastern Uttar Pradesh for turmeric-based livelihood development, owing to its suitable agro-climatic conditions, increasing farmer interest, and demonstrated success of improved varieties such as Rajendra Sonia. Building on the progress already achieved, there is a clear opportunity to transform Kushinagar into a recognized Turmeric Hub through a structured, phased, and well-supported roadmap that integrates production enhancement, value addition, institutional strengthening, and market integration.

The first pillar of the roadmap focuses on expanding area and productivity through systematic promotion of high-yielding and disease-resistant varieties, improved agronomic practices, quality seed systems, and farmer capacity building. Emphasis will be placed on establishing seed villages, encouraging scientific crop management, and ensuring reliable access to extension services through KVKs, agricultural universities, and technical agencies. Strengthening the knowledge base of farmers will help shift from subsistence cultivation to commercially oriented turmeric farming.

The second pillar is value chain development, moving beyond raw turmeric production to comprehensive primary and secondary processing. Establishing decentralized boiling, drying, polishing, storage, and grading facilities at village and cluster levels will reduce post-harvest losses and improve product quality. Promotion of micro, small, and medium enterprises (individual and FPO-led) for turmeric powder, seed turmeric, processed products, and branded consumer packs will drive value addition and employment generation. Access to financial support through PMFME, AIF, PMEGP, NABARD, and bank linkages will be a key enabler.

The third pillar focuses on institutional strengthening, particularly empowering Farmer Producer Organisations as anchor institutions in procurement, aggregation, processing, branding, and market linkages. Strengthened FPOs will facilitate collective marketing, ensure better price realization, support contract farming or buy-back arrangements where feasible, and negotiate with buyers, traders, and processing industries on behalf of farmers.

The fourth pillar emphasizes market development and branding. A dedicated Kushinagar

Turmeric identity, supported by quality assurance, certification, standardized grading, packaging, and consistent branding efforts, will help position the district competitively with established turmeric-producing states. Linkages will be built with wholesale markets, spice processors, food companies, e-commerce platforms, and institutional buyers to ensure stable and remunerative demand.

The final pillar of the roadmap highlights policy convergence and ecosystem support. Close coordination with government departments, financial institutions, research organizations, and development agencies will be essential. Focused efforts will be made to mobilize public investment, attract private sector participation, leverage subsidies, and create a supportive enabling environment. Simultaneously, climate resilience, sustainable cultivation practices, and inclusion of women and youth in enterprise roles will remain central to the strategy.

With coordinated action across these pillars, Kushinagar can evolve from a promising production zone into a vibrant turmeric hub—driving higher farmer incomes, generating rural employment, strengthening local agribusiness ecosystems, and positioning Eastern Uttar Pradesh prominently on India's turmeric map.

Cluster-Based Development Approach (Aligned with National Cluster Programme Initiatives)

A structured cluster-based development approach provides a powerful framework for positioning Kushinagar as a leading turmeric production and processing hub in Eastern Uttar Pradesh. By organizing geographically contiguous turmeric-growing villages into dedicated production clusters, the approach facilitates focused technical support, standardized practices, shared infrastructure, and collective market engagement, thereby ensuring economies of scale and higher competitiveness.

Importantly, this strategy aligns closely with the Cluster Development Programme (CDP) of the Ministry of Agriculture & Farmers Welfare, Government of India, being facilitated through the National Horticulture Board (NHB). The national programme emphasizes strengthening horticulture value chains through cluster identification, infrastructure creation, enterprise promotion, market linkage development, branding support, and policy convergence—objectives that resonate strongly with the emerging turmeric ecosystem of Kushinagar. Leveraging such national programmes can provide policy backing, financial support, and greater institutional legitimacy to the district's turmeric development efforts.

Under this approach, potential turmeric villages are grouped into production clusters where farmers receive improved seed material, scientific agronomic advisory, capacity building support, and exposure to best practices. Cluster-level demonstration plots, Farmer Field Schools, and regular handholding help farmers transition from traditional practices to more productive, quality-focused and market-oriented turmeric cultivation. Parallely, cluster-based infrastructure such as boiling units, drying platforms, polishing and grinding facilities, primary processing centers, and storage structures are promoted to reduce losses and improve value realization at the local level.

