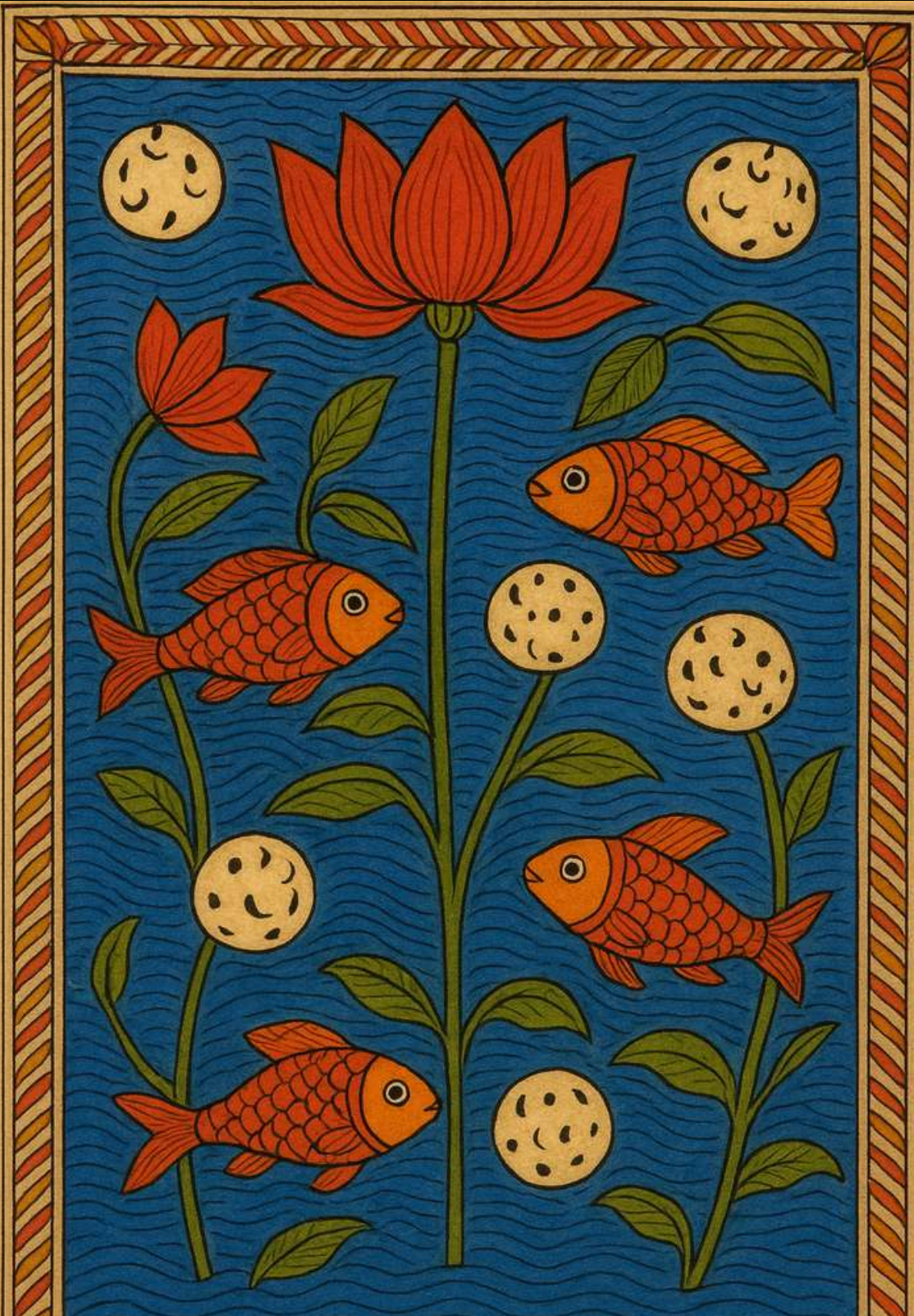


AUGUST 2025



MAKHANA 360°

Programme Report

Table Content



Executive Summary	01
Inaugural Session	04
Session 1 - Highlights & Recommendations	11
Session 2 - Highlights & Recommendations	18
Session 3 - Highlights & Recommendations	24
Session 4 - Highlights & Recommendations	30
Vote of Thanks	36
Summary Recommendations & Suggestions	38
Conclusion: Towards a Global Makhana Mission	41

Associated Partners:





Executive Summary

The **MAKHANA 360° Roundtable**, held in Patna, brought together over 70 key stakeholders spanning farmer producer organisations, government agencies, research institutions, private sector exporters, industry associations, branding experts, and financial institutions. Convened by **FEED with support from Rabo Foundation** and jointly in partnership with sector leaders, the forum served as a high-level platform to chart a coordinated roadmap for transforming India's Makhana sector into a globally competitive and socially inclusive value chain.

India commands a unique leadership position in the global Makhana industry, producing 90–95% of global supply, with Bihar contributing nearly 90% of India's output. Despite its heritage, nutritional profile, and strong domestic demand, the sector exports only 1–2% of production, reflecting untapped potential.

Over four thematic sessions, the convening explored:

01

Strengthening Production Systems through Mechanisation & Sustainable Practices –

Calls for adoption of high-yield varieties (HYVs), farmer-friendly mechanisation, integrated water management, and structured dissemination of Good Agricultural, Hygienic, and Storage Practices (GAP, GHP, GSP, GVAP). Strong emphasis on preserving traditional skills while introducing climate-smart innovations and technology-led solutions and extension services.

02

Access to Finance for Value Addition and Inclusive Growth –

Shift in banking mindset toward rural lending, yet gaps persist in grassroots credit access by farmers & processors, as well as other value chain actors, and price stabilisation mechanisms. Recommended blended finance models, targeted district-level investments, & dedicated schemes for women-led enterprises.

03 Public-Private Partnerships & Investment Opportunities –

Leveraging the **PPPAVCD** framework to converge government schemes with private investment in infrastructure, branding, and export readiness. Emphasis on FPO leadership, skill development, and integration of advanced technologies like AI, blockchain, and traceability systems. Clarion call for investments by the private sector and leveraging Government schemes and programmes to overcome the existing deficits and deficiencies in the areas of production and productivity, technology, market access and finance, warehousing and logistics, branding in a defined role-responsibility sharing matrix.

04 Export Promotion through Institutional Support & Community Empowerment –

Strategic recommendations on branding, market outreach, and compliance with global standards. Calls for phytosanitary certification, NABL-certified laboratories, SOP-driven quality assurance, and recognition of Makhana as a “nut” to unlock premium markets. Promotion strategies to draw from global commodity boards with a unified brand identity and celebrity ambassadors.

Cross-Cutting Priorities Identified Across Sessions

- Urgent mechanisation and R&D to address climate risks, labour shortages, and productivity gaps.
- Institutionalisation through the Makhana Promotion Board to coordinate branding, export strategy, and policy advocacy.
- Importance of post-harvest management and practices on storage, handling, grading.
- Importance of maintaining standardised quality and hygiene throughout the value chain.

- Development of integrated export hubs near production clusters.
- Empowerment of women and elimination of child labour.
- Long-term policy stability and structured inter-state collaboration for scale diversification.

The discussions culminated in a **comprehensive set of recommendations** covering production, finance, partnerships, export readiness, branding, data systems, and social safeguards. The overarching vision is to launch a “**Mission Makhana**”, a coordinated, multi-stakeholder initiative to position Makhana as India’s next global superfood brand, while delivering **climate-resilient incomes and rural transformation in Bihar and beyond**.

The way forward requires **synergised action** between government ministries, research institutions, private sector leaders, farmer organisations, and global market players. By aligning incentives, infrastructure, and innovation, India can capture a much larger share of the \$10+ billion global healthy snacks market and ensure that Makhana becomes both a **flagship export commodity and a driver of inclusive growth**.

The deliberations overtly note the unanimity of voices for the development of both a short-term Action Plan for six months under the aegis of the Directorate of Horticulture, GoB and drawing up of a long-term ten-year vision for overall growth of the Makhana sector impacting the livelihoods of farmers.



MAKHANA 360°

**A Roundtable
for
Sustainable Growth
&
Global Market Access**

29th July 2025 | 09:30 AM - 02:30 PM
**Conference Room, ICAR-RCER campus,
Patna, Bihar**

Institutional Partners:



Industry Partners:



Inaugural Session

Session Objective

To set the context for the roundtable by highlighting Bihar's pivotal role in global Makhana production, identifying systemic challenges, and outlining a collaborative roadmap for sustainable growth, export readiness, and farmer empowerment.

Programme Overview and Introductory Address



Mr. Suryamani Roul

Managing Trustee, FEED

Mr. Roul welcomed participants and outlined the vision for the roundtable, a platform for scientists, industry leaders, farmer representatives, policymakers, and civil society to converge on a shared action agenda for Makhana's sustainable growth. He reiterated FEED's commitment to facilitating multi-stakeholder dialogue and translating deliberations into a six-month actionable framework for sector transformation.



Mr. Hari Rajagopal

Consultant, Rabo Foundation

Extended warm welcome to all participants, setting a collaborative and forward-looking tone for the discussions ahead. He outlined the expectations from the Makhana 360° Roundtable, positioning it as a unique platform to accelerate the transformation of India's Makhana value chain into a globally competitive, inclusive, and sustainable sector.

Speaking on behalf of Rabo Foundation, he underscored its longstanding commitment to strengthening agricultural value chains in India. As part of one of the world's largest international cooperative banking networks, Rabo Foundation brings deep expertise in unlocking financing solutions for smallholder farmers. Its mission is anchored in enabling agri-fintech innovations, value chain development, and inclusive growth across diverse agricultural sectors.

Welcome Address

“ Strengthening India’s agri-value chains starts with unlocking finance for smallholder farmers, and that’s where our global cooperative banking experience becomes a true catalyst.

”

He highlighted that Rabo Foundation operates as an impact funder dedicated to the agriculture and food systems sector, investing globally with a focus on long-term, sustainable change. India represents the Foundation's largest market by investment, reflecting both the scale of opportunity and the strategic importance of supporting the country's farming communities.

In closing, Shri Rajagopal reiterated Rabo Foundation's commitment to work alongside government bodies, private sector players, farmer organisations, and research institutions to realise the full potential of India's agricultural value chains, with Makhana as a flagship example of how tradition, innovation, and market access can be harnessed for shared prosperity.

Keynote Address



Shri Rajendra Jog

Executive Director,
Syngenta Foundation India

“

*Makhana as a
Global Wellness
Product & Farmer-
Centric
Sustainability*

Cultural & Economic Value: Makhana holds unique nutritional and medicinal value, positioning it as a global wellness product with the potential to link Bihar's regional identity to premium international markets.

Farmer at the Core: The sector's foundation is the smallholder farmer, whose traditional skills must be preserved while integrating modern, science-driven practices.

Priority Interventions:

- **Water Management:** Efficient usage and climate adaptation strategies.
- **Climate Resilience:** Cultivation techniques to withstand weather extremes.
- **Capacity Building:** Training on quality control and post-harvest handling for export markets.

Empowerment via Market Linkages: Providing tools, information, and direct access to premium buyers to ensure fair returns and long-term sustainability.

Technical Overview



Mr. Harsh Wardhan

Fellow, ICRIER

“

India leads the world in Makhana production, but we're exporting barely 2% —the gap is our greatest opportunity.

”

Global Standing: India produces **90–95%** of the world's Makhana, with Bihar contributing **85–90%** of India's output. Only 1–2% is exported, leaving untapped market potential.

Nutritional Profile: High fibre, low fat, rich in amino acids, with 95% protein digestibility, comparable to fish.

Growth Drivers: GI Tag (2022), promotion during G20 Summit (2023), improved varieties (Swarna Vaidehi, Sabour Makhana-1), and area expansion from 13,000 ha (2012) to 35,000 ha (2022).

Policy Milestones:

- Introduction of dedicated HS codes for popped, powdered, and other Makhana products.
- ₹100 crore allocation for the proposed National Makhana Board under MoA&FW.