Institutional mechanisms form the backbone of the cluster approach. Farmer Producer Organisations (FPOs) and farmer collectives within each cluster act as anchor institutions to coordinate aggregation, bulk marketing, procurement of inputs, quality standardization, and enterprise promotion. This collective framework also simplifies access to bank credit, government schemes, NHB-linked support mechanisms, and insurance services, thereby strengthening financial resilience and enterprise readiness.

Market integration remains a key pillar of the strategy. Clusters are linked with wholesale spice markets, processing units, corporate buyers, online platforms, and institutional procurement mechanisms. Branding and quality certification—supported under national cluster initiatives—can further help create a “Kushinagar Turmeric Identity”, enabling the district to differentiate itself in competitive markets.

By aligning local efforts with national cluster development policies, Kushinagar stands to gain not only from structured development interventions but also from policy support, investment flow, and long-term sustainability. The integration of geographically focused development, strong farmer institutions, processing infrastructure, and market-led strategies will help establish Kushinagar as an organized, efficient, and high-potential turmeric hub—benefiting farmers, enterprises, and the regional economy at large.

Strengthening Seed Systems and Value Chain Infrastructure

A robust seed system and well-developed value chain infrastructure are fundamental to scaling turmeric cultivation and positioning Kushinagar as a leading production and processing hub in Eastern Uttar Pradesh. Ensuring timely availability of high-quality seed, supported by locally adaptive value chain assets, creates the backbone for productivity improvement, risk reduction, and market-led growth.

a) Strengthening Seed Systems:

One of the most critical interventions is the establishment of a reliable and farmer-led seed ecosystem. The adoption of improved varieties like *Rajendra Sonia* has already demonstrated significant yield gains; however, scaling this success requires systematic seed production, multiplication, and distribution arrangements. Promoting seed villages, led by trained farmers and supported by KVK scientists and SHDA field teams, will help ensure the availability of pure, disease-free, and high-germination seed rhizomes. Demonstration plots, quality certification, and community-managed storage systems will further enhance seed integrity and reduce dependence on external markets. Strengthening FPO-led seed enterprises can help standardize seed quality, aggregate demand, and ensure timely supply before each planting season.

b) Enhancing Value Chain Infrastructure:

Beyond seed availability, developing a comprehensive infrastructure ecosystem is essential for capturing value at every stage—production, post-harvest handling, processing, storage, and marketing. Cluster-level facilities such as boiling tanks, solar or mechanical dryers, polishing units, and scientific storage structures are necessary to maintain quality, reduce losses, and ensure market competitiveness. Establishing primary processing centers will help standardize product quality and reduce the

variability often seen in traditional processing. Investments in grading, packaging, and moisture-controlled storage can significantly enhance shelf-life and market value.

To complement physical infrastructure, the value chain also requires business and logistical systems that improve aggregation, transportation, and market access. FPO-managed procurement centers, working capital support, and linkages with buyers, processors, wholesalers, and e-commerce platforms can streamline supply chains and offer better price realization for farmers. Access to schemes like PMFME, AIF, PMEGP, and NHB's Cluster Development Programme can support the creation of such infrastructure and financing for small enterprises.

c) Integrated Impact:

By combining strong seed systems with modern value chain infrastructure, Kushinagar can transition from fragmented smallholder turmeric cultivation to an organized, competitive, and quality-driven production landscape. This integrated approach ensures higher yields, improved product standards, better market linkages, and enhanced incomes—laying the foundation for a vibrant and sustainable turmeric economy in the district.

Branding and GI-Tagging Possibilities

Branding and Geographical Indication (GI) recognition present powerful opportunities to position Kushinagar turmeric as a distinct and high-value product in domestic and institutional markets. With increasing adoption of improved varieties, better agronomic practices, and strengthening of processing systems, Kushinagar is steadily building a reputation for quality turmeric production in Eastern Uttar Pradesh. Developing a cohesive “Kushinagar Turmeric” identity—supported by standardized quality protocols, attractive packaging, traceability, and strong storytelling—can significantly enhance consumer trust, buyer interest, and price realization for farmers and enterprises.