Challenges Identified:

- Unorganised marketing & price volatility.
- Data gaps in production and consumption.
- Labour-intensive processing with hygiene and child labour concerns.
- Low access to formal credit and mechanisation.
- Only 12,000 MT of production meets export quality standards.

Strategic Imperatives: Investment in R&D, mechanisation, market organisation, and farmer skill development.

Inaugural Address



Shri Abhishek Kumar, IFS

Director of Horticulture, GoB

“

*For us in Bihar,
Makhana is not just a
crop, it is the story of
our women, our
wetlands, our wellness,
and our wealth.*

”

Acknowledgements: Commended FEED for convening, Rabo Foundation for promoting blended finance, and APEDA for building export readiness.

Core Challenges:

- **Varietal Innovation:** Limited to Swarna Vaidehi & Sabour Makhana-1; low Seed Replacement Ratio.
- **Mechanisation Deficit:** Lack of affordable, smallholder-friendly tools, especially for women farmers.
- **Credit Access:** Low KCC penetration; need for tailored financial products.
- **Market Organisation:** Dominance of intermediaries; need for transparent price discovery.

Government Interventions:

- ODOP recognition in six districts.
- GI Tag (2022) and draft National Makhana Board (₹100 Cr).
- Expansion to 16 districts, beyond North Bihar.

Proposed Action Agenda:

- Develop climate-resilient, high-yield varieties.
- Promote private seed production & improve SRR.
- Introduce gender-sensitive mechanisation.
- Create a six-month action plan with clear targets and review mechanisms.

Special Address and Institutional Perspective



Dr. C.B. Singh

Regional Director, APEDA

“

*International Market
Readiness & Image
Repositioning*

Rebranding Challenge: Outdated images of swampy, unhygienic cultivation damage India's trade positioning; competitors use this in negotiations.

Policy Breakthroughs: HS code upgrades, formation of the Makhana Board, and expansion to new states.

Export Readiness Gaps:

- Lack of traceability and Global GAP compliance.
- Weak packaging standards and short shelf life without a cold chain.
- Inadequate storage and pre-harvest quality infrastructure.

Market Opportunity: Premium Makhana in Dubai fetches ₹25,000/kg versus ₹2,000/kg locally.

Recommendations:

- Align production with importing countries' MRL and quality standards.
- Launch traceability pilots in key clusters.
- Develop premium, niche branding akin to California nuts.
- Facilitate greater exposure to global buyers through trade events.

Session Outcomes & Recommendations

01

Adopt a Farmer-Centric Growth Model

- Preserve traditional skills while integrating modern scientific practices.
- Prioritise training, capacity building, and climate-resilient farming.

02

Build Export-Ready Ecosystems

- Upgrade packaging, storage, and hygiene to international standards.
- Implement traceability systems and quality certifications (Global GAP).

03

Strengthen Seed Systems & Mechanisation

- Develop and distribute high-yield varieties.
- Promote affordable, smallholder-friendly mechanisation.

04

Improve Financing Access

- Expand KCC penetration.
- Introduce blended finance and crop-specific credit products.

05

Launch a Six-Month Action Plan

- Define targets for seed, mechanisation, market access, and export readiness.
- Establish a monitoring consortium for mid-course corrections.

Session 1: Strengthening Production Systems through Mechanisation & Sustainable Practices

Session Objective

To identify strategies that enhance Makhana productivity, sustainability, and profitability by bridging mechanisation gaps, promoting high-yield varieties, safeguarding indigenous skills, and integrating advanced technologies into the value chain.

Session Highlights:

- Introduction of high-yielding and climate-resilient Makhana varieties.
- Affordable and smallholder-friendly mechanisation for cultivation and processing.
- Post-harvest handling, storage, and packaging innovations for domestic and export markets.
- Capacity building and skilling programmes for farmers and local entrepreneurs.
- Scaling mechanisation through public-private partnerships and institutional support.

Panellists:

- **Dr. Janardan Jee**, Sector Expert (Founding Director, NRCM)
- **Dr. A.K. Chaudhary**, Senior Scientist, ICAR-RCER, Patna
- **Dr. Manoj Kumar**, Senior Scientist, ICAR-NRC (Makhana), Darbhanga
- **Mr. Rajeev Ranjan**, Chairman, Manigachimidas FPC



Dr. Janardan Jee

Founding Director, NRCM

“

Makhana is not just a crop – it's Bihar's cultural heritage and an economic engine waiting to be powered by technology and innovation

”

Makhana's Strategic Importance: Not just a crop but a *cultural heritage, nutritional powerhouse, and economic driver* for Bihar.

White Ball Revolution Vision: Harness Bihar's water wealth to create prosperity for farmers, communities, and the state's rural economy.

Major Challenges Identified:

- **Natural Resource & Climate Concerns** – Declining water availability, climate change impacts on aquatic ecosystems.
- **Mechanisation Gap** – Minimal adoption of modern tools in cultivation, harvesting, and processing.
- **Processing Bottlenecks** – Continued dependence on labour-intensive traditional methods.
- **Market Limitations** – Weak access to premium markets despite superfood status.

Technological Interventions Proposed:

- **Cultivation & Harvesting:** Drones for sowing & monitoring, robotic weeders, precision spraying, underwater harvesting systems.
- **Post-Harvest Processing:** Automated washing/grading with AI vision, controlled-environment dryers, automated roasting & packaging systems.
- **High-Tech Models:** “Future Food Factory” concept, closed-loop water systems, hydroponics/aquaponics, year-round production.
- **Advanced Methods:** Hydroponics for nutrient delivery, tissue culture for rapid propagation.

Roadmap for Improvement

Productivity Enhancement

- Adoption of GAP, GHP, GSP, GVAP.
- Climate-resilient varieties & scientific pond management.
- Mechanisation for harvesting & processing (graders, washers).
- R&D and tech transfer from research to the farm level.

Profitability Enhancement

- Reduce post-harvest losses.
- Invest in value addition, branding, and modern packaging.
- Strengthen market linkages via FPOs, hubs, and e-commerce.

Sustainability Measures

- Pond rejuvenation & water recirculation systems.
- Integrated farming (Makhana + aquaculture + horticulture).
- Organic certification & inputs.
- Climate adaptation with early warning systems.



Dr. A.K. Chaudhary

Senior Scientist,
ICAR-RCER, Patna

“

Mechanisation and high-yield varieties are essential, but without climate adaptation, erratic rainfall in regions like Kosi and Bihar will undermine our progress.

”

Mechanisation Imperative: Strong emphasis on mechanisation across the Makhana value chain, covering both cultivation and processing stages. Mechanisation will address labour shortages, reduce drudgery, improve efficiency, and help achieve consistent quality at scale.

Promotion of HYVs: Urgent need to promote adoption of high-yielding makhana varieties to boost productivity and farmer incomes. Priority should be given to large-scale production and widespread availability of HYV seeds to ensure equitable access for farmers across districts.

Climate Change Concerns: Drew attention to the growing impact of climate change on Makhana cultivation, particularly the effects of erratic rainfall patterns in regions like Kosi and wider Bihar. These unpredictable monsoon cycles are disrupting water availability in ponds and fields, directly affecting yields and crop quality. Stressed the need for climate-resilient infrastructure, improved water harvesting, and adaptive cultivation practices to protect farmer incomes and maintain production stability in the face of such volatility.

Strategic Recommendations:

- Development of customised mechanisation solutions suited to aquatic and semi-aquatic cultivation systems.
- Establishing seed production clusters to ensure quality, traceability, and timely supply of HYVs.
- Integrating mechanisation, HYV promotion, and climate adaptation strategies into state and national Makhana development programs.



Dr. Manoj Kumar

Senior Scientist,
ICAR-NRC for Makhana

“

In just a decade, Makhana farmers have seen incomes rise eightfold—now we must address climate, credit, and mechanisation to sustain that growth.

”

Positive Shifts in Recent Years:

- Targeted schemes (PMFME, MDS, ODOP).
- GI Tag for Mithila Makhana (2022).
- Swarna Vaidehi variety notification (2022).
- NRC status to RCM, Darbhanga (2023).
- Announcement of Makhana Board & HS code (2025).
- FTA with the UK (2025) opening export markets.

Production & Income Gains:

Productivity: 16 → 25 quintals/ha.

Farmer incomes: ₹45–50k/ha → ₹4 lakh/ha.

Challenges:

- Climate & water stress even in flood-prone zones.
- Mechanisation gap and skill deficits in post-harvest & export readiness.
- Untapped potential in value-added products.



Mr. Rajeev Ranjan

**Chairman,
Manigachimidas FPC**

“

The skills behind Makhana cultivation are centuries old—scaling production means preserving this knowledge while introducing modern techniques.

”

Unique Skill Requirements:

- Each cultivation & processing stage demands specialised knowledge refined over generations.
- Skill transfer for scaling requires structured capacity-building programs.

Market Demand:

- High demand for 6-suta premium grade Makhana.
- Limited production capacity, needs targeted yield improvement measures.

Strategic Considerations:

- Balance between tradition and modernisation.
- Develop training frameworks to replicate traditional expertise.
- Agronomic innovations to increase premium-grade output.

Session Outcomes & Recommendations

01

Mechanisation Acceleration

- Deploy smallholder-friendly machinery for cultivation & processing.
- Establish mechanisation demonstration hubs.

02

High-Yield Variety Scale-Up

- Strengthen seed clusters & SRR improvement programs.
- Encourage private sector participation in seed production.

03

Water & Climate Resilience

- Pond rejuvenation, water recirculation, and early warning systems.
- Promote integrated farming for resource optimisation.

04

Value Addition & Market Linkages

- Invest in modern packaging, branding, and diversified products.
- Build FPO-led marketing networks for premium positioning.

05

Skill Preservation & Transfer

- Launch structured training programs to pass on indigenous skills.
- Focus on scaling premium grades without quality loss.

Session 2:

Access to Finance for Value Addition and Inclusive Growth

Session Objective

To explore financing mechanisms, institutional innovations, and grassroots strategies that can enable inclusive growth and support the transition of Makhana from a regional crop to a globally competitive superfood sector.

Session Highlights:

- Expanding the reach of Kisan Credit Cards (KCC) and tailored financial products.
- Leveraging agri-fintech solutions for affordable and timely credit delivery.
- Fostering private sector and philanthropic investments in processing and value-addition infrastructure.
- Strengthening FPOs and cooperatives as vehicles for financial inclusion.

Panellists:

- **Mr. Rajnesh Sentu**, Joint General Manager, Samunnati
- **Mr. Shenoy Mathew**, Chief Sustainability Officer, Arya.ag
- **Mr. Dheeraj Mutreja**, Consultant, Rabo Foundation
- **Mr. Vijay Kumar Jha**, Regional Director, Ayekart

Session Context

As Makhana gains momentum in global wellness and superfood markets, scaling its production, processing, and marketing capacity requires robust access to finance, particularly for smallholders, Farmer Producer Companies (FPCs), and rural entrepreneurs. This session examined the shifting financial landscape, evolving lender perceptions, and the collaborative frameworks needed to sustain sector growth.

Key Session Themes & Insights

Shifting Banking Perceptions

- Increasing recognition of farmer collectives as reliable borrowers.
- Movement from collateral-heavy models to relationship-based lending.

Strategic District Targeting

- Focus on financing and interventions in high-yield districts to build scalable models.
- District-specific plans for infrastructure, training, and market integration.

Emerging Financing Models

- Blended finance combines grants, concessional loans, and commercial funding.
- Market-linked loans tied to purchase agreements.
- Tech-enabled warehouse receipt financing.

Sector Gaps & Needs

- Lack of grassroots support services for farmers.
- Weak business models for FPC sustainability.
- Price volatility is impacting farmer incomes.
- Technology and mechanisation investment gaps.
- Hygiene and food safety deficits in local popping centres.

Skill & Infrastructure Focus

- District-specific skill development for Makhana cultivation.
- Localised processing and packaging to retain value at origin.
- Climate-smart planning for Makhana as a dependent cash crop.