Pursuing GI-tagging possibilities in the medium term offers an additional strategic pathway. GI recognition helps establish product uniqueness based on geography, cultural practices, quality attributes, and production heritage, thereby protecting regional identity and preventing market dilution. To work toward this, systematic documentation of production characteristics, historical relevance, quality benchmarks, and distinctiveness will be undertaken in partnership with agricultural research institutions, state horticulture departments, and specialized agencies. Parallel efforts will focus on enabling Farmer Producer Organisations and local enterprises to participate in branded marketing, institutional procurement, and differentiated product lines such as seed turmeric, powdered turmeric, and packaged consumer products.

Through a combination of structured branding, quality assurance, and potential GI recognition, Kushinagar can move beyond being just a production zone to becoming a recognized turmeric brand, opening doors to premium markets, diversified buyers, and sustained income growth for farming communities.

Integration with Rural Entrepreneurship

Integrating turmeric development with rural entrepreneurship offers a transformative

opportunity for Kushinagar, enabling local communities to move beyond primary cultivation toward enterprise-driven value creation. As turmeric cultivation expands in Ramkola and adjoining blocks, a deliberate strategy to nurture rural entrepreneurs—particularly youth, women's collectives, and Farmer Producer Organisations—can generate local employment, stimulate small-scale industries, and retain economic value within the district. Entrepreneurship development around key functions such as seed multiplication, input services, primary processing, grading, packaging, and marketing will convert turmeric from a farm commodity into a dynamic driver of the local rural economy.

A conducive ecosystem is gradually emerging in Kushinagar to support this shift. District and national schemes such as PMFME, PMEGP, AIF, Start-Up India, and NABARD promotional programs provide strong platforms for enterprise financing, capacity building, and technical handholding. Dedicated entrepreneurship promotion will focus on developing processing units, spice-based micro-enterprises, supply chain services, branding and retail ventures, and digital marketing channels. Strengthened FPOs will act as business institutions to anchor collective enterprises, while SHDA and partner agencies will facilitate training, DPR preparation, quality certification, and market linkage support.

By fostering entrepreneurship at every stage of the turmeric value chain, Kushinagar can ensure inclusive growth—creating dignified livelihoods, enabling rural youth leadership, empowering women, and positioning the district not only as a turmeric production zone but as a vibrant turmeric enterprise hub driving sustained economic development.

Chapter 11

Interventions on Seed Spices and Ginger A Technical Overview of SHDA's Diversification Initiative

Rationale and Agro-Ecological Context

Kushinagar district, located in the eastern Indo-Gangetic plains, offers a warm sub-humid climate with fertile alluvial soils and assured irrigation potential, making it suitable for diversification beyond traditional cereal-based cropping systems. To scientifically validate diversification potential, SHDA initiated structured interventions focusing on seed spices and ginger, targeting productivity enhancement, income diversification, and risk mitigation for smallholder farmers.

Research Partnerships and Germplasm Sourcing

For seed spices, SHDA visited the National Research Centre on Seed Spices (NRCSS), Ajmer, to ensure access to regionally appropriate varieties and technical protocols. Quality seed material of coriander, fennel (saunf), fenugreek (methi), nigella (mangrail), and ajwain was procured from NRCSS.

For ginger, SHDA discussed with the High Altitude Research Station (HARS), Pottangi, Koraput, to obtain scientific guidance on varietal suitability, rhizome quality parameters, and improved agronomic practices relevant to plains adaptation.

Trial Methodology and Design

Field trials were implemented with selected farmers using a structured demonstration and evaluation framework:

- **Area under trial:** Multiple micro-plots in representative agro-ecological settings
- **Design elements:** Farmer-participatory trials integrating observational agronomy
- **Focus parameters:**
 - o Emergence rate and plant vigour
 - o Growth duration and phenological behavior
 - o Input responsiveness (nutrient, irrigation, management)
 - o Pest–disease incidence and resistance expression
 - o Yield parameters and biomass characteristics
 - o Economic feasibility indicators

Standard recommended packages of practices were followed as per NRCSS/HARS guidance, while maintaining farmer realism in resource use to ensure field applicability.