Mr. Dheeraj Mutreja

Consultant, Rabo Foundation

- Emphasised the need for blended finance models that combine grants, soft loans, and commercial capital to de-risk investments in smallholder value chains.
- Advocated for building **financial literacy among farmers and FPO leadership to improve credit readiness and negotiation power.**
- Suggested integrating financing with **capacity-building programs** so that credit translates into productivity gains and market competitiveness.

Highlighted the potential of **technology-enabled financing models** for warehouse receipt financing, traceability, and market integration.

Proposed partnerships between agri-tech companies, financial institutions, and FPCs to:

- Reduce post-harvest losses through better storage.
- Increase farmer bargaining power via aggregated market participation.

Stressed that **infrastructure finance**, particularly for primary processing, is a missing link that must be prioritised.



Mr. Shenoy Mathew

Chief Sustainability Officer,
Arya.ag



Mr. Rajnesh Sentu

Joint General Manager,
Samunnati

“

*Strong, progressive FPCs
are the backbone of rural
transformation in the
Makhana sector.*

”

Past to Present: Earlier reluctance from banks, driven by fear of defaults, is now evolving into trust-based lending as farmer collectives demonstrate repayment reliability. Emphasised on customer (farmers and other value chain actors) centric financial products.

Strategic Focus Areas:

- Target **high-production districts** to maximise impact per financing unit.
- Develop **district-specific financing and development plans**.

Challenges from Samunnati's Perspective:

- Weak grassroots support systems for farmers.
- Lack of robust, scalable business models for FPCs.
- Price volatility and absence of sustainable price mechanisms.
- Supply shortages of **premium-grade 6-suta Makhana**.

Recommendations:

- Identify and invest in progressive FPCs.
- Create an enabling ecosystem linking finance, markets, and capacity-building.
- Localised processing and packaging units for value addition.



Mr. Vijay Kumar Jha

Regional Manager, Ayekart

- Focused on **market-linked financing** where credit is tied to confirmed purchase orders or offtake agreements.
- Suggested **building financial products around value chains**, ensuring lenders and buyers share risks and benefits.
- Highlighted the **role of digitisation** in ensuring transparent transactions and quick disbursements to farmers.

- Raised concerns about the **lack of financial and institutional support** at the community level.
- Emphasised the need for **on-ground capacity building**, especially for women-led groups.
- Suggested integrating financial inclusion with **technical training** to make investments productive.



Sakhi Representative

Grassroots Perspective

Session Outcomes & Recommendations

01

Strengthen FPCs: Identify progressive FPCs and invest in their growth with integrated financial and technical support.

02

Develop Robust Business Models: Ensure FPC operations are commercially viable through market integration and operational efficiency.

03

Targeted Financing: Prioritise high-production districts with district-level credit and infrastructure plans.

04

Grassroots Empowerment: Pair credit with skill development and technical assistance, especially for women-led collectives.

05

Market Price Stabilisation: Create mechanisms for fair price discovery and stability to protect farmer incomes.

06

Infrastructure & Technology Investment: Fund mechanisation, storage, and hygiene improvements at local processing units.

Session 3:

Public–Private Partnerships & Investment Opportunities

Session Objective

To explore how Public–Private Partnerships (PPP) and blended investment models can accelerate infrastructure development, technology adoption, branding, and market access in the Makhana value chain, while ensuring equitable participation of farmers, especially women, and sustainable sector growth.

Session Highlights:

- PPP models for infrastructure development and supply chain efficiency.
- Incentives for private sector participation in processing and branding.
- Building institutional mechanisms for equitable price discovery.
- Strengthening aggregation models through FPOs and cooperatives.
- Attracting impact investors to scale innovations in the Makhana ecosystem.

Panellists:

- **Mr. Satyajit Singh**, Managing Director, Shakti Sudha Pvt. Ltd.
- **Dr. Bipin Bihari**, CEO, FDRVC
- **Mr. Rahul Prakash**, CEO & Founder, Amal Farms
- **Mr. Bharat Bali**, PPPAVCD Expert, FEED

Decadal Vision & Growth Potential

- Envisions the Makhana sector evolving into a **₹50,000 crore industry** within the next decade.
- Production capacity projected to increase nearly tenfold, from **35,000 tonnes to 3 lakh tonnes**.
- Laid emphasis on significant investment inflows due to expanding domestic demand and rising export opportunities.

Standardisation & Governance

- Urged universal adoption and **enforcement of HSN codes** for **product tracking and trade transparency**.
- Called for stronger regulatory oversight to ensure compliance with quality standards and export readiness.

Technology Integration

- Addressed the *technology deficit* in both production and processing.
- Recommended adopting **AI, blockchain, precision farming, machine learning, and traceability systems**.
- Encouraged the private sector to spearhead **process formalisation, skill-building, and mechanisation**.

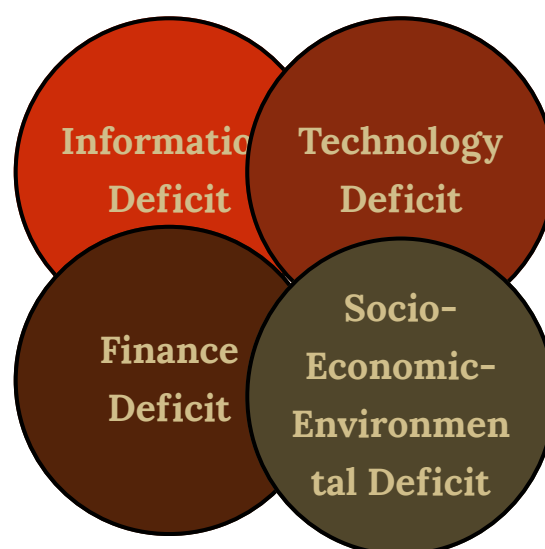
Infrastructure & Financing

Identified critical gaps:

- Lack of primary processing machinery.
- Limited procurement financing.
- Inadequate warehousing and absence of standard operating procedures (SOPs).

Proposed **blended finance pilots** through tripartite agreements between procurement companies, NBFCs, and FPOs.

Deficit Framework



Mr. Satyajit Singh

Managing Director,
Shakti Sudha Pvt. Ltd.

FPO Strengthening

- Advocated for promoting **Makhana-focused FPOs** and ensuring they receive dedicated funding and policy support.

Socio-Economic & Environmental Safeguards

- Called for eliminating child labour from the value chain.
- Stressed improvements in hygiene at village-level processing.
- Urged to define water quality standards for cultivation ponds.
- Highlighted skill development as a foundation for sustainable growth.



Dr. Bipin Bihari

CEO, FDRVC

Central Role of Women in the Value Chain

- Women dominate **post-harvest operations** such as popping, grading, and packaging, activities that demand high skill and patience.
- Women-led Producer Enterprises (PEs) have strong potential for ensuring quality, mobilising communities, and driving local economic growth.

Strengthening Women-led PEs

- There is a need for **capacity building** in enterprise management, financial literacy, and market access.
- Investment in **women-friendly mechanisation** to reduce drudgery while preserving quality.
- Facilitation of **direct linkages** between women-led PEs and premium buyers.

Policy & Institutional Support

- Proposed specialised credit schemes and grants under government and CSR initiatives for women-led PEs.
- Inclusion of gender-sensitive provisions in the Makhana Board's strategic plan.
- Branding initiatives to highlight women's contribution, enhancing both market positioning and consumer awareness..



Mr. Rahul Prakash

CEO & Founder, Amal Farms

“

Public-Private Partnerships are the key to building the infrastructure and scale that will take Makhana from Bihar to the world.

”

PPP Models for Sector Development

- Stressed that PPP frameworks are **essential for infrastructure and aggregation**, serving both domestic and export markets.
- PPP models should prioritise **processing hubs, cold storage, logistics, and quality testing labs**.

Private Sector Incentives

- Called for **policy measures and fiscal incentives** to attract private investment in branding, processing, and exports.
- Advocated for deeper **government-industry collaboration** to achieve scale.

Empowering FPOs & Cooperatives

- FPOs should be positioned as **lead actors** in the value chain.
- Capacity-building programs must focus on **export readiness and direct market linkages**.

Transparent Price Discovery

- Digital platforms and open-market systems are needed for fair price discovery.
- Reduce dependency on intermediaries and improve **transaction traceability**.

Attracting Impact Investors

- Highlight Makhana's **high-growth potential** to impact-driven funds.
- Direct investments in **technology adoption and sustainable practices**.

PPPAVCD Framework Overview

Presented the **Public-Private Partnership for Integrated Agricultural Value Chain Development** model under the Ministry of Agriculture & Farmers Welfare.

Designed to combine **public sector support with private investment** for targeted value chain strengthening.

Convergence of Schemes

- Demonstrated how central and state schemes like **MIDH, RKVY, and PMFME** can be aligned for Makhana development.
- Showed opportunities for **co-funding infrastructure and technology adoption** through convergence.

Structure of PPPAVCD

Tripartite agreements between government, private partners, and FPOs/cooperatives.

Role distribution:

- **Government:** Policy support, partial funding, enabling environment.
- **Private Sector:** Infrastructure, technology, market access, branding.
- **FPOs:** Aggregation, primary processing, farmer mobilisation, quality control.

Case Studies & Best Practices

- Shared examples where PPPAVCD accelerated cold chain, packhouse, and processing infrastructure creation.
- Demonstrated income gains for farmers due to assured markets and value addition.

Relevance for the Makhana Sector

- PPPAVCD can fund **district-level infrastructure**, mechanisation for aquatic crops, and export readiness measures.
- Allows **customised interventions** for Makhana's unique cultivation and processing needs.



Mr. Bharat Bali

PPPAVCD Expert, PMU

Session Outcomes & Recommendations

01

Adopt PPP & PPCP Models: Integrate community, private sector, and government roles into structured partnerships.

02

Scale Technology Adoption: Invest in AI, blockchain, and mechanisation suited for aquatic crops.

03

Strengthen FPOs & Women-led Enterprises: Provide targeted capacity-building and access to finance.

04

Infrastructure Development: Establish decentralised warehouses, processing hubs, and quality labs.

05

Ensure Socio-Environmental Safeguards: Eliminate child labour, improve hygiene, and set water quality parameters.

06

Leverage Convergence of Schemes: Use PPPAVCD to combine funding sources and align with national programmes.

07

Market & Brand Development: Promote Makhana as a premium, traceable, and sustainable global superfood.

Session 4:

Export Promotion through Institutional Support & Community Empowerment

Session Objective

To identify strategies for positioning Makhana as a premium, globally recognised superfood by strengthening institutional support, developing export infrastructure, enhancing branding, and empowering producer communities.

Session Highlights:

- Strengthening logistics and cold chain infrastructure for exports.
- Building capacity for SPS compliance and global certifications.
- Enhancing farmer participation in export-oriented value chains.
- Policy support and incentives for export-led production.
- Community-led branding initiatives to position Bihar Makhana globally.

Panellists:

- **Dr. C.B. Singh**, Regional Director, APEDA
- **Col Nitin Sehgal**, CEO, NDFC (I)
- **Mr. Arijit Dey**, Chief Manager, BCC&I
- **Mr. Ketan Bengani**, Director, Satviki Exports
- **Mr. Harsh Wardhan**, Fellow, ICRIER

Presentation:

Promotions of Agrifoods in Export Markets with Special Reference to Makhanas by **Mr. Sumit Saran**, Director, SS Associates



Mr. Harsh Wardhan

Fellow, ICRIER

India's Global Position & Export Gap

- Produces **90–95% of global** Makhana; Bihar alone accounts for 85–90% of India's output.
- **Only 1–2%** of production is exported, leaving vast untapped potential.
- Healthy snacks market growing at **8.5% CAGR (2024–2031)**, presenting a strong opportunity.

Key Challenges

- Unorganised marketing, price volatility, weak infrastructure.
- Lack of reliable production and trade data.
- Manual, labour-intensive processing affecting quality and causing export rejections.
- Financial constraints and limited uptake of KCC.
- Export quality shortfall: only 12,000 MT of 25,000 MT meets required standards.