Preliminary Results and Performance

Initial observations indicate:

- Good agro-climatic compatibility of coriander, fennel, methi, nigella, and ajwain in Kushinagar conditions
- Healthy germination and satisfactory vegetative growth
- Positive yield responses comparable to performance benchmarks reported from established spice-growing regions
- Farmer acceptability driven by low-to-moderate input requirement, manageable labour demand, and marketability prospects

Ginger trials have demonstrated:

- Strong establishment performance under local soil and climatic conditions
- Promising rhizome development trends
- Manageable disease incidence when guided by improved agronomic protocols
- Clear potential for scaling under intensive and semi-intensive production environments

Implications for Scaling and Value Chain Prospects

The encouraging scientific evidence provides a basis for:

- Structured expansion of seed spices and ginger within existing cropping systems
- Crop system diversification for income stabilization
- Integration with future processing, branding, and enterprise development initiatives
- Development of localized seed and planting material systems to ensure quality sustainability

Way Forward

Based on trial learnings, SHDA plans to:

- Expand trial-to-demonstration scale coverage
- Standardize locally validated production protocols
- Strengthen farmer capacity through technical training
- Develop market and institutional linkages to ensure economic viability

Crops tested: *Dhania (Coriander)*, *Methi (Fenugreek)*, *Ajwain*, *Saunf (Fennel)*, *Mangrail (Nigella)*, and *Ginger*

Under the diversification initiative, SHDA undertook systematic evaluation of five key seed spices and ginger to assess their suitability in Kushinagar's agro-climatic context. The seed spice component included *Dhania* (Coriander), *Methi* (Fenugreek), *Ajwain*, *Saunf* (Fennel), and *Mangrail* (Nigella), with quality planting material sourced from NRCSS, Ajmer. These crops were selected owing to their growing domestic demand, shorter crop cycles, moderate input requirement, and

potential for value addition. Parallely, ginger was introduced through scientifically guided trials as discussed with the High Altitude Research Station (HARS), Pottangi, Koraput, focusing on varietal suitability, establishment performance, and yield behavior under Eastern Uttar Pradesh conditions.

Preliminary field results indicate promising adaptability of all tested crops, with good germination, satisfactory vegetative growth, encouraging yield trends, and positive farmer acceptance. Together, these crops demonstrate strong potential for integration into local farming systems, supporting income diversification, enhanced resilience, and the gradual emergence of a robust spice-based production ecosystem in Kushinagar.

Technical guidance from ICAR-NRCSS Ajmer

Strengthening Seed Spice-Based Livelihoods through Scientific guidance from ICAR-NRCSS, Ajmer

To ensure that farmers in Eastern Uttar Pradesh benefit from nationally validated technologies and climate-resilient agricultural practices, SHDA visited the ICAR-National Research Centre on Seed Spices (NRCSS), Ajmer, the apex national institution for seed spice research and innovations. Through a structured technical visit and consultation, SHDA team worked closely with NRCSS scientists to access comprehensive guidance on scientific packages of practices, covering varietal selection, optimal agronomic practices, nutrient and water management, integrated pest and disease management, and post-harvest protocols aligned with quality and market standards.

As a direct outcome of this collaboration, SHDA sourced high-yielding and resilient NRCSS-released varieties for field demonstrations and farmer adoption. These include Ajmer Coriander-1 (ACr-1) and Ajmer Coriander-2 (ACr-2), known for stem gall resistance and superior productivity; Ajmer Fenugreek-4 (AFg-4) with higher yield potential and better tolerance to diseases; Ajmer Fennel-3 (AF-3) offering enhanced quality traits and resilience; and Ajmer Nigella-20 (AN-20) recognized for higher oil content and commercial suitability. These improved varieties are expected to significantly enhance productivity, quality standards, and income potential compared to traditional farmer-saved seeds.

For donor agencies, this collaboration reflects a low-risk, high-impact intervention model grounded in scientific credibility, institutional partnership, and scalability. The approach ensures access to certified seeds, improved technology transfer, and strengthened farmer capacity, thereby contributing to income enhancement, climate resilience, and market integration for small and marginal farmers. With continued support, this initiative can be expanded to benefit a larger farming population, ensuring sustainable livelihood gains and strengthening the regional seed spice ecosystem.