Opportunities & Recommendations

- **Expand field cultivation** for higher yields (2.6–3.5 MT/ha).
- **Boost mechanisation** using ICAR-CIPHET's fully mechanised system (reducing processing time from 2–3 days to 20 hours).
- Target premium export markets (USA, UK, Germany, UAE, Japan).
- Focus on **value-added products**: flavoured variants, flour, bars, RTE snacks.
- Develop **export hubs** near production clusters with popping units, labs, and customs facilities.
- Align export standards with FSSAI, ICMR, and global norms.
- Strengthen data systems through producer registration and GIS mapping.



Col. Nitin Sehgal

CEO, NDFC (I)

“

All Makhana needs is one small push—through unity, identity, and infrastructure—to dominate the global dry fruit market.

”

A National Voice for Makhana

- NDFC(I), established 2 years ago, represents over 900 nut & dry fruit stakeholders; currently, only 8–10 Makhana traders are members.
- Open invitation for FPOs, processors, and exporters to join and build a unified national identity.

Key Focus Areas

- **Policy & Standards:** Introduce production-linked incentives and minimum export quality benchmarks.
- **Training & Capacity Building:** Improve post-harvest practices and packaging innovations.
- **Infrastructure:** Invest in roads, cold chains, and storage in North & East Bihar.
- **Value Addition:** Promote branded, diversified Makhana products with 10x market potential.
- **Market Linkages:** Leverage trade shows like MEWA to connect with global buyers.

Strategic Outlook

- “Makhana must move from being a side note to a headline product in India’s nut and dry fruit industry.”
- MEWA 2026 (Delhi) highlighted as a milestone opportunity to showcase Makhana globally.



Mr. Sumit Saran

Director, SS Associates

“

Makhana deserves a brand ambassador and a global campaign—just like pistachios, walnuts, and cranberries before it.

”

Structured Branding Approach

- Establish a Makhana Promotion Board with a dedicated promotion budget.
- Create a **generic brand logo and quality seal** for market trust.
- Define **clear quality grades and specifications** for domestic and export markets.

Learning from Global Campaigns

- Take cues from **American Pistachios and Chilean Walnuts** in using bold messaging, celebrity ambassadors, and integrated marketing.
- Engage sports personalities, chefs, and influencers to build aspirational appeal.

Promotion Activities

- Select export markets based on research; engage local agencies for tailored campaigns.
- Participate in trade fairs; run in-store activations and digital marketing drives.
- Collaborate with nutritionists, chefs, and lifestyle influencers for credibility.

Positioning Strategy

- Market Makhana as a distinct superfood, not a competitor to existing nuts/dry fruits.
- Focus on consumer-driven messaging and ensure consistent traceability.



Mr. Arijit Dey

Chief Manager, BCC&I

Recognition as a Nut: Urged official classification of Makhana as a “nut” to improve market positioning and access to premium categories.

Industry Expansion:

- West Bengal ready to partner in processing, value addition, and marketing.
- Advocated for **export hubs** with modern sorting, grading, and compliance facilities.
- Called for streamlined licensing to encourage private participation.

Value Chain Disruption:

- Promote direct farmer–exporter linkages.
- Modernise logistics and introduce **traceability technologies** for quality assurance.

10-Year Roadmap for Global Competitiveness

- Emphasised **phytosanitary compliance and Good Agricultural Practices (GAP)**.
- Recommended establishing **NABL-certified laboratories** for quality testing at multiple value chain stages.
- Highlighted need for **water quality monitoring and strict hygiene protocols** during processing.
- Called for **Standard Operating Procedures (SOPs)** for every stage, supported by targeted training modules.



Mr. Ketan Bengani

Director, Satviki Exports

Session Outcomes & Recommendations

01

Build Export Hubs with integrated processing, testing, and customs clearance facilities.

02

Secure International Recognition as a “nut” to access premium pricing and categories.

03

Strengthen Quality Infrastructure: NABL labs, SOPs, GAP adoption, and water quality systems.

04

Promote Value Addition: Encourage flavoured, packaged, and ready-to-eat Makhana products.

05

Leverage Global Marketing Models: Celebrity endorsements, influencer partnerships, and targeted campaigns.

06

Expand Producer Participation: FPOs, processors, and exporters to join NDFC(I) for policy advocacy.

07

Ensure Compliance with Global Standards: Align with FSSAI, APEDA, ICMR, and target market norms.

Vote of Thanks

On behalf of the organisers, he extended heartfelt gratitude to all the distinguished speakers, panellists, participants, and partners who made the MAKHANA 360° Roundtable a milestone gathering for Bihar's and indeed India's Makhana value chain.

Throughout the sessions of the roundtable, not only were opportunities highlighted, but also sincere attempts were made to discuss and address the urgent challenges that stand between the sector's current state and its projected potential of ₹50,000 crore in revenue and 3 lakh tonnes production by 2035.



Recognising the finance and credit challenges, the labour-intensive nature of production and processing, and the persistent R&D and mechanisation gaps, from seed breeding and productivity improvement to popping and roasting technologies that can reduce processing time from 72 to just 20 hours. It was acknowledged that export readiness is imperative, and that achieving it will require building traceability systems, aligning with HSN codes, meeting MRL testing and phytosanitary standards, and investing in quality testing laboratories close to production clusters.

Several key priorities emerged from our deliberations:

- **Mindset shift:** Makhana must move away from being seen as a “poor man's crop” grown under unhygienic conditions, to being positioned as a premium, healthy lifestyle product that is low in fat and high in fibre.
- **Field cultivation expansion:** With yields of 3.5–4 tonnes/ha compared to 1.5–2 tonnes/ha in ponds, field cultivation offers a viable solution to productivity stagnation.

- **Hygiene, packaging, and presentation:** Getting the basics right is as important as high-tech interventions. Sanitary and phytosanitary compliance, women-friendly SOPs for post-harvest handling, and premium packaging are non-negotiable for global markets.
- **Mechanisation & Technology adoption:** Smallholder-friendly solutions for cultivation, harvesting, popping, and roasting, alongside AI-based quality testing and procurement systems, must be accelerated.
- **Seed supply chain strengthening:** Improving the seed replacement ratio, increasing production of high-yield varieties, and ensuring equitable access to quality seeds.
- **Finance innovation:** From escrow-based warehouse financing to risk-sharing models between NBFCs and industry players, new approaches are needed to bring capital to farmers, traders, and processors.
- **Export competitiveness:** Building brands, securing certifications, establishing export hubs, and forging strong market linkages to meet rising global and domestic demand.
- **Skill development and social safeguards:** Training across the value chain, eliminating child labour, and addressing migration pressures on cultivators' families.