Comparative Performance and Adaptability to Local Soil-Climate Conditions

The seed spices and ginger diversification trials undertaken by SHDA in Kushinagar district were systematically assessed for their agronomic performance and adaptability to

the district's alluvial soils, subtropical humid climate, and prevailing rice–wheat–sugarcane–based cropping systems. The evaluation focused on crop establishment, vegetative growth behavior, tolerance to local agro-climatic stresses, preliminary yield indicators, and compatibility with farmers' resource conditions during the rabi season.

Coriander (Dhania) demonstrated strong adaptability under Kushinagar conditions, particularly in well-drained light to medium loam soils following kharif crops. The crop exhibited uniform germination, satisfactory vegetative growth, and moderate pest incidence. Its short duration, low input requirement, and flexibility as a rotation or intercrop option make it well suited for small and marginal farmers.

Fenugreek (Methi) performed consistently across trial plots, showing good tolerance to fluctuating winter temperatures and minimal disease pressure. The crop effectively utilized residual soil moisture and responded well to modest nutrient inputs, enhancing its suitability under rainfed and semi-irrigated conditions. Farmers also valued its dual utility as both a leafy vegetable and seed spice, which further supports its adaptability and market relevance.

Ajwain exhibited moderate adaptability, with better performance observed in lighter soils under assured moisture availability. While initial crop establishment was satisfactory, its relatively longer crop duration and specific nutrient and management requirements influenced performance across locations. Under appropriate agronomic management, ajwain showed promising vegetative growth and yield attributes, indicating its potential under selected field conditions.

Fennel (Saunf) required comparatively higher soil fertility and careful crop management. Although the crop displayed good vegetative vigor, its longer maturity period and tendency towards lodging under dense growth conditions posed management challenges for smallholder farmers. These observations highlight the need for appropriate varietal selection, optimal plant spacing, and nutrient management to enhance its suitability under local conditions.

Nigella (Mangrail/Kalonji) emerged as one of the more climate-resilient crops in the diversification trials. It performed well under low-input conditions, tolerated mild moisture stress, and showed low susceptibility to major pests and diseases. Its adaptability to marginal soils and stable growth performance make it a promising diversification option, particularly for risk-averse farmers.

Ginger, introduced for the first time under SHDA's diversification initiative and currently under trial, has so far exhibited healthy and vigorous vegetative growth. In well-prepared fields with adequate soil fertility and organic matter content, the crop showed satisfactory plant establishment and canopy development. As the crop is still in the vegetative phase and has not yet been harvested, conclusions regarding yield and economic performance are premature. Nevertheless, early growth observations indicate good compatibility with local soil and climatic conditions under rabi season management.

Overall, the comparative assessment indicates that coriander, fenugreek, and nigella are highly adaptable to Kushinagar's agro-climatic conditions and farmer resource settings,



while ajwain and fennel demonstrate potential under location-specific and management-responsive scenarios. Ginger, presently in its initial trial phase, has shown encouraging vegetative performance and warrants continued observation through harvest before any scale-up. These findings have guided SHDA's phased, evidence-based approach to promoting seed spices and ginger cultivation, prioritizing crops that balance agronomic suitability, economic viability, and farmer manageability.

Initial Outcomes and Farmer Feedback

The initial outcomes from SHDA's seed spice diversification initiative in Kushinagar In the regional context, promising rotation models include:

- Paddy → Coriander / Fennel / Fenugreek (rabi) → Green gram (summer) – ensuring income diversification and improved soil fertility
- Maize (kharif) → Nigella / Ajwain (rabi) – providing a profitable alternative to conventional monocropping
- Wheat → Seed Spices (rabi) → Vegetables / Fodder (summer) – enabling efficient land use and steady cash flow
- Turmeric / Ginger (annual) integrated with coriander, fenugreek, and leafy spices as intercrops, enhancing productivity and maximizing space utilization

These rotations not only improve soil organic matter and nutrient cycling but also break pest-disease cycles, reduce production risks, and enhance climate resilience. With improved market prospects and institutional support, spice-based rotations present a viable pathway for higher farm productivity, increased income stability, and sustainable livelihood enhancement for farming communities in Eastern Uttar Pradesh.





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