Taking note of the institutional and private sector commitments shared during the convening, from Shakti Sudha, Amal Farms, Satviki Exports, and others, along with the enabling roles of ICRIER, NRCM, APEDA, the Department of Horticulture, and ICAR-CFTRI. The PPP framework discussions have given us a clear map of defined roles and pre-assigned responsibilities for moving forward. The collective task now is to stabilise quality, integrate digital systems, and ensure that the benefits flow to the grassroots, not just the top of the chain.

In closing, he thanked every individual and organisation represented here today for your commitment, insights, and passion. Let us take the momentum from today's convening and turn it into concrete action so that Makhana can take its rightful place on the global stage, not just as a product, but as a symbol of rural prosperity, innovation, and India's agricultural leadership.

Summary Recommendations & Suggestions

The MAKHANA 360° Roundtable distilled a clear set of actionable priorities emerging from cross-session deliberations. These recommendations integrate perspectives from research bodies, producer organisations, private sector actors, policy institutions, and export stakeholders to create a comprehensive development roadmap for Bihar's and India's Makhana sector.

Strengthen Production Systems & Sustainability

- **Adopt High-Yield Varieties (HYVs):** Ensure timely and equitable distribution of improved varieties like Swarna Vaidehi and Sabour Makhana-1 through certified seed clusters.
- **Mechanisation Push:** Promote farmer-friendly mechanisation across cultivation, harvesting, and processing, graders, washers, roasters, and precision tools, to reduce drudgery and improve efficiency.
- **Integrated Water Management:** Introduce pond rejuvenation, closed-loop recirculation, and climate-resilient irrigation systems to tackle both drought and flood-related stress.
- **Good Practices Adoption:** Institutionalise GAP, GHP, GSP, and GVAP through structured training modules and farmer field schools.
- **R&D Focus:** Invest in varietal improvement, pest resistance, and technology development through ICAR, NRCM, and state agriculture universities.

Build a Robust Financial & Institutional Ecosystem

- **District-Focused Financing:** Prioritise high-production districts for targeted credit and infrastructure investment.
- **Strengthen FPOs:** Identify progressive Farmer Producer Companies and cooperatives for capacity-building, governance training, and market access.

- **Blended Finance Models:** Pilot tri-partite agreements between procurement companies, NBFCs, and FPOs for working capital and infrastructure loans.
- **Special Schemes for Women-led PEs:** Provide dedicated credit lines, grant support, and market linkages to empower women in post-harvest operations.
- **Stabilise Market Prices:** Develop market intelligence and MSP-like interventions to safeguard farmer incomes from price volatility.

Enable Public–Private–Community Partnerships (PPCP)


- **Leverage PPPAVCD Framework:** Integrate Makhana into the Ministry of Agriculture’s PPPAVCD program for convergence of central and state schemes.
- **Private Sector Incentives:** Offer fiscal incentives for investment in processing, branding, logistics, and export readiness.
- **Infrastructure Co-Creation:** Establish decentralised warehouses, processing hubs, and quality labs under joint ownership models.
- **Skill Development Alignment:** Link NSDC programmes to the Makhana sector, focusing on mechanisation skills, quality testing, and export protocols.

Upgrade Quality, Compliance & Export Readiness

- **Phytosanitary & GAP Compliance:** Mandate adherence to export-grade quality protocols across the value chain.
- **NABL-Certified Labs:** Establish dedicated Makhana testing facilities for water quality, grading, and shelf-life assurance.
- **SOP Enforcement:** Develop and disseminate standard operating procedures for every stage, from pond to port, to ensure traceability.
- **Export Hub Creation:** Locate integrated hubs near production clusters with popping units, labs, training centres, and customs clearance facilities.
- **Recognition as a Nut:** Secure official classification to align Makhana with high-value nut categories in global trade.

Branding, Promotion & Market Development

- **Global Branding Campaign:** Use celebrity ambassadors, influencer marketing, and in-market activations to build premium positioning.

- 
- **Targeted Market Entry:** Focus on high-potential geographies, USA, UK, EU, UAE, Japan, through tailored campaigns.
 - **Value Addition Focus:** Promote flavoured, packaged, and ready-to-eat Makhana with strong nutritional branding.
 - **Learning from Global Models:** Adapt strategies from American Pistachios, Chilean Walnuts, and other successful commodity boards.

Data, Research & Policy Coordination

- **Centralised Data System:** Implement GIS-based mapping of producers, acreage, and yields to improve policy targeting.
- **Regular Market Assessments:** Institutionalise demand-supply tracking for domestic and export markets.
- **Inter-State Collaboration:** Facilitate expansion into Bengal and other states to diversify production bases and processing capacity.
- **Policy Stability:** Avoid sporadic interventions; ensure long-term consistency in trade, export, and quality regulations.

Cross-Cutting Social & Environmental Priorities

- **Women's Economic Empowerment:** Position women as leaders in quality management, branding, and enterprise governance.
- **Sustainability Lens:** Embed climate resilience, water stewardship, and biodiversity conservation into all interventions.
- **Eliminate Child Labour:** Implement strict compliance and monitoring mechanisms.

Conclusion: Towards a Global Makhana Mission

The Makhana 360° Roundtable has set the foundation for “Mission Makhana”, a coordinated, multi-stakeholder effort to transform Bihar’s aquatic jewel into a global superfood powerhouse.

By aligning production excellence, financial innovation, public-private partnerships, export readiness, and strategic branding, India can not only dominate global Makhana trade but also create lasting prosperity for lakhs of rural households.





NOTES





Thank You

feed
Forum of Enterprises for
Equitable Development

Rabo
Foundation



Institutional Partners:



Industry Partners:

