प्रदान Pradan

PROFESSIONAL ASSISTANCE
FOR DEVELOPMENT ACTION

Harvesting Sustainability: Market Study of Bio-inputs to Build Sustainable Agriculture and Entrepreneurial Ecosystems

Foreword

In Bihar, almost 68% of households are landless, owning minimum or no land. However, 75% of them remain dependent on agriculture. To extract more from such small holdings, the use of fertiliser and chemicals is high in Bihar.

Considering the extractive agriculture context, PRADAN is committed to promoting Regenerative Agriculture (RA) in the region.

To strengthen the ecosystem and enhance RA practices in the area, Bio-Resource Centre (BRC) is one of the promising interventions. Further, it's impact potentials encourage the rural youth to start their own enterprises. A study helped to understand the market potential of bio-inputs and what can be the BRC-based prototypes. It provides insights into what can be funded. This study will help to select the best products for BRCs and, in turn, support the BRCs more effectively.

Sahana Mishra

Abbreviations

Acronym	Full Form
FPO	Farmer Producer Organization
BRC	Bio-Resource Centre(s)
NPOP	National Programme for Organic Production
PGS	Participatory Guarantee System
PKVY	Paramparagat Krishi Vikas Yojana
PROM	Phosphorus Rich Organic Manure
NPK	Nitrogen, Phosphorus, Potassium
PSB	Phosphate Solubilizing Bacteria
AZOTO	Azotobacter (Likely refers to Azotobacter genus)
KMB	Potash Mobilizing Bacteria
SOFDA	Sikkim State Organic Farming Development Agency
INM	Integrated Nutrient Management
IPM	Integrated Pest Management
SIMFEED	Sikkim State Co-operative Milk Producers' Federation Ltd.
ATMA	Agriculture Technology Management Agency
ADA	Assistant Director of Agriculture
RARS	Regional Agriculture Research Station
ICAR	Indian Council of Agricultural Research
DAP	Diammonium Phosphate
VSI	VasantDada Sugar Institute
LCB	LCB Fertiliser PVT. LTD.
FY	Financial Year
FCO	Fertiliser (Control) Order

NABARD	National Bank for Agriculture and Rural Development
DPR	Detailed Project Report
ACABC	Agri Clinics and Agri Business Centres
PMSSY	Pradhan Mantri Swasthya Suraksha Yojana
VAM	Vesicular Arbuscular Mycorrhiza / Arbuscular Mycorrhiza
AMF	Arbuscular Mycorrhizal Fungi
NPK Consortia	Combination of biofertiliser strains providing N, P, and K
Bt	Bacillus thuringiensis
SSB	Silicate Solubilizing Bacteria
CSB	Calcium Solubilizing Bacteria
USDA	United States Department of Agriculture
NOP	National Organic Program (USDA)
OMRI	Organic Materials Review Institute
BIS	Bureau of Indian Standards
ISO	International Organization for Standardization
GST	Goods and Services Tax
CFQCTI	Central Fertiliser Quality Control and Training Institute
SFQCLs	State Fertiliser Quality Control Laboratories
MRL	Maximum Residue Limit
USP	Unique Selling Proposition
PGPR	Plant Growth-Promoting Rhizobacteria
CFU	Colony Forming Units
FYM	Farmyard Manure
RA	Regenerative Agriculture

Contents

Acknowledgement

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The study group: This is the core group that designed methodology and tools, coordinated data collection, analysed the data and drafted the report. The members are Dibyendu Chaudhuri (PRADAN), Hemant Nahata (IIM Kashipur), Megha Singh Panwar (IIM Kashipur), Pranav Trigunayat (PRADAN), Shamshad Parvez (PRADAN), Shubham Prakash Patil (IIM Kashipur), Soumen Bishwas (Consultant).

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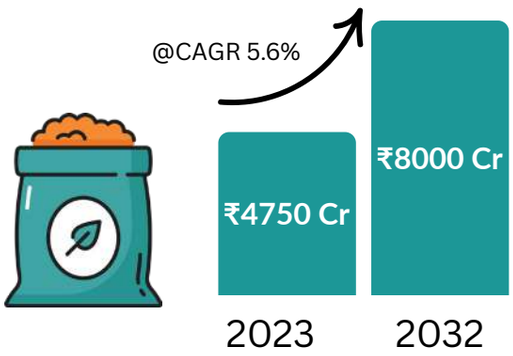
Infographics

India's Organic Fertiliser Market: Growth Trajectory



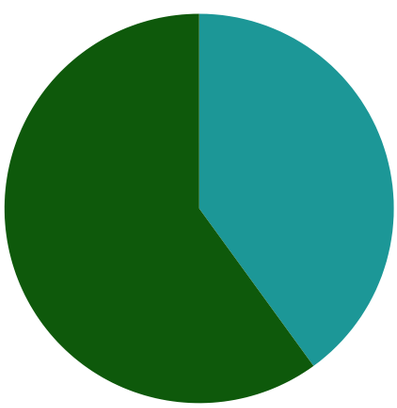
Organic Fertiliser Market Growth

₹996 cr by 2027

Bio Fertiliser Market Growth

Bio Fertiliser Market

Mycorrhiza
Largest Segment



Rhizobium
Fastest Growing

Neem Based Pesticides

₹660 cr by 2027

Humic Acid

₹415 cr by 2027

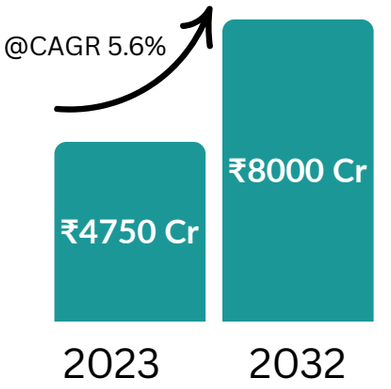
Fulvic Acid

To grow at a CAGR of **10% from 2020 to 2027**

Organic Fertiliser and Bio Fertiliser Market:

Other bio-input markets are even smaller

Example



Organic Fertiliser Market Growth

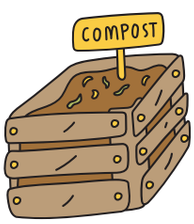
Produced and consumed domestically

Without being routed through the market

Variations in the organic fertilisers

No Price Standardisation

Example



₹8 per kg **₹70 per kg**

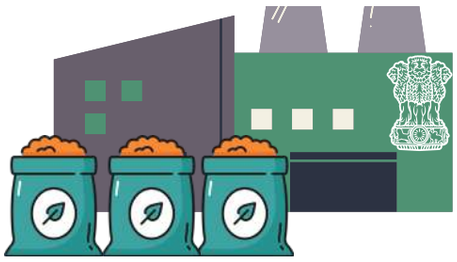
Non Commercial Use

Kitchen Garden

Balconies

Who Buys Organic Inputs?
Insights from the Field

According to the survey farmers rarely buy bio inputs from the market



Many organic input makers rely on government schemes for procurements

Under PRADAN's Operational Areas

₹15 per kg

In High Demand

For Cost Reduction

VERMIWASH

EARTHWORMS

- Streamlining the production stages
- Selling by products

Production of Bio inoculants

Mycorrhiza, Pseudomonas, Trichoderma

Can be established at FPC or higher level

Experimental Products for BRC

Chapter 1: Introduction

In recent years, Indian farmers have started adopting regenerative agricultural practices to counter the negative effects of decades of chemical input use in agriculture. One of the practices is the use of bio-inputs such as different types of composts, biofertilisers, bio-fungicides and bio-pesticides produced locally with available natural resources in the area.

Bio-inputs for agriculture can broadly be defined as products and commodities derived from or produced by organisms—plants, animals, bacteria, or fungi—used to improve soil health, enhance plant nutrition, and provide plant protection. Some bio-inputs, such as compost and vermicompost, have long been used in conventional agricultural practices to enrich soil health. However, with the growing popularity of eco-friendly agricultural practices—referred to by different names such as regenerative agriculture, organic farming, or natural farming—the use and diversification of bio-inputs have expanded significantly.

Thus, an existing market for bio-inputs has always been present. In recent years, this market has grown in both the quantity and variety of available products.

India is the largest country, in terms of the total number of certified organic producers in the world, with 16 lakh organic producers in 2020. Despite the high number of organic producers, organic cultivation covered only around 2% of India's agricultural area up to 2018-19. However, this has increased steadily over next three years. As of March 2020, 2,780,000 hectares were under certified organic farming in India, about 2 percent of India's 140.1 million hectares net sown area. Of this, 1,940,000 hectares were under the National Programme for Organic Production-APEDA (NPOP), 590,000 hectares under PKVY, 70,000 hectares under MOVCD-NER, and 170,000 hectares under state schemes.

Organic farming in the country is concentrated in only a few states. The top ten organic farming states in the country account for about 80% of the total organic crop area. A few states have taken the lead in improving organic farming coverage, like Madhya Pradesh, Rajasthan, and Maharashtra, which are the top three organic farming states in the country. Madhya Pradesh alone accounted for about 27% of India's total organic cultivation area in 2019. Organic cultivation of row crops accounted for about

59.7% of the total organic crop area in 2021. In 2019-2020, India produced 2.75 million tonnes of certified organic products, including food products, oilseeds, sugarcane, cereals, cotton, pulses, tea, coffee, fruits, vegetables, spices, dry fruits, and processed food. Soya meal was the leading export value of processed organic foods, followed by oilseeds, tea and coffee, cereals and millets, spices and condiments, dry fruits, and medicinal plants.

The increasing demand for organic products and Indian government initiatives to go organic are anticipated to increase organic crop area during the forecast period. Thus, the growing number of organic producers have been helping increase the area under organic cultivation, primarily in row crops. The above trends help in understanding the current market scenario and its growth potential.

The dominance of row crops is mainly due to their large cultivation area in the country, which accounted for about 59.8% of the total organic crop area in the same year. There is a huge demand for organic products both in domestic and international markets. The overuse of chemical fertilisers is one of the major challenges in the country. The Indian government is promoting sustainable and organic cultivation practices through various schemes or programmes by providing incentives for biofertilisers, which will drive the market during the forecast period.

Organic fertilisers include compost, vermicompost, green manure, bone meal, blood meal, fish emulsion, different types of cakes, such as neem cake and mustard cake. The top manufacturers of organic fertilisers are:

- Coromandel International Ltd.
- Deepak Fertilisers & Petrochemicals Corp. Ltd.
- Gujarat Narmada Valley Fertilisers & Chemicals Ltd.
- Southern Petrochemical Industries Corp. Ltd.
- Swaroop Agrochemical Industries.

The India Organic Fertiliser Market was valued at Rs 4,750 crore in 2023 and is projected to reach Rs 8,000 Cr by 2032, growing at a CAGR of 5.6% (Custom Market Insights).

The India Biofertiliser Market size is estimated at 10.63 million USD in 2024, and is expected to reach 16.50 million USD by 2029, growing at a CAGR of 9.20% during the forecast period (2024-2029).

- Report, India Biofertiliser Market, 2024

Biofertilisers are organic substances with living microorganisms such as Rhizobium, Azotobacter, Azospirillum, Phosphobacteria, Pseudomonas, Arbuscular Mycorrhizal Fungi (AMF), Pseudomonas fluorescens, Trichoderma that promote plant growth. The biofertilisers market is expected to reach Rs 996 crores by 2027. The Mycorrhiza segment accounts for the largest share of the biofertiliser market and the Rhizobium segment accounts for the fastest growing. The consumption of biofertilisers is dominant in the row, and it accounted for about 88.3% of the market value in 2022.

The India Biofertiliser Market is fairly consolidated, with the top five companies occupying 74.08%.

Biofertiliser Market Leaders - Top Five:

- Biostadt India Limited
- Fertilisers and Chemicals Travancore Limited
- Gujarat State Fertilisers & Chemicals Ltd
- Indian Farmers Fertiliser Cooperative Limited
- National Fertilisers Limited

Other important companies include GrowTech Agri Science Private Limited, IPL Biologicals Limited, Madras Fertilisers Limited, Samriddhi Crops India Pvt. Ltd, T.Stanes and Company Limited.

Botanical pesticides are neem-based, pyrethrum based, garlic based, pongamia based etc. The neem-based pesticides market is expected to reach INR 660 Crores by 2027

Market of organic soil conditioners such as humic acid is expected to reach Rs 415 crores by 2027. Fulvic acid, another soil conditioner, is expected to grow at a CAGR of 10% from 2020 to 2027. Seaweed extracts account for 20% of the organic soil conditioners market

One of PRADAN's initiatives to facilitate regenerative agriculture practices focuses on promoting market-led growth of organic input supply (compost, bio-fertilisers, bio-pesticides, growth promoters, etc.). To achieve this, PRADAN is incubating entrepreneurs from among the village youth, who set up bio-resource centres (BRCs) for the production and supply of these. These entrepreneurs play a crucial role in promoting sustainable agricultural practices and enhancing the livelihoods of smallholder farmers by supplying organic fertilisers and bio-products. As part of this initiative, it is essential to identify the products that these entrepreneurs offer, understand their standardisation processes, and assess the impact of these products on agricultural productivity and sustainability.

This study was conducted to understand the organic inputs market, identify organic inputs that have gained traction in the market and to recommend ways to produce, market, and scale up selected organic inputs through the BRCs.

Chapter 2: Methodology

The preceding chapter analysed the challenges of the global agricultural system, highlighting the departure from the Green Revolution strategies of agriculture to alternative agricultural practice, and shows how farmers have started adopting regenerative agricultural practices to counter the negative impact of the use of chemical inputs in agriculture and introducing BRCs in rural areas, where access to information about RA practices and bio-inputs is limited. This chapter delineates the study's objectives, the methodologies employed, and the tools used for data collection and analysis.

2.1 Objectives

The Bio-Input study was undertaken with the aim of fulfilling the following research objectives:

1. To identify and assess the range of products offered in the market and their supply chain.
2. To understand the regulatory environment for the production and supply of organic inputs.
3. To provide recommendations for products that can be standardised for entrepreneurs.
4. To develop a prototype plan for a BRC for the production and supply of organic inputs.
5. To develop effective marketing and value addition strategies.

2.2 Methodology

The study methodology includes both qualitative and quantitative methods involving

- Secondary research.
- Structured questionnaires.
- Interviews and observations with farmers, government officials and private-sector representatives.
- Data were collected from Bihar, Jharkhand, Sikkim, Andhra Pradesh, Delhi, Haryana, Rajasthan, Madhya Pradesh and Maharashtra.

The study involved multiple stages, each meticulously planned and executed to gather relevant data and insights.

2.3 Data Collection Period

The study was conducted over multiple phases. Each phase involved visits to various locations to gather insights from government officials, farmers and distributors (Annexure B: Key persons with whom the team interacted)-

- **Government Officials:** Key officials involved in the regulation and promotion of organic inputs, such as Shri Purnendu Nath Jha (Joint Director, Chemistry, Compost & Biogas-cum-senior I/C Organic Cell, Krishi Bhawan, Patna) and Dr. S. Anahbalagan (IFS, CEO, SOFDA, Gangtok).
- **Farmers:** Both individual farmers and those associated with Farmer Producer Organisations (FPOs), such as Smt. Bindu Bala from Katoria and Smt. Lata Devi, a BRC entrepreneur in Katoria.
- **Private Sector Representatives:** Entrepreneurs and business owners involved in the production and distribution of organic inputs, such as Sri Atul Gupta (Founder Director, Sunrise Farm, Jaipur) and Raghuveer (Owner, Eco Jeevan Bio Organics, Rajasthan).

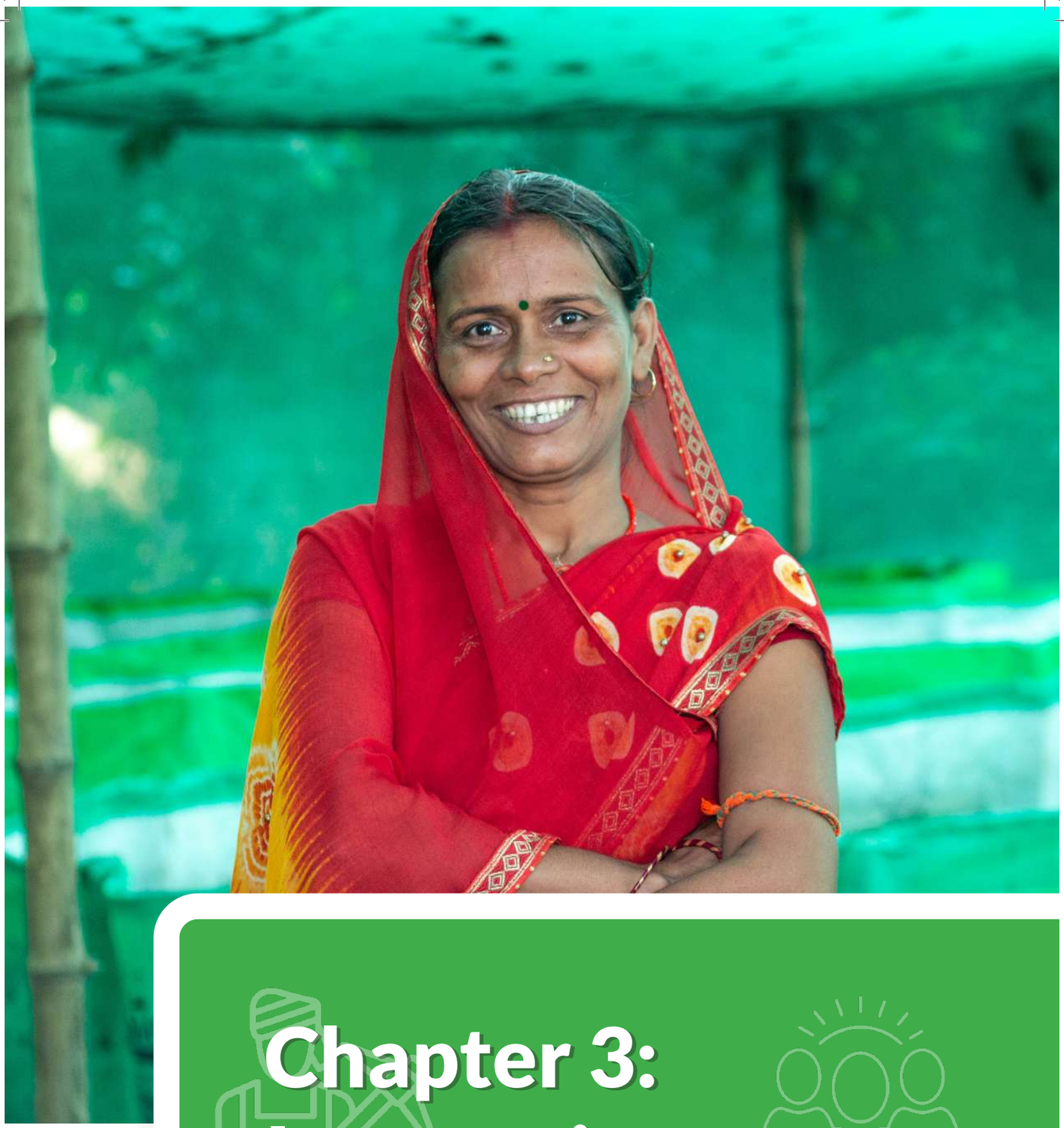
The data collection for the study was completed in four different phases.

- The **first phase** was in the period between 8-21 April 2024. The visit was completed by three different teams, where Team 1 visited Begusarai, Team 2 visited Jamui and Banka and Team 3 visited Katoria, Rajaun, Vaishali, Buxar and Deoghar (Jharkhand). During the visits they interacted with the Joint Director, Chemistry, Compost & Biogas-cum-senior I/C Organic Cell at Krishi Bhawan and KPMG consultants working on the Jaivik Scheme. In this phase the discussion was carried with individual distributors and farmers. The discussion was focussed on the challenges in the organic fertiliser market, how they would engage with local BRCs and farmers to understand the production and distribution of organic inputs, discussion on the demand for organic fertilisers and assessment of organic farming practices.

- The **second phase** was conducted in the period between 22 April to 2 May 2024. The visit was completed by two different teams, where Team 1 visited Madhya Pradesh (Indore, Julwaniya and Ozahr) and Team 2 visited Sikkim (Gangtok, Majitar, Rangpo, Kumeri Village). In the visit they interacted with government officials, the CEO of SOFDA, farmers, small entrepreneurs and different agencies like SIMFED and Sikkim IFFCO. The discussion was focussed on how to make farmers self-sustainable through training and certification programmes, to understand local organic farming practices and to learn about initiatives by SOFDA to support organic farming.

- The **third phase** was conducted in the period between May 3-18, 2024. Three teams conducted visits, where Team 1 visited Andhra Pradesh (Visakhapatnam, Thotlakonda, Anakapalli, Vijayawada), Team 2 visited Rajasthan (Lalsot, Rampura and Jaipur) and Team 3 visited Maharashtra (Pune, Kolhapur and Karad). During the visit they interacted with farmers and distributors to assess market for organic inputs. They also made visits to local farmers and individual entrepreneurs to understand the supply chain dynamics and different organic inputs.

- The **fourth phase** was conducted in the period between May 19-24, 2024. The visit was completed by two teams, where Team 1 visited Delhi and Faridabad and Team 2 visited Maharashtra (Sangli and Latur). During the visit they interacted with one major producer of organic inputs involved in the production of vermicompost, organic DAP and bio-pesticides.



Chapter 3: Interactions With Different Stakeholders

This chapter compiles interactions made with a wide range of stakeholders based on field visits made by the teams to selected locations. The stakeholders include officials, entrepreneurs, and farmers involved in government or private bodies that are producing or distributing organic inputs.

Some major findings from the interactions are as follows:

- The organic fertiliser and biofertiliser markets are small in size, and the other bio-input markets are even smaller. For example, the ₹ 4,750 crore organic fertiliser market is expected to be ₹ 8,000 crore by 2032, growing at a CAGR of 5.6%. The biofertiliser market is expected to be ₹ 996 crore by 2027.
- It is likely that a lot of organic fertilisers are produced and consumed domestically without being routed through the market.
- There are numerous variations in organic fertilisers, and prices are not standardised. For example, vermicompost price varies from ₹ 8 per kg to ₹ 70 per kg.
- Many individuals who purchase organic fertilisers and other bio-inputs do so for non-commercial purposes, for example raising organic vegetables in kitchen gardens, flowers in balconies and so on. They do not calculate cost-benefit because the produce is not for sale.
- The primary survey in this study found no evidence that farmers are purchasing bio-inputs from the market in any significant quantity. On the other hand, many manufacturers of organic inputs depend on government procurement under different promotional schemes.

3.1. Meeting with Government Officials

Krishi Bhawan, Bihar

Officials Met: Joint Director, Chemistry, Compost & Biogas-Cum-Senior I/C Organic Cell

The Joint Director introduced us to the KPMG consultants engaged in promoting and regulating the Jaivik Corridor scheme in Bihar. The consultants provided us with comprehensive insights into the scheme, which operates in 13 districts and adheres to two standards: NPOP (National Programme for Organic Production) and PGS (Participatory Guarantee System). The Jaivik Corridor follows NPOP standards, while the PKVY (Paramparagat Krishi Vikas Yojana) follows PGS standards and covers 23 districts (including the 13 from Jaivik Corridor plus an additional 10).

We learned about the various initiatives under these schemes, such as encouraging farmers to produce their own organic inputs and verifying the setup of vermi-beds before disbursing funds. The scheme includes a budget for vermi-beds, providing ₹ 5,000 for each setup. Additionally, we discussed the types of products distributed under these schemes, including PROM, NPK consortia, PSB, Azoto, KMB, neem cake, and Trichoderma.

Krishi Bhawan, Gangtok

Officials Met: CEO, SOFDA

The CEO explained their mission is to make farmers self-sustainable by producing organic inputs within their farms. The government supports these efforts by providing training and recognised certifications (NPOP) at the national level. They also conduct various awareness programmes, hands-on training sessions, and run a farm school, where experienced farmers train others. Other initiatives include frontline demonstrations, farmer-to-farmer training, exposure visits, farmer-scientist interactions, and Kisan Melas (farmer fairs). The CEO then connected us with key contacts in the Integrated Nutrient Management (INM) and Integrated Pest Management (IPM) departments.

Integrated Nutrient Management (INM) Department

Officials Met: Ms Chinmzon, Head of Nutrient Management Department

Ms Chinmzon emphasised their goal of maintaining soil fertility. They encourage the use of cow dung, cow urine and crop rotation practices. She explained that the government places orders through the Sikkim State Co-operative Supply and Marketing Federation Ltd (SIMFED) agency, which then conducts bids for distributors to supply organic inputs. Products distributed include Agrovita, Sanjivini Plus, Organo Gel, Grow FOS, Calcus, Ponnen, Nimbion 1500 ppm, Cinopro, and Cura. For vermicompost, orders are placed with local suppliers.

IPM (Integrated Pest Management) Department

Officials Met: Dr Roshna Garmer, Deputy Director, Agriculture Department

Dr Roshna Garmer discussed their approach in creating mother cultures from ICR on soil and their strong recommendation for using neem products for pest control. Neem bio-oils are used at a concentration of 1–2 ml per litre of water every 15–20 days. They also utilise Metarhizium (trade name: Kalichakra) and conduct trials in IPM before recommending any product for wider use.

She also showed us one neem product which they currently use: Nimbion 1500 (For more information, see: https://nimbion.com/product_nimbion_1500.php)

Agriculture Technology Management Agency (ATMA)

Officials Met: ATMA Office in Julwaniya, Madhya Pradesh

In this visit, we gained valuable insights into its pivotal role in advancing agricultural practices. ATMA operates as a decentralised agency focused on holistic agricultural development by bridging the gap between research institutions and farmers. Their primary focus is on disseminating innovative agricultural technologies and practices to enhance productivity and sustainability.

ATMA achieves its goals through a series of well-coordinated activities. They organise regular training programmes, workshops, and field demonstrations to educate farmers about the latest agricultural techniques and technologies. Additionally, they facilitate the formation of Farmer Interest Groups (FIGs) and Self-Help Groups (SHGs) to encourage collective action and peer learning among farmers. By providing continuous support and access to resources, ATMA empowers farmers to adopt modern, efficient, and environmentally friendly farming practices, ultimately contributing to improved livelihoods and food security in the region.

Jaivik Corridor Office, Buxar

Officials Met: Shri Rishabh, Head of the Jaivik Corridor Scheme, Buxar District

The Jaivik Corridor scheme is designed to create a sustainable and eco-friendly agricultural environment by encouraging the adoption of organic farming practices across the region. This scheme aims to transform traditional farming methods, reduce chemical usage, and improve soil health, leading to higher quality produce and better farmer incomes.

The Jaivik Corridor scheme operates through a multifaceted strategy. It provides extensive training and support to farmers on organic farming techniques, such as composting, crop rotation, and the use of natural fertilisers and pesticides. The scheme also facilitates the certification process for organic produce, ensuring that farmers can market their produce as certified organic, which often fetches higher prices. Additionally, the office coordinates with various stakeholders, including government bodies, NGOs, and agricultural experts, to provide a robust support network for farmers. By fostering a community of organic farmers, the Jaivik Corridor scheme is making significant strides towards sustainable agriculture and improved livelihoods for farmers in the Buxar district.

3.2. Visit to Entrepreneurs

Rajaun Farmers Under the PKVY Scheme

The team met Shri Tej Singh Naruka, a local farmer deeply involved in the PKVY scheme. According to Shri Naruka, out of the ten farmers involved, only three successfully constructed vermicompost beds using scheme funds. While all the farmers acknowledged the benefits of vermicompost, they were reluctant to produce it independently due to the associated costs. The few who ventured into independent production spent approximately ₹ 15,000 to produce around 1,200 kg of vermicompost, which they used on their 2-acre farms. The high initial investment was a significant barrier, despite the clear advantages of vermicompost.

Bio-pesticide Production by Smt Bindu Bala, Katoria

Smt Bindu Bala is a pioneering farmer in bio-pesticide production. Her farm was an intricate workshop of organic practices. Smt Bala detailed her process of creating a potent bio-pesticide by mixing besan, cow dung, cow urine, soil, and mustard cake to form '*Jeevamrit*'. This base was then combined with '*Agniastra*', made from neem leaves, colocasia leaves, aak leaves, and custard apple leaves. To enhance the mixture further, she added '*Haathi Khaad*' from the FPO, and additional inoculants such as Modicare's Activzyme, Active 80, and IFFCO's Nano Urea liquid. This concoction was not just for her use but also benefited her neighbours, fostering a community of sustainable farming.

Smt Lata Devi– BRC Entrepreneur, Katoria

Lata Devi, an entrepreneurial force behind a BRC unit supported by PRADAN. These units, known as Bio-Resource Centres (BRC), were established to produce biofertilisers like Haathi Khaad in large quantities. Lata Devi proudly shared that her unit had a monthly production capacity of 4,500 kg of Haathi Khaad. The previous financial year saw the sales of 33,733 kg of *Haathi Khaad*, produced by a total of four BRC units. The biofertiliser, primarily made from cow dung with various inoculants, had garnered significant demand in the market, highlighting the success of these farmer-driven enterprises.

Agrawal Fertilisers, Distributor in Banka

The team visited Agrawal Fertilisers in Banka, the owner's perspective was stark: organic products accounted for only 0.5% of their sales. The farmers in the region were largely unaware of organic alternatives and relied heavily on chemical fertilisers and pesticides. This reliance stemmed from the belief that chemical inputs resulted in higher yields, leading to a general distrust of organic products.

Shivansh Sainik Khad Centre (Manufactured by Pran Shakti, Begusarai, Bihar)

We spoke with a dedicated farmer running this small-scale operation. They specialise in producing super-vermicompost. The process begins with 20–25-day-old cow dung, which is inoculated with 4-5 kg of earthworms. After 10-12 days, they add jaggery and besan to accelerate the earthworms' activity. After approximately 45 days, six inoculants were added, including Trichoderma, Mycorrhiza, PSB, Azotobacter, Parle Phosphate, and KMB, to produce the final super-vermicompost product.

The farmer explained that their association with the Farmer Producer Organisation (FPO) streamlines their operations. The FPO provides them with details of the farmers to whom they need to supply, eliminating the need for direct interaction with individual farmers. Capital investment for their setup was also facilitated by the FPO, highlighting the collaborative effort behind their success.

Suhani Jaivik Khad (Manufactured by Pran Shakti, Begusarai, Bihar)

Suhani Jaivik Khad, another enterprise managed by Pran Shakti, operates on a much larger scale. Here, the team observed their advanced super-vermicompost production process, which caters to both individual farmers and FPOs. They customise their super-vermicompost based on investor demand. For instance, while the standard formulation includes 1 kg of inoculants per tonne, they adjust this ratio depending on investor requirements.

The unit outsources packaging and labelling to specialised vendors, ensuring a professional finish. During our conversation, the team shared their ambition to expand beyond Bihar by seeking export opportunities. They are also applying for a manufacturing licence to enhance their credibility and operational capacity. This proactive approach reflects their commitment to scaling operations and exploring new markets.

Sweety Jaivik Khad, Begusarai, Bihar

We visited Sweety Jaivik Khad, where we met the owner and observed operations. They produce both vermicompost and super-vermicompost. Vermicompost is sold at ₹ 5.50 per kg, and super-vermicompost at ₹ 6 per kg. Each vermi-bed produces 50 kg of compost, packaged into 20 bags. They use six inoculants (0.5 kg each) per tonne to create super-vermicompost.

Their production costs include ₹ 1,700 for cow dung, ₹ 600 for labour, ₹ 90 for 2 kg of sugar, and ₹ 45 for 1 kg of besan. The FPO provides packaging. They have utilised the MGNREGA scheme to set up their vermi-beds. Additionally, they sell earthworms at ₹ 30 per kg. Despite high demand, they face supply constraints due to their current capacity. For pest control, they use *Jeevaamrit* and *Agniastra*, sometimes providing these products free to farmers for promotional purposes.

Greedhari Supplier Visit, Begusarai, Bihar

Our visit to Greedhari Supplier in Begusarai revealed their operations as a wholesale firm with a BRBN dealership and distribution licence. They informed us that the demand for conventional (chemical) fertilisers is 97-98%, while organic fertilisers only account for 2-3%. Despite the low demand, organic fertilisers offer higher margins. They are suppliers under the Jaivik scheme and provide a kit for farmers that includes Trichoderma, neem oil, PSB, liquid NPP consortia, Phos, and a drum costing ₹ 6000. Bio-potash is among their top 30 selling products. They noted no significant issues with

the storage or handling of organic fertilisers but face challenges with dead stock due to low demand.

Green Globe Organic Ventures Pvt. Ltd., Majitar, Sikkim

Shri Dipendra, the owner, welcomed us and shared insights into their operation. Specialising in biofertilisers like NPK, Pseudomonas, Azotobacter SP, and PSB, the unit primarily fulfilled government contracts which they obtained by first applying for and then bidding on the lease of this project for the project when it was made public by the Government of Sikkim. With a production capacity of 100,000 litres, they were currently selling 50,000 litres. The technology used was sourced from CSIR, Palampur, and Tamil Nadu Agriculture University. The products were certified by Lacon Quality Certification. This certification is particularly focused on organic production and labelling of organic products. Lacon Quality Certification Pvt. Ltd. is accredited for ISO/IEC 17065, which is a standard for bodies certifying products, processes, and services, ensuring compliance with EU Regulation (EU) 2018/848 on organic production and labelling). Their pricing was competitive, with NPK at ₹ 360 per litre and Pseudomonas at ₹ 415 per litre.

Joint Director's Office and Biological Control Lab, Visakhapatnam

Smt M. Sivalaxmi, (ADA), and Shri Sai Prasad, Agricultural Officer, guided us through their well-established facility. Since 1998, the lab has produced various biofertilisers including Pseudomonas, Trichoderma, Trichogramma and Metarhizium. Most of their produce, 70%, was provided to farmers at subsidised rates, with the remaining 30% sold at MRP through retailers. In the fiscal years 2022–23 and 2023–24, they sold 20 tonnes and 30 tonnes of Pseudomonas at ₹ 150 per kg, 14 tonnes and 20 tonnes of Trichoderma at ₹ 100/kg, 1400 cards of Trichogramma at ₹ 40/card each year, and 700 kg and 1 tonne of Metarhizium at ₹ 100/kg.

Regional Agriculture Research Station, Anakapali

Smt Ramalaxmi, a soil science expert, provided a tour. The station produced biofertilisers (Azotobacter, Azospirillium, Rhizobium and PSB) from locally sourced raw materials, distributing 10% directly to farmers, 50% through FPOs and NGOs, and using 40% internally for research. Their products included liquid Azotobacter at ₹ 150 per litre with an annual production of 5,000 litres, and solid Azotobacter at ₹ 80 per kg with 1,200 kg produced annually. Rhizobium followed the same pricing and production. Azospirillum was produced based on demand, usually below 1,000 litres and 500 kg annually. PSB production was entirely dependent on the availability of orders.

ICAR Department, Anakapalli

Here Dr Visalaxmi, the Principal Scientist, explained their mission: the department focuses on producing high-quality inputs like Trichogrammatid, Metarhizium, Pseudomonas, and Trichoderma. Their goal was not profit but to supply quality cultures for further multiplication. They produced 3,000 Tricho-cards annually at ₹ 150 per card, with production costs at ₹ 450 per card. For Metarhizium, they produced 1000 kg per year, sold at ₹ 250 per kg, with production costs between ₹ 500-600/kg. Pseudomonas and Trichoderma followed similar production and cost patterns, each producing 1000 kg per year sold at ₹ 250 per kg.

Kikaboni Farms, Faridabad

Shashi Shikha, the owner of Kikaboni Farm, this farm specialised in organic agricultural

products, including vermicompost, organic DAP, and bio-pesticides. Using Eisenia Fetida earthworms, they achieved a vermicompost production capacity of 100 tonnes every 3 months, totalling 500 tonnes annually, with a selling price of ₹ 6 to ₹ 10 per kg and a production cost of ₹ 2.5 to ₹ 3 per kg (excluding freight). Each vermicompost bed, measuring 30 ft × 4 ft, contained 30 kg of earthworms and was fed with a mix of 10 kg of besan and 10 kg of gud per 200 kg drum. Their organic DAP was produced by decomposing rock phosphate in cow dung over 5-6 months, sold for ₹ 25 to ₹ 30 per kg. They also offered a bio-pesticide made from cow urine, neem leaves, castor leaves, green chillies, and banana stem juice, priced at ₹ 250 to ₹ 300 per litre.

Sunrise Farm, Jaipur, Rajasthan

At Sunrise Organic Farm in Jaipur, we observed the meticulous preparation of various organic products. The farm produces vermicompost, a nutrient-rich soil conditioner made from cow dung, earthworms, and organic inoculants. Vermiwash, an effective foliar spray and pesticide, is also extracted from the vermicomposting beds. Additionally, we saw the innovative process of making bacteria khad, which involves combining cow dung with black soil and regular watering. These products reflect Sunrise Farm's dedication to sustainable farming and eco-friendly practices.

Lalsot Pareek Organic Farm, Rajasthan

At Lalsot Pareek Organic Farm, we met Shri Prakash, who shared insights about their significant contributions to organic farming. The farm has received substantial support from the government and NABARD, including a ₹ 2 lakh investment and assistance with vermi-bed structure expenses. Specialising in vermicompost bed and Azolla bed production, the farm collaborates with 500 local farmers. They offer practical solutions like Jeevamrit drum mixtures to enhance soil fertility. The farm's role in promoting sustainable agriculture and community development is evident through this robust support.

Eco Jeevan Bio Organics, Rajasthan

Eco Jeevan Bio Organics focuses on producing and selling organic inputs. During our visit, we learned about their high-quality vermicompost and vermiwash products. Vermiwash, priced at ₹ 300 per litre, is enriched with amla and buttermilk (chaach) to boost its nitrogen content. This nutrient-rich liquid fertiliser is highly valued by farmers for its effectiveness in promoting plant growth and soil health. Additionally, the farm sells earthworms, which are essential for vermicomposting. This visit underscored the farm's commitment to organic agriculture and its positive impact on the local farming community.

Kamdhenu Jaivik Krishak Kalyan Samiti, Madhya Pradesh

Kamdhenu Jaivik Krishak Kalyan Samiti- this innovative organisation is dedicated to the production of a variety of products entirely reliant on natural processes. They specialise in natural organic fertilisers, including neem seed extract and a unique mixture derived from five distinct plants. One of their standout products is *Sudarshan*, a unique blend that combines all of their individual offerings. This ensures a comprehensive solution for organic farming needs. The commitment of Kamdhenu Jaivik Krishak Kalyan Samiti to sustainable and eco-friendly agricultural practices was truly inspiring and highlighted the potential of natural products in enhancing soil fertility and crop health.

VasantDada Sugar Institute, Pune

The institute boasts a well-equipped liquid

biofertiliser production unit spanning 8,750 square feet, with an impressive annual capacity of 100,000 litres. Additionally, their vermicompost production unit covers 5,000 square feet and can produce up to 250 tonnes per year. One of the key recommendations from VSI is the application of a consortium of potash-mobilising bacterial liquid bioinoculant at a rate of 2.5 litres per hectare, mixed with 500 litres of water during planting using the drenching method. This should be done alongside 75% of the recommended potash source (87 kg/ha) and 100% of the recommended doses of Nitrogen and Phosphorus (250 kg/ha and 115 kg/ha, respectively). This method is advised to achieve maximum cane and sugar yield in Suru sugarcane cultivation.

Krishna Biofertiliser Lab, Rethare Bk

We visited Krishna Biofertiliser Lab, which offers a wide range of products, including beneficial bacteria, biopesticides, biofertilisers, bio-fungicides, and growth promoters. The Krishna Biofertiliser unit is well-structured and equipped with essential instruments for producing biofertilisers, such as autoclaves, shakers, and laminar airflow systems. The facility is thoughtfully organised with specialised processing rooms to ensure efficient production and quality control. These include the Mother Culture Room, Incubation Room, Laminar Room, Shaker Room, Quality Control Room, and Packaging Room. Each room is dedicated to a specific stage in the production process, reflecting the lab's commitment to high standards and innovation in the field of biofertilisers.

LCB Fertiliser Pvt. Ltd.

During our visit, we learned that the company operates six production units- four in Uttar Pradesh, one in Maharashtra, and one in Madhya Pradesh. These units benefit from incubation support provided by IIT Kanpur. The company employs 50 dedicated staff members, working tirelessly to produce high-quality biofertilisers. One of their standout products is Navyakosh, which is available in 50 kg bags ₹ 700 (dealer price) and ₹ 800 (farmer price). For home and kitchen gardening enthusiasts, Navyakosh is also available on Amazon in 2 kg bags for ₹ 399. This biofertiliser contains beneficial microbes fermented on a blend of cow dung, jaggery, and chickpea flour.

A unique feature of Navyakosh is its treatment with nanoparticles, allowing it to survive temperatures up to 78°C. Additionally, it is also enhanced with a biopolymer that improves water retention near the root zone, making it particularly effective in high-temperature conditions. This visit highlighted the company's innovative approach to sustainable agriculture and their commitment to supporting farmers and gardeners alike.

3.3. Farmers Visit

Smt Muniya - Based in Katoria, Bihar

While the team was conducting field visits in Katoria, we came across many farmers, one of them was Smt Muniya, who was not only working as a farmer but also running a nursery of her own where she grows plant saplings for 2–3 weeks and then supply them to various farmers. Just from her nursery she was earning an annual income of ₹ 2,00,000. Apart from this, Smt Muniya mainly grows capsicum, coriander, red chillies, and tomatoes. She mentioned that she uses only organic inputs provided by either PRADAN or acquired by them from the local market.

Smt Bindu Bala - Based in Katoria, Bihar

Smt Bindu Bala has been a farmer for her entire life and used to grow crops like French beans, capsicum, coriander, red and green chillies,

tomatoes and cabbage. She anticipated her total production to be 600-700 kg in total, which according to her had increased since last year as a result of her using *Haathi Khaad*, a biofertiliser being produced at BRC units in Katoria block. She also told us that they are able to get better rates in the market for organic produce, but due to limited quantities they do not usually go to the market as it is cost-prohibitive, instead they sell to the nearest available buyer.

Smt Parul - Based in Banka, Bihar

Smt Parul, a farmer primarily growing red chillies, known in her neighbourhood for making her own bio-pesticide with different varieties of leaves, chillies and cow urine. She also used *Haathi Khaad* as a biofertiliser for her crops just like Smt Bindu. She mentioned her concern with the product (Haathi Khaad) that due to similarity in its appearance with decomposed cow dung, a lot of farmers are not convinced that it has any real advantages, and that they should spend ₹ 15 per kg on this product.

Shri Upendra Sharma - Based in Begusarai, Bihar

We visited Upendra Sharma, who has been part of the Jaivik Corridor Scheme for a year. He grows potatoes, black wheat, and mustard organically on his farm. Upendra shared that he can achieve an output of 50-70 kg without using urea. Through the Jaivik Corridor Scheme, he received a ₹ 5,000 subsidy to set up a vermi-bed. The Krishi Salhakar (agricultural advisor) provided training on using different organic fertilisers. Currently, Upendra uses Trichoderma, mycorrhiza, and Parle phosphate to enhance soil fertility.

Farmer in Kameria Village, Rangpo, Gangtok, Sikkim

We visited a farmer in Kameria Village, Gangtok, who has been farming organically since 2014 on his 2-acre land. He grows chilli, brinjal, and karela using rural compost (cow dung) and self-produced vermicompost. He also grows azolla as bio-manure and cow feed. For pest control, he uses a mix of medicinal plants (*Titapati*, *Nimpati*, *Banmara*), cow urine, and curd. The government provides training and supplies seeds. Bees are used for maize pollination.

Under the Pradhan Mantri Swasthya Suraksha Yojana (PMSSY), he received ₹ 8 lakh for setup, with 60% government-funded and 40% self-funded. This support has significantly boosted his farm's productivity.

Chapter 4: Bio-Input Products

In this chapter, we will be discussing different kinds of products used in organic farming, types of licences or certificates required for organic farming and will also discuss various government interventions to promote organic inputs for organic farming.

4.1 Different Kinds of Products

The organic inputs market in India is categorised based on the type of inputs used in organic farming. These categories include:

1. Organic Fertilisers:

1. **Compost:** this is decomposed organic matter used to enrich soil.

Product: Haathi Khaad. Manufactured by BRC units, associated with PRADAN

Quantity sold in previous FY: 33,733 kg at ₹15 per kg

Sold to: 100% sold to FPOs, which in turn sell it to farmers.

About: An organic manure produced primarily from decomposed cow dung mixed with Jeevamrit (made from chickpea flour, jaggery, mustard cake, and cow urine). After mixing, they are left to further decompose for a few days and then additional inoculants are added including - Trichoderma, Pseudomonas, Rhizobium, Mycorrhiza, NPK Consortia, Chickpea flour, Green Gram flour, Horse Gram flour and Jaggery.

2. **Vermicompost:** these are compost produced through the breakdown of organic matter by earthworms.

Product: Super-Vermicompost

During our visit to the Shivansh Sainik Khad Centre, We spoke with Shri Sharma, the unit manager. They use 20–25-day-old cow dung, mix it with vermicompost, and introduce 4-5 kg of earthworms. After 10-12 days, they spray a jaggery and besan solution to boost microbial activity. The compost is covered and left to mature for 45 days. At Suhani Jaivik Khad, Smt Singh explained their customised approach, adjusting inoculant levels according to investor requirements. They outsource packaging and labelling and are exploring export opportunities. Both units aim to enhance soil fertility and reduce reliance on chemical fertilisers, benefiting local farmers significantly.

3. **Green Manure:** this refers to plant-based materials used to improve soil fertility. Green manure involves the cultivation of specific plants (cover crops) that are grown primarily to be incorporated back into the soil to improve its organic matter content and fertility. Common green manure crops include legumes, clover, and grasses.

Product: Azolla is a freshwater fern used in tropical and sub-tropical regions as green manure. It fixes atmospheric nitrogen into ammonia, benefiting rice plants. It was explained that to make compost from Azolla, one can collect Azolla and prepare a compost area or bin. It can be done by layering coarse materials like small branches or straw at the bottom for airflow. Then, add a layer of Azolla, followed by a layer of dry leaves or straw. Repeat these layers until the pile or bin is full. Keep the compost pile moist. After a few months (4-5) the materials will turn into dark, crumbly compost. We can use this compost to enrich the soil and help the plants grow better.

Bio-Manure: Dried Azolla is a good nitrogen source.

4. **Biofertilisers:** these are microbial inoculants that enhance nutrient availability and uptake. There are multiple biofertilisers available in the market, some of the products that we observed during this study were:

Box 4.1: Types of Biofertilisers

Product	Manufactured By	Quantity sold in previous FY	Sold to	About the product
Pseudomonas	Biological Control Lab, Vizag	20,000 kg at ₹ 150 per kg	100% sold to farmers, 70% at subsidised rate and 30% at MRP	Pseudomonas is a genus of bacteria known for its diverse metabolic capabilities and its role in promoting plant health and soil fertility. Pseudomonas can produce phytohormones like auxins, which promote root growth and enhance nutrient uptake. Some species of Pseudomonas are involved in nitrogen fixation, converting atmospheric nitrogen into forms that plants can absorb and use. Pseudomonas produces antibiotics that can suppress soil-borne pathogens, reducing the incidence of plant diseases.
Trichoderma	Biological Control Lab, Vizag	14,000 kg at ₹ 100/ kg	100% sold to farmers, 70% at subsidised rate and 30% at MRP	Trichoderma is a genus of fungi commonly found in soil and root ecosystems. These fungi are known for their beneficial effects on plant health and soil quality. Trichoderma species primarily feed on decaying organic matter, contributing to the decomposition process. They are known for their fast colonisation and growth, which allows them to quickly establish in soil environments. Trichoderma fungi are effective in controlling plant pathogens

Product	Manufactured By	Quantity sold in previous FY	Sold to	About the product
Metarhizium	Biological Control Lab, Vizag	1,000 kg at ₹100 per kg	100% sold to farmers, 70% at subsidised rate and 30% at MRP	Metarhizium is a genus of entomopathogenic fungi belonging to the family Clavicipitaceae. These fungi are known for their role as natural pesticides, targeting a variety of insect pests. Metarhizium species are commonly found in soil and have multifunctional lifestyles, exhibiting saprotrophic, endophytic, and insect pathogenic modes of nutrient acquisition. They can enhance plant growth and health by providing essential nutrients derived from their insect-host interactions.
Azotobacter	Regional Agricultural Research Station, Anakapalli	5,000 litres at ₹150 per litre	10% directly to farmers, 50% through FPOs and NGOs, 40% used internally for research.	Azotobacter is a genus of free-living, nitrogen-fixing bacteria that are typically oval or spherical in shape and known for forming thick-walled cysts. In agriculture, Azotobacter is valued for its use in biofertilisers because of its nitrogen-fixing capabilities, which can enhance soil fertility and promote plant growth without the need for chemical fertilisers. Additionally, some species of Azotobacter can produce substances that may have biopolymer and food additive applications.
NPK Consortia	Green Globe Organic Ventures Pvt. Ltd., Majitar, Sikkim	50,000 litres at ₹360 per litre	10% directly to farmers, 50% through FPOs and NGOs, 40% used internally for research.	NPK consortia refer to a combination of biofertiliser strains that provide essential nutrients—nitrogen (N), phosphorus (P), and potassium (K)—to plants. These consortia typically include nitrogen-fixing bacteria like Azospirillum or Gluconacetobacter, phosphate-solubilizing bacteria (PSB) such as Pseudomonas striata, and potassium-solubilizing bacteria (KSB). The purpose of NPK consortia is to create a more balanced and efficient means of delivering these key nutrients to crops. NPK consortia are available in various formulations, including liquid, lignite, kaolinite, sodium alginate, and bentonite base formulations, each with different properties and application methods.

Box 4.2: Types of Botanical Pesticides

Product	Manufactured by	Quantity sold in previous FY	Sold to	About the product
Trichogramma	Biological Control Lab, Vizag	1400 cards at ₹40 per card	100% sold to farmers, 70% at subsidised rate and 30% at MRP	*Trichogramma* cards, commonly known as Trichocards, are a biological control method used in agriculture to manage pest populations, particularly those of the Lepidoptera order, which includes moths and butterflies. These cards are impregnated with eggs of the *Trichogramma* species, which are tiny parasitic wasps. The wasps are beneficial insects that parasitize the eggs of harmful pests, preventing them from hatching into crop-damaging caterpillars or larvae. Each card contains approximately 20,000 Trichogramma eggs. The cards are placed in the fields, and when the eggs hatch, the emerging wasps seek out and parasitize the eggs of target pests. This method is effective in preventing 80–90% of potential crop loss due to pest damage.
Metarhizium anisopliae	Krishna Biofertiliser Lab, Rethare Bk.	2650 kg, ₹220 per kg	100% sold to farmers	*Metarhizium anisopliae* is an entomopathogenic fungus widely used in agriculture as a biological pesticide to control various insect pests. It infects insects by penetrating their exoskeletons, proliferating inside their bodies, and ultimately killing them. It has a broad host range that includes beetles, locusts, and termites, it serves as an effective and environmentally friendly alternative to chemical pesticides, and has minimal impact on non-target organisms such as humans, pets, and beneficial insects. Commercially available in various formulations, it is a vital component of integrated pest management (IPM) strategies and supports sustainable agriculture.. Ongoing research seeks to enhance its efficacy and stability, and to develop new, improved strains.

2. Botanical Pesticides

Biopesticides are a type of insect killer derived from natural materials such as animals, plants, bacteria, and certain minerals. Unlike conventional pesticides, biopesticides typically have low toxicity to humans, animals, and the environment, and they often target specific pests, reducing the risk of harm to beneficial organisms.

1. Microbial Pesticides: Contain microorganisms that target specific pests

2. Organic & Neem-based Pesticides: Plant-based substances, such as neem extracts, are widely used for pest control in organic farming.

3. Bio-fungicides:

These are specifically designed to control fungal diseases in plants. Like other biopesticides, bio-fungicides are derived from natural materials and offer environmentally friendly alternatives to synthetic chemical fungicides. They utilise living organisms or naturally occurring substances to suppress or inhibit the growth of fungal pathogens.

Box 4.3: Types of Bio-Fungicides

Product	Manufactured by	Quantity sold in previous FY	Sold to	About the product
Pratikar Liquid Fungicides	VSI Pune	9590 litres	100% sold to farmers	The microbial fungicide formulation, featuring a microbial count of and a shelf life of one year, is a mixed culture comprising *Trichoderma harzianum*, *Trichoderma viride*, *Gliocladium virens*, *Bacillus subtilis*, and *Pseudomonas fluorescens*. It is suitable for all types of crops, including monocotyledons, dicotyledons, fruit crops, and vegetables. The product is available in 1-litre packaging, with 5-litre and 20-litre packs available upon request. The price is ₹250 per litre plus a 5% GST. This bio-fungicide provides an effective, environmentally friendly solution for crop protection, leveraging the beneficial properties of its microbial constituents to promote healthy plant growth and yield.

4. Organic Growth Promoters

1. Plant Growth Regulators: Natural substances that influence plant growth and development. Plant growth hormones are concentrated solutions that provide essential nutrients to plants in a form that is quickly absorbed through leaves and roots. They can be applied directly to the soil or as a foliar spray, offering a fast and efficient method of nutrient delivery.

Product - Vermiwash

About: The Team visited Sunrise Farm where Vermiwash is produced and used as a foliar spray. Vermiwash is a liquid fertiliser extracted from vermicomposting beds. It contains excretory products and mucus secretions of earthworms, rich in plant growth hormones and micronutrients. It is used to enhance plant growth and protect against pests and diseases.

Materials required to make it: bucket or drum, broken bricks or pebbles, coarse sand, loamy soil, earthworms, cattle dung and water.

2. Bio-stimulants: Substances that enhance plant growth and stress resistance.

5. Organic Soil Conditioners

1. Humic Acid: Enhances soil nutrient holding capacity and microbial activity.

2. Fulvic Acid: Promotes nutrient absorption and enhances plant growth.

3. Seaweed Extracts: Improve soil structure and fertility, and stimulate plant growth.

6. Organic Seeds and Planting Material

Seeds that are certified organic, free from synthetic chemicals, and non-GMO.

7. Organic Crop Protectants

1. Biocontrol Agents: Predators, parasites, or pathogens used to control agricultural pests.

2. Natural Enemies: Beneficial insects that naturally manage pest populations.

Apart from the products discussed above, there are multiple biological fertilisers, pesticides and fungicides available in the market from various large and small-scale producers.

A list of organic inputs (few products) with their bifurcation into each category and their uses/ benefits are listed in the Annexure D

4.2 Different Types of Licences/ Certificates

In this section, we will discuss the different licences or certifications that are required for farming, the steps required for certification and their regulatory bodies.

1. Organic Certification Process

In India, organic certification is regulated by the Agricultural and Processed Food Products Export Development Authority (APEDA) under the Ministry of Commerce and Industry. The certification process follows the National Program for Organic Production (NPOP) standards.

The organic certification process includes several steps such as farm registration, inspection, application submission, documentation, review, and final decision. Details are provided in Annexure E.

2. Licensing for Biofertilisers

For biofertilisers like Super vermicompost, the Fertiliser (Control) Order (FCO) 1985 governs the licensing process. The FCO is administered by the Department of Agriculture, Cooperation & Farmers Welfare under the Ministry of Agriculture and Farmers Welfare.

Steps for Licensing: Licensing steps include application submission, product testing, inspection, approval, licensing, and renewal.

Details of the process are provided in Annexure E.

3. Regulations for Vermicompost

Vermicompost, including Super-vermicompost, must comply with specific regulations under the FCO. These regulations ensure that the product is safe, effective, and of high quality. Key regulatory requirements include quality standards, labelling, and packaging. Details are provided in Annexure F.

4.3 Government Interventions in Organic Inputs

The Indian government plays a significant role in the biofertiliser and bio-pesticide market through various schemes aimed at promoting organic farming. Some key government initiatives are outlined below:

1. Paramparagat Krishi Vikas Yojana (PKVY)

This scheme aims to support and promote organic farming, resulting in an improvement in soil health. It encourages the Participatory Guarantee System (PGS) for organic certification, which is a decentralised, farmer-friendly system. The government provides financial assistance under PKVY, with a funding pattern in the ratio of 60:40 by the Central and State Governments respectively. In the case of Northeastern and Himalayan States, the ratio is 90:10, and for Union Territories, it's 100%. The scheme proposes to cover an additional 600,000 hectares under organic farming by 2025-26.

2. Jaivic Corridor

This initiative by the Bihar government promotes organic farming along the banks of the River Ganga as part of the state's 'Third Agriculture Roadmap' for 2017-2022. The corridor spans 13 districts and aims to convert 20,000 acres into fully organic areas.

3. Procurement of Organic Inputs

The government procures organic inputs through various channels, including direct purchases from certified producers and open tenders. Companies supplying these inputs are often those that have certifications under the National Programme for Organic Production (NPOP) or PGS-India. These companies are required to adhere to strict quality standards to ensure that the products are genuinely organic and free from contaminants.

4. Capital Investment Subsidy Scheme

The Bio Research Center (BRC) opts to proceed as a private entity, it can apply for the subsidy through NABARD. BRC needs to prepare a comprehensive Detailed Project Report (DPR) and ensure adherence to NABARD's guidelines. Although the assistance covers only 25% of the project cost, this funding can significantly reduce the initial financial burden. BRC should explore additional funding sources to cover the remaining project costs, to ensure the successful establishment of the biofertiliser unit. By leveraging this scheme, BRC can enhance its production capabilities and contribute to sustainable agricultural practices.

5. Agri Clinics and Agri Business Centres Scheme

The ACABC scheme, overseen by the Ministry of Agriculture and Farmers' Welfare in India and facilitated by NABARD as the subsidy channelling agency, aims to enhance public extension efforts by offering essential services to farmers either for free or on a paid basis, depending on the agri-preneur's business model, local needs, and the target farmers' affordability. Additionally, the scheme seeks to promote agricultural development and create meaningful self-employment opportunities for

unemployed agricultural graduates.

6. Prime Minister Employment Generation Programme

Under this scheme approximately 90% of the total estimated cost of establishing a lab is sanctioned in the form of a loan.

7. Role in the Market

The government's role in the biofertiliser and bio-pesticide market is multifaceted:

1. Promoting Organic Practices: By financially supporting farmers to adopt organic farming practices, the government helps increase the demand for biofertilisers and biopesticides.

2. Quality Assurance: Through schemes like PKVY, the government ensures that only high-quality, certified organic inputs are used, which helps maintain market standards.

3. Market Expansion: Initiatives like the Jaivic Corridor help expand the market for organic inputs by creating new areas of organic farming, thus increasing the overall market size.

4. Direct Procurement: The government directly procures organic inputs for distribution among farmers, which provides a stable market for producers of these inputs.

4.4 Process for Availing the Subsidy

1. Application Submission

1. For Government agencies, a detailed project report (DPR) to the respective State Government must be submitted to the relevant state agriculture department. The DPR should include technical and financial details, proposed capacity, and cost estimates.

2. For individuals/private agencies, the DPR is to be submitted to the National Bank for Agriculture and Rural Development (NABARD) or any other designated agency. The DPR must include project details, estimated costs, and projected outcomes.

2. Project Appraisal

The submitted DPR will be appraised by a committee constituted by the State Government or NABARD. The appraisal process includes feasibility analysis, cost-benefit analysis, and verification of technical aspects.

3. Approval

Upon successful appraisal, the project will be approved, and a sanction letter will be issued. For Government Agencies, the approval will come from the State Government. For Individuals/Private Agencies, the approval will come from NABARD or the designated agency.

4. Sanctions

For Government Agencies, 100% assistance up to a maximum limit of ₹160 lakh per unit will be provided. Funds will be released in instalments as per the project milestones and progress. For Individuals/Private Agencies, assistance up to 25% of the project cost limited to ₹40 lakh per unit will be provided. NABARD will release the funds in phases, typically linked to project milestones.

5. Implementation and Monitoring

The implementing agency (State Government or NABARD) will monitor the project's progress regularly. Beneficiaries must submit periodic progress reports and utilisation certificates.

Chapter 5: Recommendations

This chapter entails discussions on the recommended products, their processes and applications, different marketing strategies and experimental products for organic farming. In summary, the following recommendations emerged from the study:

- Based on discussions with existing BRC entrepreneurs, each BRC should have a production capacity of at least 100 tons per year of super-vermicompost. This capacity should enable the BRC owners to achieve a minimum annual return of ₹4,00,000, including labour costs.
- A biofertiliser plant may be established at the FPC/Federation of FPC level. This plant will produce the biofertilisers to be used as inoculants in vermicompost production. The biofertilisers can also be sold in the market.
- Currently, consumers pay ₹15 per kg of vermicompost. It should be possible to reduce this cost. Some options are listed below:
  - Vermicompost production currently is a three-stage process viz, vermicompost production, enrichment with Jeevamrit and finally with biofertilisers. The cost incurred for each stage of enrichment versus nutrient benefit achieved requires careful evaluation. If there are no commensurate benefits, one or more stages may be deleted. This could reduce the overall cost.
  - Vermiwash and earthworms can be harvested and sold as byproducts.
  - Explorations could be undertaken with leading organic and biofertiliser manufacturers for tie-ups in production, or franchisee arrangements, if they offer comparative advantages.
- Steps may be taken to bring super-vermicompost under Fertiliser Control Order so that it can be sold to the government and in the open market.
- While cow dung should be available for the BRCs, collection could become an issue because the animals graze during the day. A solution for this challenge needs to be developed.

5.1. Products Recommended

1. Super-vermicompost:

Super-vermicompost is recommended for its superior benefits compared to regular vermicompost and other organic fertilisers. It contains several beneficial inoculants, including Trichoderma, Pseudomonas, PSB, Mycorrhiza, Rhizobium, and NPK Consortia, which enhance its effectiveness as a biofertiliser. These inoculants provide additional nutrients, improve soil health, and promote plant growth, making super-vermicompost a comprehensive solution for sustainable agriculture.

The process and its application for producing super-vermicompost are discussed in Annexure G. Super-vermicompost produces two by-products:

a. Earthworms

b. Vermiwash

- Earthworms (by-product): After adding 4 kg of earthworms to each bed and providing them with moisture, shade and cow dung, the earthworms reproduce at a rapid pace. The spare earthworms are sold in the market at ₹400 per kg. On Average, a BRC owner sells about 5 kg of earthworms from a single vermi-bed in a year. Considering that an average BRC unit currently has about 35 beds, these earthworms alone can generate an additional revenue of ₹2,000 per bed or ₹70,000 from 35 beds. An additional cost of ₹33 would be incurred by the BRC owner for selling each kg of earthworm, this would mean an additional cost of ₹5,775 for selling 175 kg of earthworms. Cost sheets and related assumptions are discussed in the annexure H and I.

Vermiwash (by-product): Vermiwash is an organic liquid fertiliser collected after water

Box 5.1: Why was super-vermicompost selected as an ideal product

- Multiple products were evaluated during the study, and super-vermicompost emerged as the most beneficial product that can be commercially produced and encourage organic farming among farmers.
- Nutrient-rich: Provides a balanced supply of essential nutrients, including nitrogen, phosphorus, and potassium, as well as trace elements.
- Soil health: Enhances soil structure, water retention, and microbial activity.
- Plant growth: Promotes robust plant growth, improves yield, and enhances resistance to pests and diseases.
- Sustainability: Reduces the need for chemical fertilisers, promoting sustainable agricultural practices.
- 1,000 kg of super-vermicompost can be produced using 1,350 kg of cow dung, making it scalable for large-scale production.
- Super-vermicompost is the only product in our study that yields two maketable by-products- vermiwash and earthworms- offereing additional profit opportunities for the entrepreneurs.
- Super-vermicompost was also preffered over Haathi Khaad, an alternative to super-vermicompost, currently produced by four BRC units in Katoria, Bihar, was facing rejection by farmers. Its visual similarity to cow dung made Hathi Khad less appealing to farmers as a product which cost 10 times the price of cow dung.

passes through a composting pit containing earthworm rich super-vermicompost. It is rich in plant growth hormones, micro-nutrients, and major nutrients such as nitrogen, phosphorus, and potassium. Vermiwash is essentially a by-product of vermicomposting and contains excretory products and mucus secretions of earthworms, along with micronutrients from the soil organic molecules. It is used as a foliar spray for plants and is known for its non-toxic and eco-friendly properties, which can enhance plant growth and protect against pests and diseases.

A single bed of super-vermicompost produces 120 litres of vermiwash annually as a by-product during its production process. Vermiwash will sell for ₹60 per litre in the market. Assuming an expenditure of ₹25 per litre on packaging, labour and transportation, each litre of vermiwash would still provide ₹35 per litre of profit to the BRC owner. With 35 beds in a BRC, this would translate to 4200 litres of vermiwash per year generating a profit of ₹1,47,000. We have also prepared the cost sheets and with assumptions detailed in Annexures H and I, respectively.

Financial Viability

Assumptions made:

To calculate the potential costs and revenues from the BRCs and FPOs, certain assumptions were made based on the information provided by BRC owners, PRADAN officials and one private vermiwash producer based in Rajasthan. All assumptions made (see Annexure I) are listed below:

- Based on our discussion with the BRC owners during this study it is decided that an annual production of at least 100 tonnes or (1,00,000 kg) of super-vermicompost would be necessary for the attractiveness of the overall prospect. Based on our calculations this quantity would provide the BRC owners with their desired profit of ₹4,00,000 per annum.
- Each bed in a BRC is assumed to produce 3,000 kg of super-vermicompost per year, with 5 kg of Super-Vermicompost spent for packing

every 5 kg of earthworms. Annually, 120 litres of vermiwash are produced per bed, and there are 35 beds in a BRC, with 5 production cycles per year. Each bed yields 600 kg of super-vermicompost per cycle. The packaging costs are ₹2 per kg for Super-Vermicompost and ₹15 per kg for vermiwash. The transportation cost for Super-Vermicompost is ₹2 per kg, while marketing costs are ₹1 per kg. The cost of cow dung is ₹2 per kg, and inoculants cost ₹2 per kg of Super-Vermicompost.

- The machinery required costs ₹70,000. An interest rate of 12% assumed for the investment corpus. Infrastructure costs are estimated at ₹150,000. Each bed has a cost of ₹2,000, and 4 kg of earthworms are required per bed. The labour cost for producing 1 kg of Super-Vermicompost is ₹2. The selling price of Super-Vermicompost to FPO (Farmer Producer Organisation) is ₹11 per kg, and the FPO sells it to farmers at ₹15 per kg. Earthworms can be sold at ₹400 per kg, and the transportation cost for Vermiwash is ₹5 per litre. Labour for producing Vermiwash costs ₹5 per litre, and the packaging cost for earthworms is ₹2 per kg. Vermiwash is sold at ₹60 per litre, with a product wastage rate at 5%.

Initial Investment:

Initially, the owner would need to invest personal funds or take a loan of approximately ₹7,42,638. This would include funds for the following:

- Machinery - ₹70,000
- Infrastructure - ₹1,50,000
- Vermi-Beds - ₹70,000
- Earthworms - ₹56,000

These funds would also be required for working capital for the **first 6 months**, including:

- Cow Dung - ₹1,41,750
- Inoculants - ₹1,05,000
- Labour - ₹1,15,675
- Packaging (by-products) - ₹34,213 and
- Transportation (by-products) - ₹10,675

Based on the calculations and assumptions made, the BRCs profit, loss and break-evens for the owners are mentioned as under-

- BRCs would earn a total profit of ₹4,61,799, including a profit contribution of ₹2,50,574 from the sale of Super-Vermicompost; ₹1,47,000 from the sale of vermiwash; and ₹64,225 from the sale of earthworms.
- The costs given by various individuals from BRC and PRADAN, At current acquisition rates, the FPO incurs super-vermicompost from the BRCs, it incurs a net loss of ₹1 per kg. At this rate the total net loss for FPO would be ₹99,584.
- BRC owner would be able to reach a break-even point after selling 11,344 kg of super-vermicompost, the profit from which would cover their annual proportionate fixed costs of ₹54,200.

Cow Dung Availability

Each BRC unit would require 141,750 kg of cow dung annually. This quantity will be easily available based on the Village and Ward level cattle data available as per the **20th Livestock Census Report 2019.** As per the data available from the Village and Ward level Cattle Census report of 2019, there are, on average, 154 cows per village in Katoria block of Banka district. Assuming each cow produces approximately 10kg of cow dung every day, would translate to an average annual production of 562,100 kg of cow dung per village in a year. Given that the Katoria block has a total of 290 villages, the total production of cow dung in the Katoria block would be 163,009,000 kg of cow dung in a year. Although the quantity of annual cow dung produced appears to be enormous, considering the demand and supply dynamics, we assume that only 10% of this quantity can be procured from the market without causing any significant changes in the price of cow dung. Ten percent of the total cow dung available would be

16,300,900 kg. We would need only 1,41,750 kg of cow dung annually for 1 BRC, considering five BRCs in the block, they would all together require 708,750 kg of cow dung annually. This represents just 3.43% of the cow dung that could be procured from the open market.

Recommendations

Considering the projected loss for FPO, it would be essential to either reduce the costs that the FPO is incurring or offer a lower price to the BRC owner for super-vermicompost. Assuming that the costs involved cannot be reduced, the only option for the FPOs is to decrease the price offered for 1 kg of super-vermicompost by at least ₹1.5/kg. If FPOs reduce the price offered to BRCs to ₹9.5 per kg, the BRCs would still make an annual profit of ₹312,702. Additionally, this would replace FPO's loss of ₹99,584 with an annual profit of ₹49,792.

Laboratory for Bio-inoculants

Based on the multiple labs visited by the team during this study, it can be concluded that for the production of bio-inoculants such as Mycorrhiza, Pseudomonas, and Trichoderma. It is necessary that PRADAN invest in a laboratory which can directly produce such bio-inoculants. It was also discovered that if we produce these bio-inoculants instead of buying them we can maintain better quality which has been customised to the specific requirements of super-vermicompost. While we conducted a meeting with various BRC owners and PRADAN officials it was found that we can also procure said inoculants from West Bengal at discounted prices, but it was later confirmed that the quantity being produced in West Bengal is only sufficient to meet their needs at the moment. Nevertheless, this further reinforced the need to establish a dedicated biological laboratory. These recommendations are based on samples observed during the study, which clearly indicate that these inputs not only have substantial market, but can also be produced at 50% of the market price. Below are some promising products that were evaluated:

1. Pseudomonas: A genus of bacteria known for its diverse metabolic capabilities and its role in promoting plant health and soil fertility.

Benefits in Agriculture:

a. Pseudomonas can produce phytohormones like auxins, which promote root growth and enhance nutrient uptake.

b. Some species of Pseudomonas are involved in nitrogen fixation, converting atmospheric nitrogen into forms that plants can absorb and use.

c. Pseudomonas produces antibiotics that can suppress soil-borne pathogens, reducing the incidence of plant diseases.

d. By occupying space and utilising resources, Pseudomonas competes with and suppresses harmful microorganisms.

e. Pseudomonas can solubilise phosphates in the soil, making this essential nutrient more

Organisation	Cost of Production	Current production	Selling Price
Biological Control Lab, Visakhapatnam	₹60-65 /kg	20,000 kg	₹150 /kg

available to plants.

2. Trichoderma: Is a genus of fungi commonly found in soil and root ecosystems, known for their beneficial effects on plant health and soil quality. Trichoderma species primarily feed on decaying organic matter, contributing to the decomposition process. They are known for their rapid colonisation, enabling quick establishment in soil environments. They are effective in controlling plant pathogens.

Benefits in Agriculture:

a. Trichoderma produces enzymes and antibiotics that inhibit the growth of harmful fungi and bacteria, protecting plants from diseases.

b. Some Trichoderma species can directly parasitise and kill pathogenic fungi.

c. Trichoderma colonises plant roots, promoting increased root growth and nutrient uptake.

d. They produce plant growth hormones such as indole acetic acid (IAA), which stimulate plant growth.

e. By breaking down organic matter, Trichoderma helps release essential nutrients back into the soil, improving soil fertility.

f. Trichoderma can enhance the plant's own immune system, making it more resistant to a wide range of stresses and pathogens.

Organisation	Cost of Production	Current Production	Selling Price
Biological Control Lab, Visakhapatnam	₹50-55 /kg	14,000 kg	₹100 /kg

3. Vesicular Arbuscular Mycorrhiza (VAM): also known as Arbuscular Mycorrhiza (AM), is a type of mycorrhizal fungi that forms symbiotic relationships with the roots of most terrestrial plants. VAM fungi penetrate plant root cells to form structures called vesicles and arbuscules, facilitating nutrient exchange between the fungi and the plant. They associate with the vast majority of plant species, including many crops.

Benefits in Agriculture:

a. VAM fungi improve the solubilisation and uptake of phosphorus, a critical nutrient that is often limited in soils.

b. The extensive hyphal network of VAM fungi extends far into the soil, accessing nutrients beyond the root zone.

c. VAM hyphae contribute to soil aggregation, improving soil structure, aeration, and water retention.

d. They bind soil particles together, reducing erosion and runoff.

e. VAM associations help plants to withstand drought conditions by enhancing water uptake and retention.

f. Mycorrhizal plants often show increased

Organisation	State of Product	Cost of Production	Current Production	Selling Price
Agrinos India Pvt. Ltd.	Granular form	₹65-70 /kg	40,00,000 kg*	₹105-120 /kg
Agrinos India Pvt. Ltd.	Powder form	₹88-96 /kg	40,00,000 kg*	₹150-170 /kg

resistance to soil-borne pathogens due to improved overall health and vigour.

g. VAM fungi facilitate the exchange of nutrients, providing plants with essential nutrients in exchange for carbohydrates.

h. VAM fungi can stimulate the production of growth-promoting substances in plants.

*The total production is estimated at 8,000 tonnes, with the bifurcation into granular and powder forms assumed to be in equal proportion due to balanced demand.

5.2 Marketing Strategy

A marketing strategy for super-vermicompost targeting farmers without smartphones or access to social media involves leveraging traditional communication channels and community engagement. Based on insights gathered during the field study in these areas and among these farmers, we suggest the following techniques for marketing of super-vermicompost:

1. Coordinating with Farmer Producer Organisations (FPOs)

The following are strategies used by companies to collaborate and coordinate with FPOs, which are mentioned as under-

Strategy 1: Partnership and Collaboration

Example: EcoPro and FPOs in Tamil Nadu, India

Description: EcoPro, a company producing organic inputs, partnered with several FPOs in Tamil Nadu to promote their vermicompost products.

Implementation:

- **Identify key FPOs:** EcoPro identified FPOs in regions with high organic farming potential.
- **Joint workshops and training:** They help workshops with FPOs to educate farmers on the benefits of vermicompost.
- **Incentive programmes:** EcoPro offered incentives to FPOs for bulk purchases and successful referrals.
- **Outcome:** This partnership led to a significant increase in the adoption of vermicompost among farmers in Tamil Nadu, boosting EcoPro's sales and market presence.

Strategy 2: Bulk Supply Agreements

Example: Bio-Tech International and FPOs in Maharashtra, India

Description: Bio-Tech International entered into bulk supply agreements with FPOs in Maharashtra to ensure a steady demand for their organic fertilisers.

Implementation:

- **Negotiation:** Bio-Tech negotiated long-term contracts with FPOs, offering discounted rates for bulk purchases.
- **Customisation:** They provided customised packaging and delivery options tailored to the needs of different FPOs.
- **Quality assurance:** Bio-Tech provided quality assurance certificates and regular updates on product quality to build trust.
- **Outcome:** These agreements helped Bio-Tech secure a stable customer base and streamline their production processes.

2. Individually Scaling up BRC Units

The following strategies can be adopted to scale up BRC units, first, through direct-to-farmer marketing approach and second, by developing a robust retail network to make their products available to the customers

Strategy 1: Direct-to-Farmer Marketing

Example: KisanKraft's direct marketing approach

Description: KisanKraft, a company specialising in agricultural inputs, used a direct-to-farmer marketing approach to promote their organic fertilisers.

Implementation:

- **Digital marketing:** KisanKraft utilised social media platforms, email marketing, and a dedicated website to reach farmers directly.
- **Field demonstrations:** They organised field demonstrations and trials to showcase the effectiveness of their products.
- **Farmer testimonials:** KisanKraft collected and shared testimonials from farmers who successfully used their products.
- **Outcome:** This approach helped KisanKraft build a strong brand presence and loyalty among farmers, leading to increased sales.

Strategy 2: Retail Distribution Network

Example: Organic India's retail distribution strategy

Description: Organic India developed a robust retail distribution network to make their organic products easily accessible to consumers.

Implementation:

- **Identify retail partners:** Organic India partnered with agricultural input retailers and cooperatives to stock and sell their products.
- **Branding and packaging:** They invested in attractive and informative packaging to stand out on retail shelves.
- **Promotional campaigns:** Organic India ran promotional campaigns, including discounts, free samples, and loyalty programmes.
- **Outcome:** This strategy helped Organic India expand their market reach and increase product visibility, leading to higher sales.

Marketing Challenges

Marketing super-vermicompost to farmers may involve multiple challenges. While the team was conducting the study across Bihar and other states some important aspects were noted that need to be considered as potential challenges and worked upon well in advance:

- **Awareness and education**: Educating farmers about the benefits of Super-Vermicompost over traditional fertilisers can be difficult, particularly if they are unaccustomed to using biofertilisers. During this study it was found that many farmers were convinced that using organic inputs would lead to lower yields than chemical/synthetic inputs.
- **Infrastructure**: Once production scales up, proper storage facilities will be required to safely store the finished products.
- **Short-term vision**: Farmers often focus on immediate results. Convincing them to adopt a new product that may take longer to show results compared to chemical alternatives can be challenging.
- **Trust**: Building trust in a new product takes time, especially when farmers have been using chemical fertilisers for a long time.
- **Market competition**: Standing out in a market that is already saturated with various fertiliser options require a strong value proposition and clear communication of benefits.

Addressing these challenges requires a strategic approach that combines education, community engagement, and partnerships with local stakeholders to build trust and demonstrate the value of Super-Vermicompost to farmers.

5.3 Experimental Products

1. Organic DAP: Organic Diammonium Phosphate (DAP) is made by decomposing rock phosphate with cow dung. The process involves the biological breakdown of rock phosphate, which is a natural mineral source of phosphorus, using the microbial activity present in cow dung. Here's a detailed explanation:

- **Rock phosphate decomposition**: Rock phosphate is a sedimentary rock that contains high amounts of phosphate minerals. It is not readily available to plants due to its low solubility.
- **Cow dung as a decomposer**: Cow dung is rich in microbial life, including bacteria and fungi, which can break down complex substances. When rock phosphate is mixed with cow dung, the microorganisms begin to decompose the rock phosphate, releasing phosphate ions that are more accessible to plants.
- **Organic DAP production**: The mixture of rock phosphate and cow dung is typically left to decompose for a period, often in composting pits or heaps. During this time, the microbial action converts the rock phosphate into a form that are easier for plants to absorb. The benefits and challenges of DAP are mentioned below:

Benefits	Challenges
1. Nutrient release: The decomposition process releases phosphorus slowly, providing a steady supply to plants.	**1. Time-consuming:** The decomposition process can take longer than using ready-to-use chemical fertilisers.
2. Soil health: The organic matter from cow dung improves soil structure and fertility.	**2. Variable composition:** The nutrient content can vary depending on the quality of the rock phosphate and cow dung.
3. Environmentally friendly: This method avoids the use of synthetic chemicals, making it suitable for organic farming practices.	**3. Labour-intensive:** The preparation and maintenance of the composting mixture require more labour compared to applying conventional DAP.

This organic approach to fertilisation aligns with sustainable agricultural practices, promoting long-term soil health and reducing the environmental impact of farming.

Organisation	Cost of Production	Current Production	Selling Price
Kikaboni Farms	₹8-10 /kg	5000 kg	₹25-30 /kg

2. Bacteria Khad: It is an innovative organic fertiliser designed for farmers who lack the resources to establish a traditional vermicomposting shed setup. Unlike conventional vermicompost, Bacteria Khad does not involve the addition of external bacteria. Instead, it relies on a natural process that utilises cow dung and simple field techniques to create a nutrient-rich fertiliser.

Process is explained below:

Step 1	**Initial Setup:** Spread cow dung in an open field and allow it to dry for 24-40 hours. Application of Black Soil: Perform "lipai" (coating) with black soil over the dried cow dung.
Step 2	**Watering:** Water the setup every 2-3 days to maintain moisture levels.
Step 3	**Duration:** The entire process takes approximately 20-25 days.
Step 4	**Natural Earthworm Generation:** A unique aspect of this method is the natural attraction of earthworms, which migrate from the soil beneath and integrate into the Bacteria Khad. This reduces the need for farmers to manually introduce and manage earthworms.

The bacteria khad has some **'Unique Selling Proposition' (USP)** which are mentioned below:

1. Cost-Effective: Ideal for farmers who cannot afford the infrastructure for a shed setup.

2. Low Maintenance: Requires minimal intervention, as the natural process attracts and integrates earthworms.

3. Time Efficient: Ready to use within 20-25 days.

4. Natural Process: Utilises existing field conditions and cow dung, making it sustainable and eco-friendly.

Some advantages and challenges are mentioned in the box below:

Advantages	Challenges
1. Accessibility: Provides an affordable option for small-scale and resource-limited farmers. **2. Simplicity:** The straightforward process does not require sophisticated equipment or extensive labour. **3. Environmental Benefit:** Promotes the use of natural processes and local resources, reducing reliance on chemical fertilisers.	**1. Weather Dependency:** The open-field setup may be affected by adverse weather conditions, impacting the consistency and quality of the product. **2. Limited Control:** The natural process may result in variability in the nutrient composition of the final product.

Chapter 6: Conclusion

PRADAN's initiative has made significant strides in promoting sustainable agriculture through organic fertilisers and bio-products. This study highlights the diversity and potential of the products offered by entrepreneurs, while also identifying key areas for improvement in standardisation and market penetration.

Despite the benefits of organic products, their adoption remains limited due to challenges such as high production costs and market distrust. To overcome these barriers, it is crucial to establish robust standardisation processes, enhance farmer education, and develop effective marketing strategies.

In 2024, PRADAN conducted a scoping study on regenerative agriculture. One key finding was that women's workload in regenerative agriculture can be reduced by ensuring the timely availability of bio-inputs at their doorsteps. Implementing the recommended actions will help entrepreneurs effectively meet the needs of farmers, thereby promoting sustainable agricultural practices and enhancing the livelihoods of smallholder farmers. The study's findings and recommendations offer a comprehensive roadmap for achieving these outcomes, highlighting the importance of ongoing support and innovation in the organic farming sector.

The research aimed to assess the range of organic products currently available, their standardisation processes, and their impact on agriculture, particularly in terms of crop yield, soil health, and overall sustainability. This included evaluating products like liquid fertilisers, vermiwash, and green manure. For example, Vermiwash was highlighted for its role as a nutrient-rich liquid beneficial as a foliar spray and natural pesticide, while Azolla, a type of green manure, was noted for its symbiotic relationship with nitrogen-fixing bacteria and its utility in rice cultivation.

Super-vermicompost emerged as the final recommended product after a detailed evaluation process. This selection was based on several factors: its high quality and efficacy in improving crop yield and soil health, positive feedback from farmers, and a well-defined standardisation process ensuring consistent quality. Additionally, Super-vermicompost offers significant economic benefits through its by-products—earthworms and vermiwash. These by-products not only enhance agricultural productivity but also provide additional revenue streams for farmers, adding a substantial economic incentive.

The report also presented the regulatory environment for the production and supply of organic inputs. It concludes with a recommendation of products for BRCs, including a business prototype for entrepreneurs including marketing and value addition strategies.

Annexure

Annexure A: Locations covered in the study

Sr. No.	City/Village	State
1	Patna	Bihar
2	Banka	Bihar
3	Katoria	Bihar
4	Rajaun	Bihar
5	Deoghar	Jharkhand
6	Vaishali	Bihar
7	Chakai	Bihar
8	Buxar	Bihar
9	Julwaniya	Madhya Pradesh
10	Indore	Madhya Pradesh
11	Gangtok	Sikkim
12	Majitar	Sikkim
13	Rangpo	Sikkim
14	Kumeri	Sikkim

Sr. No.	City/Village	State
15	Visakhapatnam	Andhra Pradesh
16	Anakapalli	Andhra Pradesh
17	Vijayawada	Andhra Pradesh
18	New Delhi	Delhi
19	Faridabad	Haryana
20	Lalsot	Rajasthan
21	Rampura	Rajasthan
22	Jaipur	Rajasthan
23	Pune	Maharashtra
24	Karad	Maharashtra
25	Kolhapur	Maharashtra
26	Latur	Maharashtra
27	Sangli	Maharashtra
28	Satara	Maharashtra

Annexure B: Persons with whom the study team interacted

Sr. No.	Name	Post/Designation	Location
1	Shri Purnendu Nath Jha	Joint Director (Chemistry), Com-post & Biogas-cum-senior I/C Organic Cell	Krishi Bhawan, Patna, Bihar
2	Shri Tej Singh Naruka	Government employee under PKVY Scheme	Rajaun, Bihar
3	Shri Anand Jha	KPMG Consultant	Krishi Bhawan, Patna, Bihar
4	Shri Rajveer Singh,	ICCOA Service Provider	Begusarai & Banka, Bihar
6	Dheeraj Singh	DA, PRADAN	Begusarai, Bihar
7	Shri Dipendra	Owner, Green Globe Organic Ventures	Majitar, Sikkim
8	Dr S. Anahbalagan	IFS, CEO, SOFDA	Gangtok, Sikkim
9	Chenzom	INM, Nutrient Management	Gangtok, Sikkim
10	Khem Bhattarai	Kameri Village, Farmer	Gangtok, Sikkim

Sr. No.	Name	Post/Designation	Location
11	Dr Roshna Garmer	Deputy Director, Agriculture Department	Gangtok, Sikkim
12	Dr M. Sivalaxmi	ADA, Biological Control Lab	Visakhapatnam, Andhra Pradesh
13	Dr Sai Prasad	Agricultural Officer, Biological Control Lab	Visakhapatnam, Andhra Pradesh
14	Dr Ramalaxmi	Scientist-Soil Science, Regional Agriculture Research Station	Anakapalli, Andhra Pradesh
15	Dr Visalaxmi	Principal Scientist, IPM	Anakapalli, Andhra Pradesh
16	Dr Jagannath Rao	Asst. Director, Regional Agriculture Research Station	Anakapalli, Andhra Pradesh
17	Shri Suribabu Naira	South region sales incharge, Agrinos India Pvt. Ltd.	Guntur, Andhra Pradesh
18	Shri Kiran	Region Incharge, Vikasa NGO	V. Modugula, Andhra Pradesh
19	Smt Shashi Shikha	Owner, Kikaboni Farms	Faridabad, Haryana
20	Shri Atul Gupta	Founder Director	Jaipur, Rajasthan

Sr. No.	Name	Post/Designation	Location
21	Shri Prakash	Owner, Pareek Farm	Lalsot, Jaipur, Rajasthan
22	Raghuveer	Owner, Eco Jeevan Bio Organics	Amer, Rajasthan
23	Shri Om Prakash	Head, Kamdhenu Jaivik Krishak Kalyan Samiti	Segaon, Khargone, MP
24	Shri Rishabh Sir	Jaivik Corridor Office	Buxar, Patna
25	Anita Ma'am	Team Head, Chakai Office PR-DAN	Chakai, Patna
26	Dr Kumbhar Sir	Manager in Krishna Biofertiliser lab	Rethare, Maharashtra
27	Shri Rajkumar Yadhav	Sales Executive officer in LCB Fertilisers Pvt. Ltd.	Kolhapur, Maharashtra
28	Tilok Solanki	ASA Office, Ozar	Ozar, Madhya Pradesh
29	Dr Pratap Patil	Entomologist in College of Agriculture, Rethare Bk.	Karad, Maharashtra
30	Shri Ghodke P. V	Scientist & Head, Department of Agronomy.	Manjari Bk, Pune

For more information or contact details, please get in touch with the PRADAN Research Team.

Annexure C: Key research questions

1. For Government Officials:

- What policies and regulations govern the production and distribution of organic inputs in Bihar?
- What are the current government initiatives and schemes for promoting organic inputs and organic farming?
- How is the Jaivik Corridor Scheme functioning, and what is its impact on the market?
- Which government departments and agencies procure organic inputs?
- What is the procedure to become a vendor under these schemes?
- Are these products provided to the farmers at a subsidised price? How much of a subsidy is generally provided?
- Are there any other products which are directly provided by the government to the farmers or FPOs?
- What is the role of the ICAR department in providing biopesticides to the farmers?
- Does the ICAR department also recommend certain products to the farmers or FPOs?
- How do the scientists decide which products to recommend to the farmers?
- What are the major barriers to the widespread adoption of organic inputs among farmers?

2. For Farmers:

- What organic practices and inputs do farmers use, and what challenges do they face?
- How do farmers source their organic inputs, and what is their expenditure on these inputs?
- What are the benefits and challenges of using organic inputs compared to chemical ones?
- What support services or government schemes have been beneficial for organic farming?

3. For Private Sector Entities (e.g., Green Globe Organic Ventures):

- What organic input products do they manufacture, and what is their market share?
- What is the type of market they sell their products in? Do they trade directly with farmers/government or are they involved in B2B trade?
- Which are companies that you sell your products to? (if they are involved in B2B trade)
- How much initial capital is required to start a venture like they have?
- Do the government policies help in any way to start such a venture?
- How much of the initial investment was provided by the government to help you start your venture? (if any government aid has been availed)
- What percentage of their total production is directly sold to farmers, FPOs and government agencies?
- How do they ensure quality control and distribution of their products?
- What are their marketing strategies and support mechanisms for farmers?
- What challenges do they face in the production, distribution, or marketing of organic inputs?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Annexure D: Organic Inputs

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	Katyayani Organics	BT Bio Larvicide	BT Larvicides	270	1Lt	BT Larvicides is an advanced, biotechnology-based product developed through extensive research. It contains highly specialized bio-components in their natural form and in concentrations that deliver powerful action for plant protection. It is eco-friendly, and the targeted pests are unlikely to develop resistance against it. BT Larvicides not only protects plants under various conditions but also promotes healthy growth and enhances the plant's ability to withstand different types of stress. It is highly effective against all Lepidopteran caterpillars, including: Helicoverpa, Spodoptera, Brinjal Fruit Borer, Diamondback Moth, Cotton Bollworms, Cutworms, Leaf Webber, Semi-looper, and Loopers. **Recommended Crops:** Brinjal, Tomato, Chilli, Lady's Finger (Okra), Cabbage, Cauliflower, Cotton, Pulses, Paddy, Maize, Groundnut, and Soybean.

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	Katyayani Organics	Katyayani Antivirus	Organic Virucide, Rare herbs	900	1Lt	No Virus is the world's first effective organic antiviral product designed to protect crops from a wide range of viral diseases. It is a broad-spectrum organic virucide that not only safeguards plants against viral infections but also boosts their natural resistance. Formulated using a combination of rare herbs, No Virus acts rapidly to suppress viral activity and promotes fresh growth and improved yield. The product enters the plant through stomatal openings and is translocated through the vascular bundles. Upon entry, it encapsulates virion particles within the infected plant cells and clears the conductive tissues blocked by viruses. As a result, the plant begins to recover, and new virus-free leaves emerge. **Effectiveness duration:** Up to 15 days after application. **Diseases with Visible Results:** Chilli Mosaic Virus, Squash Mosaic Virus, Cucumber Mosaic Virus, Tomato Leaf Curl Virus, Tomato New Delhi Virus, Tomato Mosaic Virus, Tomato Brown Rugose Fruit Virus, Zucchini Yellow Mosaic Virus, Papaya Mosaic Virus, Okra Mosaic Virus.

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	Katyayani Organics	Katyayani Beauveria	Beauveria bassiana	300	1kg	Katyayani Beauveria contains the spores and mycelial fragments of an entomopathogenic fungus called Beauveria bassiana, which is widely used for controlling insect pests across the world. It is also known as the “white muscardine fungus.” Katyayani Beauveria is available in both wettable powder and liquid formulations. It effectively controls pests belonging to the Lepidoptera, Coleoptera, Hemiptera, Hymenoptera, and Diptera families. Target pests include borers, cutworms, root grubs, leafhoppers, whiteflies, aphids, thrips, mealybugs, and the banana pseudostem weevil, among others.

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	Katyayani Organics	Katyayani BT Bio Larvicide	Bacillus thuringiensis	250	1kg	Bacillus thuringiensis (Bt) is a safe bacterial insecticide that is friendly to humans and the environment, accounting for more than 95% of the microbial pesticide market. As a complementary biological pesticide, Bt plays a vital role in plant pest control and organic agriculture. **Mode of Action:** Bt strains produce endotoxins (parasporal crystals) and exotoxins. These toxins cause pests to stop feeding, ultimately leading to death by starvation, cell wall rupture, blood cell destruction, and nervous system poisoning. **Target Pests:** Bacillus thuringiensis is effective against over 100 species of pests, including insects from the Lepidoptera, Diptera, and Coleoptera orders, as well as both animal and plant nematodes. **Applied statistics show that Bt is highly virulent to:** 64 species of forest pests, 34 species of fruit tree pests, 12 species of tea pests **Common Targets Include:** Pieris rapae, Plutella xylostella, Spodoptera litura, corn borer, rice bractworm, rice leaf roller, Chilo suppressalis, cotton bollworm, cotton pink bollworm, tea caterpillar, tea looper, pine caterpillar, sky caterpillar, tussock moth, spiny moth, and other Lepidopteran, Hymenopteran, Dipteran, and Coleopteran pests. Bt also shows egg-killing activity and has proven efficacy in soybean seed treatment to control underground nematodes. **Application Methods:** Bt can be used for spraying, broadcasting, filling, granulation, or as a poison bait. It can be applied over large areas by aircraft and may also be combined with low-dose chemical insecticides to enhance effectiveness.

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	Katyayani Organics	Katyayani Metarhizium Anisopliae Bio Insecticide	Metarhizium anisopliae	250	1kg	Metarhizium anisopliae is a unique biological insecticide. It is an entomopathogenic fungus that causes muscardine disease in a variety of insects, including bugs, weevils, and hoppers. It effectively controls several economically important agricultural pests. The product is pet-friendly, infant-friendly, eco-friendly, and helps maintain ecological balance. By reducing pest populations, it improves plant health and increases crop productivity. Importantly, it does not harm beneficial parasites or useful predators, providing long-lasting pest control. M. anisopliae has shown excellent potential in managing thrips across diverse crop ecosystems and can also be applied at the harvest stage. **Target Crops:** Fruit crops, cole crops, sugarcane, cotton, groundnut, maize, sorghum, barley, rice, potato, soybean, ornamentals in greenhouses and nurseries. **Target Insects:** Root weevils, black vine weevils, spittlebugs, white grubs, termites, Japanese beetles, caterpillars, semi-loopers, beetle grubs, borers, cutworms, and sucking pests like Pyrilla, mealybugs, and aphids.

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Fertiliser	Biofer-tiliser	Katyayani Or-ganics	Katyayani Bacsil SILI-CA	Bacsil Silica	180	1Lt	Bacsil Silica Liquid Biofertiliser is formulated using advanced fermentation technology and contains a cell count of ₹10 CFU/ml of Silicate Solubilizing Bacteria (SSB). Although silicon is not classified as a primary nutrient, plants actively accumulate it and deposit silica on the walls of epidermal and vascular tissues. This deposition enhances rigidity and strength in stems and leaves, making plants more resistant to pests and disease attacks. While over 90% of the Earth's crust is composed of silicate minerals, these forms are unavailable to plants. They must first be depolymerized into ortho-silicic acid, the form that plants can absorb. The Silicate Solubilizing Bacteria in Bacsil convert insoluble soil silicates into ortho-silicic acid, which is then absorbed by plants along with water. This process plays a crucial role in increasing crop yield and improving overall plant health.

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Fertiliser	Biofer-tiliser	Katyayani Organics	Katyayani Bhumiraja	Mycorrhiza	115	1kg	Katyayani Bhumiraja Mycorrhiza Biofertiliser enhances crop yield and improves soil health by increasing nutrient availability and stimulating the production of plant hormones. It also strengthens plant resistance to pathogens and increases the root surface area, enabling better nutrient absorption from the soil. This biofertiliser is suitable for a wide range of cash crops, including paddy, sugarcane, groundnut, potato, wheat, cotton, fruit crops (such as banana, mango, and pomegranate), vegetables, onion, garlic, tomato, as well as garden and nursery plants, turfs, and ornamental plants. It is ideal for use in home gardens, kitchen gardens, terrace gardens, nurseries, greenhouses, and for general agricultural applications. Recommended for organic cultivation.

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Fertiliser	Biofer-tiliser	Katyayani Organics	Katyayani Bio Npk	Nitrogen, Phosphate, Potassium. Azoto-bacter/Azo-spirillum: 1 x 10^9 CFU/ gm	240	1kg	NPK is a powerful consortium of Nitrogen-Fixing, Phos-phate-Solubilizing, and Potash-Mobilizing bacteria, available in lyophilized form for enhanced shelf life and stability. It is further enriched with Zinc-Solubilizing and Silica-Sol-ubilizing bacteria, providing a comprehensive solution for improving soil fertility and plant nutrition. Suitable for use across all types of crops.

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Fertiliser	Biofer-tiliser	Katyayani Organics	Katyayani Calsol	Calcium Solubilizing bacteria	200	1Lt	Katyayani Calsol Liquid Biofertiliser is a scientifically formulated liquid biofertiliser containing Calcium Solubilizing Bacteria (CSB). These beneficial microbes convert insoluble calcium compounds in the soil into soluble forms that plants can readily absorb—particularly valuable in high pH soils or soils rich in calcium carbonate. **Key Functions:** - Enhances calcium availability to plants - Increases crop yield and quality - Improves soil health and structure - Reduces the dependence on chemical fertilisers **Farmer Benefits:** - Higher crop productivity and nutritional quality - Lower input costs due to reduced chemical fertiliser use - Improved soil fertility and microbial activity - Enhanced crop resilience to environmental stress

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Fertiliser	Biofer-tiliser	Katyayani Organics	Katyayani Rhizobium spp	Rhizobium	200	1Lt	Katyayani Rhizobium spp is a nitrogen-fixing biofertiliser containing beneficial bacteria that capture free nitrogen from the air and convert it into ammonia, a form readily absorbed by plants. This process provides nitrogen naturally, reducing the need for artificial fertilisers. It is widely used for leguminous crops, including: Peas, Beans, Clover, Soybean, Green Pea, Lentil, Chickpea (Chana), Indian Bean, Mung Bean, Black Gram, Pigeon Pea, Kidney Beans (Rajma), Cowpea, and Groundnut. **Key Benefits:** - Enhances nitrogen availability in the soil - Promotes root and shoot growth - Increases crop yield naturally - Enriches soil with plant growth-promoting substances - Encourages the proliferation of beneficial microorganisms in the soil

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Fertiliser	Biofer-tiliser	Katyayani Organics	Katyayani Vesicular Arbuscular Mycorrhizal	Mycorrhizal 1500 IP/ml	200	1Lt	Katyayani Vesicular Arbuscular Mycorrhizal (VAM) 1500 IP/ml Liquid Biofertiliser is an organic plant essential designed to improve root growth, boost nutrient uptake, and support healthy plant development. It is eco-friendly and recommended by NPOP for organic farming. Suitable for all plants and ideal for home gardens and agricultural use. **Product Highlights:** 1. Enhances root biomass and branching, 2. Improves uptake of phosphorus, as well as other macro- and micronutrients. 3. Increases overall crop yield and enhances produce quality **Widely Used For:** **Fruit Crops:** Banana, Papaya, Mango, Sapota, Pomegranate, Guava, Ber, Apple, Pear, Peach, Plum, Loquat, Almond, Cherry, Grape, Fig, Watermelon, Muskmelon, Jackfruit, Aonla, Bael, Custard Apple, Phalsa, Orange, Citrus, Apricot, Walnut, Pecan Nut, Strawberry, Litchi, Pineapple, Dragon Fruit, Avocado, Date Palm **Vegetables & Spice**s: Tomato, Brinjal, Chilli, Capsicum, Okra, Pea, Cowpea, French Bean, Bottle Gourd, Bitter Gourd, Ridge Gourd, Sponge Gourd, Cucumber, Cabbage, Cauliflower, Little Gourd, Pointed Gourd, Drumstick, Kidney Bean, Lima Bean, Onion, Garlic, Ginger, Turmeric, Kale, Knol-Khol, Sprouting Broccoli, Pigeon Pea, Spine Gourd. **Condiments & Herbs:** Coriander, Fenugreek, Nutmeg, Clove, Cumin, Cinnamon, Elaichi (Cardamom), Curry Leaves **Cereal & Pulse Crops:** Wheat, Paddy (Rice), Sorghum, Bajra, Barley, Maize, Chickpea (Chana), Lentil (Masoor), Black Gram, Mung, Groundnut, Mustard, Sesame, Linseed, Sunflower. **Plantation & Commercial Crops:** Coconut, Cotton, Sugarcane, Jute, Tobacco, Arecanut. **Ornamentals & Flowers:** Rose, Marigold, Hibiscus, Bougainvillea, Jasmine, Orchid, Chrysanthemum

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Fertiliser	Biofer-tiliser	Katyayani Organics	Katyayani ZSB	Zinc Solubilising Bacteria Biofertiliser	200	1Lt	Katyayani ZSB (Zinc Solubilizing Bacteria) is a natural zinc-providing biofertiliser that converts insoluble zinc compounds such as zinc sulphide, zinc oxide, and zinc carbonate into plant-available Zn₹ ions. It breaks down complex compounds and lowers soil pH, making zinc more accessible to plants. It serves as an effective organic alternative to chemical zinc fertilisers. **Widely Recommended For: Fruit Crops:** Banana, Papaya, Mango, Sapota, Pomegranate, Guava, Ber, Apple, Pear, Peach, Plum, Loquat, Almond, Cherry, Grape, Fig, Melon, Jackfruit, Aonla, Bael, Custard Apple, Phalsa, Orange, Citrus, Apricot, Walnut, Pecan Nut, Strawberry, Litchi, Pineapple, Dragon Fruit, Kiwifruit, Avocado, Date Palm **Vegetables & Spices:** Tomato, Brinjal, Chilli, Capsicum, Okra, Pea, Gourds (Bottle, Ridge, Bitter), Cucumber, Cabbage, Cauliflower, Drumstick, Beans, Onion, Garlic, Ginger, Turmeric, Kale, Knol-Khol, Sprouting Broccoli **Condiments & Herbs:** Coriander, Fenugreek, Nutmeg, Clove, Cumin, Cinnamon, Elaichi (Cardamom), Curry Leaves **Cereals & Pulses:** Wheat, Paddy (Rice), Sorghum, Bajra, Barley, Maize, Chickpea (Chana), Lentil (Masoor), Black Gram, Mung, Groundnut, Mustard, Sesame, Linseed, Sunflower **Other Crops:** Coconut, Cotton, Sugarcane, Jute, Tobacco, Arecanut **Ornamentals & Flowers:** All flowering plants, garden plants, nursery plants **Key Benefits:** 1. Enhances plant maturity. 2. Improves internode length and leaf size. 3. 100% organic and eco-friendly. 4. Cost-effective solution for: Home gardens, Kitchen/terrace garden, Nurseries, Agricultural applications

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	Kay Bee Bio Organics	Pesto Raze	New generation bio-insecticide	2000	1Lt	Pesto Raze Cotton Special is a botanical-based organic bio-insecticide specifically formulated for cotton crops, using advanced marker compound technology. It provides effective control within 48 hours against common sucking pests such as whiteflies, aphids, hoppers, thrips, and mealybugs. As a plant-based bio-pesticide, Pesto Raze Cotton Special not only eliminates pests but also stimulates phyto-tonic activity in plants and activates the plant's natural defence mechanisms by promoting the production of secondary metabolites. The product exhibits a unique combination of contact, systemic, and fumigant modes of action, enabling comprehensive pest control. It is effective against all life stages of sucking pests, ensuring thorough protection of the crop. For best results and to prevent pest infestation and crop damage, apply Pesto Raze Cotton Special every 7–8 days, or as needed based on pest population levels in the field.

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	Kay Bee Bio Organics	Bacto Raze	botanical based bactericide	3000	1Lt	Bacto Raze is a broad-spectrum organic bactericide formulated for effective control of plant bacterial diseases. It primarily works by inhibiting the biosynthesis of cell wall lipids and proteins in plant-pathogenic bacteria, thereby restricting their growth and spread. This multi-component formulation offers multiple modes of action, making it effective against a wide range of bacterial infections across agronomic, vegetable, fruit, and flower crops. In addition to its bactericidal action, Bacto Raze exhibits a phytotonic effect, enhancing overall crop vigor and productivity. It is residue-free, safe for use in organic farming, and ideal for export-oriented agricultural production.

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	Kay Bee Bio Organics	Fungo Raze	Ferula asafoetida and Cinnamomum cassia	2000	1Lt	Fungo Raze is a next-generation organic fungicide formulated with botanical extracts of Ferula asafoetida and Cinnamomum cassia. It is a contact and systemic broad-spectrum fungicide with both protective and curative properties, offering effective disease management while also improving crop quality and yield. This bio-fungicide is highly effective against a wide range of airborne fungal diseases. It suppresses the growth of plant-pathogenic fungi and also supports plant development by regulating growth rates. **Fungo Raze is especially effective for controlling:** Anthracnose, Rust, Smut, Blight (including Early Blight and Late Blight), Leaf Spot, Fruit Spot Powdery Mildew. **It is a residue-free, botanical-based solution, making it ideal for:** - Sustainable and organic farming - Export-oriented production - Conventional agriculture Widely recommended for the management of airborne fungal diseases across vegetables, fruits, flowers, oilseeds, pulses, and cereal crops.

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesti-cide	Kay Bee Bio Organics	Viro Raze	bio viricide various plant extracts	3100	1Lt	Viro Raze is a powerful, versatile, and advanced bio-viricide formulated to combat a wide range of plant viral diseases. It is highly effective against viruses such as: - Chilli Leaf Curl Virus - Tomato Leaf Curl Virus - Papaya Ringspot Virus - Yellow Vein Mosaic Virus of Okra - Little Leaf of Brinjal - And other commonly occurring crop viruses What sets Viro Raze apart is its dual action: it not only targets plant viruses directly but also controls virus vectors, particularly sucking pests, to prevent the spread of infection from diseased plants to healthy ones. **As a botanical-based, residue-free bio-viricide, Viro Raze is ideal for:** - Organic farming - Export-oriented production - Both polyhouse/shade-net cultivation and open-field applications

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	Kay Bee Bio Organics	Larvo Raze	bio larvicide	3500	1Lt	Larvo Raze is a novel bio-larvicide and stem borer insecticide, formulated using marker compounds extracted from various botanicals. It offers highly effective treatment against a wide range of larval pests and is especially recommended for: - Brinjal fruit borer - Paddy/rice stem and shoot borers - Caterpillars in crops like okra, tomato, soybean, cotton, maize, chickpea, and beans As a broad-spectrum larvicide and borer insecticide, Larvo Raze provides assured control of Lepidopteran pests through its multi-botanical composition. Being a plant-based biopesticide, Larvo Raze also induces phyto-tonic effects, triggering the plant's natural pest defense mechanisms through the stimulation of secondary metabolite production. In addition to pest control, it promotes significant improvements in crop productivity across vegetables, fruits, flowers, and field crops, while enhancing plant resilience to both biotic and abiotic stresses.

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	IFFCO	Acetobacter	Acetobacter	200	1Lt	Acetobacter is an organic liquid biofertiliser that fixes atmospheric nitrogen in the presence of oxygen. It is particularly suitable for sugarcane and beet crops. **Minimum Viable Cell Count (CFU):** 1 × 10₹/ml **Nitrogen Fixation:** Increases nitrogen availability by 30–40 kg per hectare **Yield Benefit:** Improves crop yield by 10–20% **Fertiliser Savings:** Reduces the need for 60–80 kg of urea per hectare
Pesticide	Bio-Pesticide	IFFCO	Bio-decomposer	group of microorganisms	500	1kg	IFFCO Bio-decomposer is a powerful blend of beneficial microorganisms that rapidly convert crop residues, animal waste, dung, and other organic waste into nutrient-rich organic manure. It is an inexpensive and effective solution for managing agricultural waste and crop residues, contributing to sustainable farming practices. **Key Benefits:** - Converts crop residues and agricultural waste into compost - Transforms animal waste and dung into organic manure - Helps prevent seed-borne diseases through seed treatment - Aids in the control of pests and diseases when applied as a foliar spray - Enhances soil fertility when used through drip irrigation - Reduces production costs and increases net farm income - One bottle can help generate over 1 lakh metric tonnes of organic manure annually

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	IFFCO	Liquid Consortia	Rhizobium, Azotobacter	200	1Lt	Liquid Consortia Biofertiliser is a multi-strain biofertiliser suitable for all crops, including legumes. It is a scientifically formulated consortium of Rhizobium, Azotobacter, Phosphobacteria, and Potash Solubilizing Bacteria that enhances the availability of essential nutrients—Nitrogen (N), Phosphorus (P), and Potassium (K)—to plants. **Key Specifications:** - Minimum Viable Cell Count (CFU/ml): - Rhizobium / Azotobacter: 5 × 10₹ CFU/ml - Phosphobacteria: 5 × 10₹ CFU/ml - Potash Solubilizing Bacteria: 5 × 10₹ CFU/ml - Total Viable Cell Count: 1.5 × 10₹ CFU/ml **Benefits:** - Increases nutrient availability per hectare: - Nitrogen: 25–30 kg - Phosphorus: 20–25 kg per acre - Potassium: 10–15 kg - Enhances crop yield by 10–20% - Saves chemical fertiliser usage per hectare: - Urea: 50–60 kg - D.A.P.: 40–50 kg - M.O.P.: 15–25 kg

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	IFFCO	Rhizobium	Rhizobium	200	1Lt	Rhizobium – Liquid Biofertiliser **Recommended for:** All leguminous crops only Rhizobium is an efficient nitrogen-fixing soil bacterium that forms a symbiotic association with the roots of leguminous plants such as Bengal gram, green gram, red gram, cowpea, soybean, and others. Since Rhizobium cannot fix nitrogen independently, it colonizes the root system of legumes and forms nodules. These nodules fix atmospheric nitrogen and convert it into ammonia, which is readily absorbed by the plant to enhance growth and yield. **Specifications:** Viable Cell Count (CFU): 1 × 10₹ CFU/ml **Key Benefits:** - Fixes 50–100 kg of nitrogen per hectare - Increases crop yield by 25–35% - Saves 100–200 kg of urea per hectare - Enhances plant growth and nitrogen content in soil - Releases allelochemicals that improve pest resistance - Reduces dependency on chemical fertilisers

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Fertiliser	Biofer-tiliser	IFFCO	Bio-Decom-poser	group of microorgan-isms	500	1kg	IFFCO Bio-decomposer is composed of a group of beneficial microorganisms that rapidly convert crop residues, animal waste, dung, and other organic waste into nutrient-rich organic manure. It is an inexpensive and effective technology for managing agricultural waste and crop residues. Remarkably, a single bottle of IFFCO Bio-decomposer can help generate over one lakh metric tonnes of organic manure annually. **Key Applications & Benefits:** - Compost production from crop residues - Conversion of animal waste and dung into organic manure - Seed treatment to prevent diseases caused by seed-borne pathogens - Foliar spraying to control a wide range of pests and diseases - Enhances soil fertility when applied through drip irrigation - Helps reduce production costs, thereby increasing net farm income

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Fertiliser	Biofer-tiliser	Multiplex	Multiplex Trishul	Vesicular Arbuscular Mycorrhizae (VAM)	470	1Lt	Multiplex Trishul contains Vesicular Arbuscular Mycorrhizae (VAM), a beneficial fungus that forms a symbiotic association with plant roots, significantly enhancing the absorption of phosphorus, water, and other essential nutrients in an easily usable organic form. In addition to improving nutrient uptake, Trishul also promotes plant health by producing a wide range of plant growth-promoting substances such as: - Indole-3-Acetic Acid (IAA) - Indole-3-Butyric Acid (IBA) - Gibberellic Acid (GA) These compounds support vigorous and healthy plant growth.
Fertiliser	Biofer-tiliser	Multiplex	Multiplex Annapurna biofertiliser	Azoto-bacter, Azo-spirillum, Rhizobium; Phosphate solubilizing bacteria; Potash mobilizing bacteria, Trichoder-ma sp., and Pseudomo-nas, etc.	120	1kg	Multiplex Annapurna is a coco peat-based organic manure, enriched with neem cake, castor cake, Pongamia cake, and vermicompost. It is a well-decomposed formulation designed to improve soil health and crop productivity. **Key Benefits:** - Enhances soil structure and fertility - Promotes root proliferation for better nutrient uptake - Reduces dependency on chemical fertilisers - Effectively controls soil-borne pests and diseases

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Fertiliser	Biofer-tiliser	Multiplex	Multiplex Nalpak	Liquid Consortia	450	1Lt	Multiplex Nalpak Liquid is a balanced blend of beneficial bacteria, including nitrogen fixers (Azotobacter and Azospirillum), phosphate-solubilizing bacteria, and potash-mobilizing bacteria. **This microbial formulation aids in:** Fixing atmospheric nitrogen, Solubilizing phosphorus, Mobilizing potassium These actions significantly improve the availability and uptake of essential nutrients, leading to enhanced crop growth and yield. Additionally, Nalpak Liquid ensures better utilization of applied major nutrients, thereby improving soil health and reducing dependence on chemical fertilisers.
Fertiliser	Biofer-tiliser	Multiplex	Multiplex Zinc-B	Zinc Solubilizing Bacteria	330	1Lt	Multiplex Zinc-B is a liquid or carrier-based biofertiliser containing Zinc Solubilizing Bacteria (ZSB)—specifically Pseudomonas striata—that play a vital role in improving zinc availability in the soil. These bacteria colonize the rhizosphere and convert complex zinc compounds into simpler, plant-available forms. One of the primary mechanisms used is acidification, which enables the solubilization of insoluble zinc minerals. **Specifications:** - Liquid Formulation: Minimum 1 × 10₹ CFU/ml - Carrier-Based Formulation: Minimum 5 × 10₹ CFU/gm **Key Benefits:** Enhances zinc availability for optimal plant nutrition, Promotes plant growth, vigour, and crop yield, Improves root development and overall plant health, Reduces the need for chemical zinc fertilisers **Recommended Crops:** Cereals & Millets, Pulses & Oilseeds, Fibre Crops (e.g., cotton, jute), Sugarcane & Forage Crops, Plantation Crops (e.g., tea, coffee), Vegetables, Fruits & Spices, Flowers, Orchards & Ornamentals, Medicinal & Aromatic Plants

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Fertiliser	Biofer-tiliser	Multiplex	Multiplex Aadhar	Azospirillum Brasiliense spp	210	1kg	Multiplex Aadhar is a biofertiliser containing Azospirillum spp., a free-living nitrogen-fixing bacterium that captures atmospheric nitrogen and enriches the soil. It is particularly beneficial for the cultivation of non-leguminous and vegetable crops. In addition to nitrogen fixation, Azospirillum in Aadhar promotes plant health by: Stimulating the production of plant growth hormones such as Indole-3-Acetic Acid (IAA), Gibberellic Acid (GA), and Cytokinins Enhancing synthesis of vitamins essential for plant metabolism Inducing the production of antibiotics within the plant, which help suppress soil and plant pathogens
Pesticide	Bio-Pesti-cide	Multiplex	Multiplex Baba	Beauveria Bassiana	610	1Lt	Multiplex Baba Beauveria bassiana is a bio-insecticide that effectively controls a wide range of insect pests, including whiteflies, aphids, thrips, mealybugs, shoot borers, semi-loopers, and various caterpillars. It is a non-toxic, organic formulation that is safe for humans, animals, and the environment. **Mode of Action:** Beauveria bassiana is an entomopathogenic fungus that infects and kills insect pests. Its spores attach to the insect's body, germinate, and penetrate the exoskeleton. The fungus then releases toxins that kill the host insect from within. As a biological product, Multiplex Baba works gradually visible effects may not be immediate, but with regular application, it ensures effective and sustainable pest control. **Key Benefits:** Controls sucking and chewing pests effectively, Safe for beneficial insects, pollinators, and natural enemies, Suitable for organic and sustainable farming, Environmentally friendly alternative to chemical pesticides

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	Multiplex	Multiplex Varsha	Verticillium lecanii	240	1kg	MULTIPLEX VARSHA is a bio-pesticide formulated in powder form, containing the entomopathogenic fungus Verticillium lecanii. It is highly effective against various soft-bodied insect pests. Upon contact, the fungal spores adhere to the insect's body, penetrate the cuticle, and begin to grow inside the host. The fungus then emerges and sporulates on the surface, causing the infected insect to appear as white to yellowish cottony growth. **Mode of Action:** - The fungal mycelium produces powerful insecticidal toxins such as: - Bassianolide (a cyclodepsipeptide toxin) - Dipicolinic acid - These toxins disrupt the insect's metabolism, leading to death within 4 to 6 days. **Key Benefits:** - Effective biological control for a wide range of insect pests - Leaves no chemical residue—safe for beneficial insects and the environment - Suitable for organic and sustainable farming practices

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	Multiplex	Multiplex Minchu Plus	Bacillus thuringiensis kurstaki (16000 iu/mg min) -10% Saccharopolyspora spinosad-5% Emamectin benzoate-0.15%	1370	1Lt	Multiplex Minchu+ is an advanced biological insecticide formulated with two naturally occurring microbes and their active metabolites: Bacillus thuringiensis var. kurstaki (Btk) – a soil-borne, aerobic, gram-positive, spore-forming bacterium that produces crystalline toxins. These toxins act through gustatory ingestion, causing blood septicaemia and death in insect larvae. Saccharopolyspora spinosa (Spinosad) – a soil-borne actinomycete that produces neurotoxic compounds, disrupting the nervous system of insects and leading to paralysis and death. This combination delivers a dual mode of action, making Multiplex Minchu+ highly effective against a broad spectrum of caterpillar pests, including Fall Armyworms. **Key Features & Benefits:** - Non-toxic, eco-friendly, and safe for humans, animals, and beneficial insects - Controls Fall Armyworm and a wide range of Lepidopteran caterpillar pests - Oil-based formulation ensures better microbial persistence and field performance - Leaves no harmful residues—suitable for organic and sustainable farming

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	Multiplex	Multiplex Strike Plus	Fatty Acid Salts and Essential Oils	1000	1Lt	Multiplex Strike Plus is a fast-acting bio-insecticide that eliminates soft-bodied insects within 48 hours of spraying through a contact mode of action. It causes complete dehydration of the insect body, effectively preventing sucking and leaf-eating pests from damaging crops. **The product also:** - Repels insects with its strong natural odor - Disrupts multiple stages of the insect life cycle - Prevents crop loss, ensuring improved yield quality and quantity **Target Pests and Benefits:** **Effective against:** - Sucking pests, mites, thrips - Lepidopteran caterpillars - Certain disease-causing fungi - Eco-friendly: Leaves no toxic residues - Ideal for sustainable and organic farming practices

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesti-cide	T Stanes	Nimbecidine EC	azadirachtin 10000 ppm	2650	1Lt	Nimbecidine EC is a neem oil-based botanical insecticide containing Azadirachtin (10,000 ppm) along with other bio-active alkaloids that possess strong insecticidal properties. **It effectively controls a broad spectrum of pests, including:** - Whiteflies - Aphids - Thrips - Mealybugs - Caterpillars - Leafhoppers **Key Features & Benefits:** - Azadirachtin 10,000 ppm concentration ensures effective pest control - Safe for beneficial insects such as parasitoids, predators, and honeybees - Suitable for prophylactic use (preventive) - Can be combined with chemical pesticides for enhanced curative action - Ideal for integrated pest management (IPM) and organic farming practices

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	T Stanes	Bio Catch	Verticillium lecanii	450	1Lt	Bio Catch is a highly effective biological solution for controlling a wide range of economically important sucking pests, including: - Whiteflies - Jassids - Aphids - Thrips - Mealybugs Unlike chemical pesticides, Bio Catch does not cause pest resistance or resurgence. Instead, it contributes to a cleaner environment by significantly reducing pesticide residues in soil and crops. Bio Catch is a certified organic product, ideal for use in sustainable and environmentally friendly farming practices.

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesti-cide	T Stanes	BioPower	Beauveria bassiana	450	1Lt	BioPower is a broad-spectrum biological insecticide that effectively controls a wide range of economically important pests, including: - Borers - Cutworms - Root grubs - Leafhoppers - Whiteflies - Aphids - Thrips - Mealybugs By efficiently targeting these pests, BioPower helps improve crop productivity and quality. Unlike chemical pesticides, BioPower does not lead to pest resistance or resurgence. Instead, it significantly contributes to reducing pesticide residues in the environment, supporting eco-friendly and sustainable farming.

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	T Stanes	BioMagic	Metarhizium anisopliae	450	1Lt	BioMagic is a broad-spectrum biological insecticide that effectively controls several economically important pests, including: - Leafhoppers - Grasshoppers - Root grubs - Corn rootworms - Bugs and beetles - Palm weevils - Borers - Cutworms - Termites By efficiently targeting these pests, BioMagic supports higher crop productivity and helps protect yield quality. Unlike chemical pesticides, BioMagic does not cause pest resistance or resurgence. Instead, it plays a key role in reducing pesticide residues in the environment, making it ideal for eco-friendly and sustainable agriculture.

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Fertiliser	Biofer-tiliser	Dr Soil	Slurry En-richer	Potash Mobilizing Bacteria	540	1Lt	Dr Soil Slurry Enricher is a bio-based formulation that combines Potash Mobilizing Bacteria (PMB) to enhance the decomposition of organic waste and enrich slurry with essential nutrients. It boosts microbial activity, recycles organic matter, and mobilizes potash near the root zone, improving plant nutrient uptake. It is suitable for all soil types, especially those with low potash content, and supports sustainable soil health and crop productivity. **Key Benefits:** - Rapid slurry enrichment with beneficial microbes - Supplies active Potash Mobilizing Bacteria - Accelerates cell division and plant growth - Enhances nutrient uptake efficiency - Increases potash availability in the soil - Biodegradable and eco-friendly solution for organic farming

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Fertiliser	Biofer-tiliser	Dr Soil	Fertility Booster	Azotobacter and Azospirillum	450	1Lt	Dr Soil (Soil Fertility Booster) is a biofertiliser formulated with a synergistic blend of beneficial bacteria, including: - Nitrogen-fixing bacteria (Azotobacter and Azospirillum) - Phosphate-solubilizing bacteria - Potash-mobilizing bacteria **This powerful microbial consortium plays a vital role in:** - Fixing atmospheric nitrogen - Solubilizing phosphorus - Mobilizing potassium - Together, these actions help enhance soil fertility, nutrient availability, and crop yield. **Key Benefits:** - Improves soil health and fertility - Controls the growth of harmful soil-borne fungi - Reduces the occurrence of diseases - Enhances flowering and fruiting - Improves crop quality and yield - Promotes long-term soil sustainability

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Fertiliser	Biofer-tiliser	Dr Soil	Bijopachar	Rhizobium	500	1Lt	Dr Soil Bijopachar Culture is a highly effective biofertiliser containing Rhizobium and other specialized bacterial strains formulated to support pulse crops. It is one of the most widely used biofertilisers in India for enhancing nitrogen fixation and improving soil fertility in legume cultivation. **Recommended for Use In:** - Groundnut - Green gram - Black gram - Peas - Soybean - Beans - Cowpea This product promotes healthy root nodulation, enhances biological nitrogen fixation, and supports higher yields and better plant growth in pulse crops.

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Fertiliser	Biofer-tiliser	Dr Soil	Bijopachar	Azospirillum Brasilense	500	1Lt	Dr Soil Bijopachar (Azospirillum) is an associative symbiotic nitrogen-fixing biofertiliser known for its high nitrogen fixation potential. It enhances soil productivity by converting atmospheric nitrogen into plant-available forms, particularly benefiting non-leguminous crops. **Recommended Crops:** - Paddy - Jowar (Sorghum) - Maize - Ragi (Finger millet) - Turmeric - Ginger - Cardamom **Key Benefits:** - Improves seed sprouting and germination - Produces plant growth-promoting substances - Enhances crop yield and quality - Supports sustainable soil health

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Fertiliser	Biofer-tiliser	Dr Soil	Grapes Spe-cial	Nitrogen fixers (Azoto-bacter and Azospiril-lum) Phosphate Solubilizers and Potash Mo-bilizers.	470	1Lt	Dr Soil (Grapes Special) is a targeted biofertiliser formulated with a synergistic blend of beneficial bacteria, including: - Nitrogen-fixing bacteria (Azotobacter and Azospirillum) - Phosphate-solubilizing bacteria - Potash-mobilizing bacteria This powerful microbial composition enhances nutrient availability, improves soil fertility, and increases grape crop yield and quality. **Key Benefits:** - Fixes atmospheric nitrogen - Solubilizes phosphorus and mobilizes potassium - Improves soil health and structure - Controls the growth of harmful soil fungi - Reduces disease occurrence - Enhances berry size, sugar content, color, crispiness, and keeping quality of grapes - Promotes higher yield and fruit quality

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Fungicide	Multiplex	Multiplex Sparsha	Pseudomonas fluorescens (Min. 1x108 CFU /ml for Liquid Based & min. 1 x 108 CFU /gm for Carrier Based)	155	1kg	Multiplex Sparsha is a powerful bioformulation containing Pseudomonas fluorescens, a beneficial Plant Growth-Promoting Rhizobacteria (PGPR) known for its ability to control soil-borne pathogens and enhance plant immunity. It effectively suppresses bacterial and fungal wilts and helps manage plant-parasitic nematodes, particularly root-knot nematodes affecting crops like tomato and okra. **Mode of Action & Benefits:** - Suppresses soil-borne bacterial and fungal pathogens - Controls root-knot and cyst nematodes - Induces systemic resistance and triggers natural plant immunity - Enhances plant growth and yield - Eco-friendly and suitable for organic farming **Specifications:** - Pseudomonas fluorescens Concentration: - Liquid Form: Minimum 1 × 10₹ CFU/ml - Carrier-Based Form: Minimum 1 × 10₹ CFU/gm **Target Crops:** Cereals, Vegetables, Pulses, Oilseeds, Spice crops, Plantation crops, Horticultural crops **Target Diseases & Pests:** - Ralstonia solanacearum (Bacterial Wilt) - Erwinia carotovora (Soft Rot) - Root-knot nematodes - Cyst nematodes - Other soil-borne bacterial and fungal infections

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Fungicide	Multiplex	Multiplex Nisarga	Trichoderma Viride	240	1kg	Multiplex Nisarga is a bio-fungicide formulated with Trichoderma viride, known for its strong antagonistic activity against a wide range of seed- and soil-borne fungal diseases. It effectively controls diseases such as root rot, damping-off, fungal wilts, and blight, commonly affecting vegetables, fruit crops, field crops, pulses, and plantation crops. **Special Application:** Proven efficacy against Ganoderma wilt in arecanut and coconut plantations **Formulation Details:** Trichoderma viride 1.5% WP / 5% LF **Minimum Viable Count**: Liquid Formulation: 2 × 10₹ CFU/ml Carrier-Based Formulation: 2 × 10₹ CFU/gm **Target Diseases:** - Root, collar, and stem rots - Damping-off - Wilt and blight diseases - Target Crops: - Vegetables - Fruits - Field crops - Pulses - Plantation crops

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Fungicide	Multiplex	BIO-JODI	Pseudomonas fluorescens & Bacillus subtilis	450	1kg	MULTIPLEX BIO-JODI is a bioformulation combining two of the most widely used beneficial bacteria: Pseudomonas fluorescens and Bacillus subtilis. This powerful combination offers dual protection against pathogens and promotes plant growth and development. **Mode of Action:** - During sporulation, the microbes produce antibiotics that suppress or eliminate disease-causing microorganisms by: - Inhibiting their growth - Exhibiting direct fungicidal activity on fungal pathogens - Produces phytotonic substances that enhance overall plant vigor and productivity **Formulation Details:** - Pseudomonas spp. & Bacillus spp. Concentration: - Liquid Formulation: Minimum 2 × 10₹ CFU/ml - Carrier-Based Formulation: Minimum 5 × 10₹ CFU/gm **Key Benefits:** - Provides broad-spectrum protection against fungal pathogens - Enhances root and shoot development - Improves plant immunity and stress tolerance - Supports sustainable and organic farming practices

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Fungicide	Multiplex	BIO-JODI	Pseudomonas fluorescens & Bacillus subtilis	1430	1Lt	MULTIPLEX BIO-JODI is a potent bioformulation in liquid form, combining two of the most widely used beneficial bacteria: - Pseudomonas fluorescens - Bacillus subtilis This product acts as both a bio-fungicide and bio-bactericide, providing broad-spectrum protection against fungal and bacterial pathogens. **Mode of Action:** - The beneficial microbes in BIO-JODI produce antibiotics during sporulation, which: - Compete with and suppress disease-causing microorganisms - Inhibit the growth or directly kill fungal and bacterial pathogens - Exhibit direct fungicidal activity against target fungi - Enhance plant resistance and overall health **Formulation Details:** - Bacillus spp. & Pseudomonas spp. Concentration: - Liquid Formulation: Minimum 2 × 10₹ CFU/ml - Carrier-Based Formulation: Minimum 5 × 10₹ CFU/gm **Target Crops:** Potato, Brinjal (Eggplant), Banana, Paddy (Rice), Wheat, Orange, Pomegranate **Target Diseases:** Rice blast, Sheath blight (Paddy), Early and late blight (Tomato, Chilli, Potato), Root and stem rot (caused by Sclerotium and Rhizoctonia), Bacterial wilt, Fusarium wilt, Leaf spots caused by fungi and bacteria

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Fungicide	Multiplex	Rognash-B	Tea Tree oil (Melaleuca alternifolia), Camphor oil (Cinnamomum camphora) & Adjuvants	2630	1Lt	Rognash-B is a broad-spectrum bio-solution with multiple modes of action against a wide range of plant pathogens. It is ideal for integration into resistance management programs and supports both curative and prophylactic applications in organic and conventional cultivation systems. **Key Features & Benefits:** - Multiple modes of action for effective disease suppression - Suitable for both preventive and curative applications - Highly compatible with commonly used insecticides and fungicides - Zero residue, no MRL (Maximum Residue Limit), and non-toxic - Maintains leaf health by preventing disease onset - Enhances photosynthesis and plant vitality - Improves crop yield in both quality and quantity

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	Krishna Biofertiliser Lab Rethare Bk.	Krishna Trichoderma	Trichoderma Viride	220 ₹	1Lt	Trichoderma viride is a bio-fungicide and plant growth promoter widely used in sustainable agriculture. This beneficial fungus plays a dual role by suppressing plant pathogens and stimulating plant growth. **Key Benefits:** - Controls a wide range of soil-borne fungal pathogens - Enhances soil health and promotes a balanced microbial ecosystem - Improves nutrient uptake by supporting root development - Stimulates root growth and overall plant vigor - Boosts plant resilience against biotic and abiotic stress - Reduces the need for chemical fungicides, supporting eco-friendly cultivation **Recommended Application Methods:** - Seed Treatment - Soil Application - Foliar Spray

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	Krishna Biofertiliser Lab Rethare Bk.	Krishna Metarhizium	Metarhizium Anisopliae	220 ₹	1Lt	Metarhizium anisopliae is a potent bio-insecticide widely recognized for its effectiveness in controlling a broad spectrum of insect pests. As an entomopathogenic fungus, it infects insects by penetrating their exoskeleton, ultimately killing them from within. This natural mode of action makes it a highly effective, eco-friendly alternative to chemical pesticides, supporting sustainable and organic farming practices. **Key Benefits:** - Controls a wide range of soil- and foliar-dwelling insect pests - Penetrates and destroys insects via natural fungal infection - Leaves no toxic residues and is safe for beneficial insects - Reduces the risk of pest resistance and environmental contamination **Recommended Application Methods:** - Soil Treatment - Foliar Spray - Seed Coating

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	Krishna Biofertiliser Lab Rethare Bk.	Krishna Beauveria	Beauveria Bassiana	220 ₹	1Lt	Beauveria bassiana is a well-established bio-insecticide known for its efficacy in controlling a wide range of insect pests. This naturally occurring entomopathogenic fungus infects insects by penetrating their cuticle and colonizing their bodies, ultimately causing death. As a biological alternative to chemical pesticides, it is highly suitable for sustainable, organic, and integrated pest management (IPM) systems. **Key Benefits:** - Controls a variety of sucking and chewing insect pests - Causes natural infection and death without harming beneficial insects - Leaves no toxic residues, making it safe for the environment - Reduces risk of pest resistance from overuse of chemicals **Recommended Application Methods:** - Soil Treatment - Foliar Spray - Seed Treatment

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	Krishna Biofertiliser Lab Rethare Bk.	Krishna Verti	Verticillium Lecanii	220 ₹	1Lt	The company produces Verticillium lecanii, a highly effective bio-insecticide used to control a variety of soft-bodied insect pests such as aphids, whiteflies, and thrips. This entomopathogenic fungus infects target pests through direct contact, penetrates their bodies, and ultimately leads to their death—offering reliable protection against pest infestations. Verticillium lecanii is an environmentally friendly solution suitable for use on a wide range of crops. It supports sustainable agriculture by preserving beneficial insect populations and promoting healthy plant growth. **Application Methods:** - Foliar Spray - Soil Treatment **Key Benefits:** - Targets soft-bodied pests like aphids, thrips, and whiteflies - Provides a natural, residue-free alternative to chemical insecticides - Helps maintain ecological balance by not harming beneficial insects - Suitable for organic and integrated pest management (IPM) systems - Promotes sustainable pest control and plant vitality

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	VasantDada Sugar Institute	Pratikar	Trichoderma Viride	250 ₹	1Lt	This is a mixed microbial formulation containing the following beneficial bioagents: - Trichoderma harzianum - Trichoderma viride - Gliocladium virens - Bacillus subtilis - Pseudomonas fluorescens These microbes are known for their strong antagonistic action against a wide range of soil-borne fungal pathogens, while also promoting soil health and plant growth. **Target Crops:** **Suitable for all types of crops, including:** - Monocotyledons - Dicotyledons - Fruit crops - Vegetables **Dosage:** - 2 litres per acre - 5 litres per hectare **Method of Application:** **Field Application (Compost Enrichment):** - Mix 2 litres per acre (or 5 litres per hectare) of the liquid biofungicide with 500 kg of well-decomposed FYM or compost - Mix uniformly and apply evenly across the field before sowing or transplanting **Furrow Drenching:** - Dilute 2 litres of the product in 200 litres of water - Apply by drenching the furrows at the time of planting

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Pesticide	Bio-Pesticide	VasantDada Sugar Institute	BVM-liquid Biopesticides	Mixed Formulation	250 ₹	1Lt	This product is a mixed microbial formulation containing the following entomopathogenic and biocontrol agents: - Beauveria bassiana - Metarhizium anisopliae - Lecanicillium lecanii - Bacillus thuringiensis These beneficial microbes are effective in controlling a broad range of insect pests, including both chewing and sucking insects, while promoting ecological balance and reducing chemical load in farming systems. **Target Crops:** Suitable for all types of crops, including: - Monocotyledons - Dicotyledons - Fruit crops - Vegetables **Recommended Dosage:** - 2 litres per acre - 5 litres per hectare **Method of Application:** **1. Field Application (Compost Enrichment):** - Mix 2 litres per acre (or 5 litres per hectare) of liquid biopesticide with 500 kg of well-decomposed FYM or compost - Mix thoroughly and apply uniformly in the field before sowing or transplanting **2. Furrow Drenching:** - Dilute 2 litres of the product in 200 litres of water - Drench the planting furrows with this solution at the time of sowing or transplanting

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Fertiliser	Biofer-tiliser	VasantDada Sugar Institute	HIRKANI	Acetobacter liquid bioin-oculant	250 ₹	1Lt	This microbial formulation contains Glucanacetobacter diazotrophicus, a nitrogen-fixing bacterium specifically effective in sugarcane and other sugar-rich monocotyledon crops. It enhances crop growth by fixing atmospheric nitro-gen, improving nutrient uptake, and supporting sustainable cultivation practices. **Recommended Crops:** - Sugarcane - Other sugar-containing monocotyledons **Dosage:** - 1 litre per acre - 2.5 litres per hectare **Method of Application:** **1. Sett / Ratoon Treatment:** - Prepare a solution by mixing 1 litre of Glucanacetobacter in 200 litres of water - Dip setts or ratoon canes in this solution for 30 minutes before planting **2. Foliar Application:** - Mix 1 litre per acre in 200–250 litres of water - Spray on the crop 60 days after planting until earthing-up - Apply during early morning hours for best results **Packaging Sizes:** - Standard Pack: 1 litre - Bulk Packs (on request): 5 litres and 20 litres

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Fertiliser	Biofer-tiliser	VasantDada Sugar Institute	SOLUPOST	Azophospho liquid bioin-oculant	250 ₹	1Lt	This product is a mixed microbial formulation of: - Azotobacter – a free-living nitrogen-fixing bacterium - Phosphate-Solubilizing Bacteria, including: - Bacillus megaterium - Bacillus polymyxa - Pseudomonas striata This Azophospho bioinoculant enhances soil fertility by fixing atmospheric nitrogen and solubilizing bound phosphorus, making nutrients more available to plants. **Recommended Crops:** Suitable for all types of crops **Dosage:** - 1 litre per acre - 2.5 litres per hectare **Method of Application:** **1. Field Application (with Compost/FYM):** - Mix 1 litre per acre (2.5 litres/ha) of the bioinoculant with 500 kg of well-decomposed FYM or compost - Add water to maintain 20–25% moisture, mix thoroughly, and leave overnight - Apply the mixture uniformly in the field before planting **2. Furrow Drenching:** - Dilute 1 litre of the product in 200 litres of water - Drench in the planting furrows at the time of sowing or transplanting **Packaging Sizes:** - Standard Pack: 1 litre - Bulk Packs (on request): 5 litres and 20 litres

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Fertiliser	Biofer-tiliser	VasantDada Sugar Institute	VISHWAT-MA	Potash Mobilizing Bacteria	250 ₹	1Lt	This product is a mixed microbial formulation of seven strains of Potash Mobilizing Bacteria (PMB). These beneficial microbes help convert insoluble forms of potassium in the soil into forms readily available to plants, enhancing nutrient uptake, soil health, and overall crop productivity. **Recommended Crops:** Suitable for all types of crops **Dosage:** - 1 litre per acre - 2.5 litres per hectare **Method of Application:** 1. Field Application (with FYM/Compost): - Mix 1 litre per acre (or 2.5 litres per hectare) of the liquid potash mobilizing bioinoculant with 500 kg of well-decomposed FYM or compost - Add water to maintain 20–25% moisture content - Mix thoroughly and keep the mixture overnight - Apply uniformly in the field before sowing or transplanting 2. Furrow Drenching: - Dilute 1 litre of the bioinoculant in 200 litres of water - Drench the planting furrows at the time of sowing or transplanting

Category	Sub-Category	Brand/ Manufacturer	Product	Organic Inputs	Price (₹)	Qty.	Benefits
Fertiliser	Biofer-tiliser	VasantDada Sugar Institute	BRIDGE	Sulphur Oxidizing Microorgan-isms	250 ₹		This microbial formulation contains a synergistic blend of beneficial sulfur-oxidizing and phosphate-solubilizing micro-organisms, including: - Thiobacillus thiooxidans - Actinomyces spp. - Aspergillus niger - Aspergillus awamori - Penicillium spp. These microbes enhance the availability of essential nutri-ents—particularly sulfur and phosphorus—by breaking down complex compounds in the soil, promoting root development and plant growth. **Recommended Crops:** Sugarcane, All cereal crops **Dosage:** - 2 litres per acre - 5 litres per hectare **Method of Application:** 1. Root Zone Drenching: - Mix 2 litres of the product in 200 litres of water - Apply as a drench at the root zone of the crop 2. Compost Enrichment & Broadcasting: - Mix 1 litre of the product in 1 cartload of half-decomposed FYM - Broadcast the enriched FYM evenly over the field

Annexure E. Organic Certification Process

In India, organic certification is regulated by the Agricultural and Processed Food Products Export Development Authority (APEDA) under the Ministry of Commerce and Industry. The certification process follows the National Program for Organic Production (NPOP) standards.

1. Steps for Organic Certification:

a. Farm Registration:

Farmers must register their farms with a recognised certification agency accredited by APEDA.

Provide details about the land, crops, and cultivation practices.

b. Inspection:

- An inspection is conducted by the certification agency.
- Inspectors verify that organic farming practices are followed, including the non-use of synthetic fertilisers, pesticides, and GMOs.
- Inspectors also check records and documentation maintained by the farmer.

c. Certification Application:

- After a successful inspection, the farmer submits a certification application to the certification agency.
- The application includes details about the farm, crops, farming practices, and organic inputs used.

d. Documentation:

- Maintain detailed records and documentation related to cultivation practices, including seed sourcing, crop rotation, pest management, and the use of organic inputs such as compost or manure.

e. Review and Decision:

- The certification agency reviews the application, documentation, and inspection report.
- If compliant with organic standards, the farmer is granted organic certification.

f. Certification Period and Renewal:

- Organic certification is typically valid for one year.
- Farmers need to renew the certification by undergoing the inspection and application process again.

2. Licensing for Biofertilisers

What comes under the bio fertilisers according to Fertiliser (Control) Order (FCO) >

For biofertilisers like Super vermicompost, the Fertiliser (Control) Order (FCO) 1985 governs the licensing process. The FCO is administered by the Department of Agriculture, Cooperation & Farmers Welfare under the Ministry of Agriculture and Farmers Welfare.

Steps for Licensing:

a. Application Submission:

- Submit an application to the State Agriculture Department or the Central Fertiliser Quality Control and Training Institute (CFQCTI).
- Include details about the product, manufacturing process, and quality control measures.

b. Product Testing:

- The product must be tested for quality and efficacy.
- Submit samples to a recognised laboratory for analysis.

c. Inspection:

- An inspection of the manufacturing facility is conducted to ensure compliance with FCO standards.
- Inspectors verify the production process, storage, and quality control measures.

d. Approval and Licensing:

- If the product meets the required

standards, the licence is granted.

- The licence specifies the terms and conditions for manufacturing and selling the biofertiliser.

e. Renewal:

- The licence must be renewed periodically, typically every three years.
- Renewal involves re-inspection and re-evaluation of the product and manufacturing process.

Annexure F: Regulations for Vermicompost

1. Regulations for Vermicompost Production in India

- **Vermicompost**: Vermicompost is defined as the product of the composting process using various species of worms, usually red wigglers, white worms, and other earthworms, to create a mixture of decomposing vegetable or food waste, bedding materials, and vermi-cast.
- **Composition**: Vermicompost should contain a balanced mix of essential nutrients including nitrogen, phosphorus, potassium, calcium, and magnesium.

2. Quality Standards

- Moisture Content: The moisture content of vermicompost should not exceed 15-25%.
- pH Value: The pH value of vermicompost should be between 6.5 and 7.5.
- Organic Carbon: The organic carbon content should be at least 9.5%.
- Total Nitrogen: The total nitrogen content should be at least 1.5%.
- Total Phosphorus: The total phosphorus content should be at least 0.5%.
- Total Potassium: The total potassium content should be at least 0.5%.

3. Contaminant Limits

- Heavy Metals: The levels of heavy metals such as lead, cadmium, chromium, and mercury should be within the permissible limits as specified by the FCO.
- Pathogens: Vermicompost should be free from pathogens and harmful microorganisms.

4. Packaging and Labelling

- Packaging: Vermicompost should be packed in moisture-proof bags to prevent contamination and moisture absorption.
- Labelling: Each package should be labelled with the following information:
  - Name of the product (Vermicompost)
  - Name and address of the manufacturer
  - Batch number
  - Date of manufacture
  - Net weight
  - Nutrient content (N, P, K)
  - Instructions for use

5. Certification and Compliance

- Certification: Vermicompost producers must obtain certification from the appropriate regulatory authorities (Central Fertiliser Quality Control and Training Institute (CFQCTI), State Fertiliser Quality Control Laboratories (SFQCLs) and Directorate of Agriculture in respective states) to ensure compliance with FCO standards.
- Compliance: Regular inspections and testing should be conducted to ensure that the vermicompost meets the specified quality standards.

Some other certifications-

1. National Programme for Organic Production (NPOP) Certification:

Description:

The NPOP certification is a comprehensive standard established by the Government of India, managed by the Agricultural and Processed Food Products Export Development Authority (APEDA). This certification ensures that organic products, including fertilisers, meet specific standards of organic production.

Process:

1. Application: Submit an application to an accredited certification body along with the necessary documents.
2. Inspection: An on-site inspection is conducted to ensure compliance with NPOP standards.
3. Review: The inspection report is reviewed by the certification body.
4. Certification: If the product meets all the standards, the certification is granted.
5. Validity: The certification is valid for one year and needs to be renewed annually.

Benefits:

1. Recognition in both domestic and international markets.
2. Increased consumer trust and marketability.
3. Potential for higher prices due to the premium nature of certified organic products.

2. Organic Materials Review Institute (OMRI) Listing:

OMRI is a non-profit organisation that reviews and lists products for use in organic production, according to the standards set by the USDA National Organic Program (NOP).

Process:

1. Application: Submit an application along with product formulations and labels.
2. Review: OMRI reviews the product to ensure it meets NOP standards.
3. Listing: If the product is compliant, it is listed on the OMRI Products List.
4. Validity: OMRI listing is reviewed annually, and the product must be re-evaluated each year.

Benefits:

1. Widely recognised in the United States and internationally.
2. Enhances market access and consumer confidence.
3. Ensures compliance with USDA organic standards.

3. Bureau of Indian Standards (BIS) Certification:

The BIS certification is a quality mark in India that signifies a product conforms to the prescribed standards set by the Bureau of Indian Standards.

Process:

1. Application: Submit an application with product details and a fee.
2. Testing: Product samples are tested in BIS-approved laboratories.
3. Inspection: A BIS officer inspects the manufacturing unit.
4. Certification: Certification is granted if the product passes all tests and inspections.
5. Validity: The certification is valid for two years and can be renewed.

Benefits:

1. Assurance of quality to consumers.
2. Enhanced credibility and trust in the market.
3. Potential access to government tenders and contracts.

4. ISO 9001:2015 Certification:

ISO 9001:2015 is an international standard for quality management systems. It ensures that products and services consistently meet customer and regulatory requirements.

Process:

1. Application: Submit an application to an accredited certification body.
2. Gap Analysis: An initial assessment to identify areas needing improvement.
3. Implementation: Implement required changes to meet ISO standards.
4. Audit: An external audit by the certification body.
5. Certification: Granted upon successful completion of the audit.
6. Validity: The certification is valid for three years, with annual surveillance audits.

Benefits:

1. Demonstrates commitment to quality.
2. Enhances operational efficiency.
3. Increases customer satisfaction and market competitiveness.

5. Fertiliser Control Order (FCO) Certification:

The FCO certification is mandatory in India for manufacturing and selling fertilisers. It ensures fertilisers meet specific quality and safety standards.

Process:

1. Application: Apply to the Department of Agriculture with product specifications.
2. Inspection: The manufacturing unit is inspected.
3. Testing: Product samples are tested in

government laboratories.
4. Certification: Issued if the product meets FCO standards.
5. Validity: The certification is valid for three years and requires periodic renewals.

Benefits:

1. Legal compliance for selling fertilisers in India.
2. Assurance of product quality and safety.
3. Access to government subsidies and schemes.

6. Ecocert Certification:

Ecocert is an international organic certification organisation that certifies products according to European and international organic standards.

Process:

1. Application: Submit an application with product details.
2. Audit: An initial on-site audit to verify compliance with standards.
3. Review: The audit report is reviewed by Ecocert.
4. Certification: Granted if the product meets all standards.
5. Validity: The certification is valid for one year and must be renewed annually.

Benefits:

1. International recognition and credibility.
2. Access to global organic markets.
3. Assurance of high standards of organic production.

Annexure G: Process and application to make Super Vermicompost

Process to Make Super Vermicompost:

1. Preparation of Vermicompost: 1 tonne

- Cow dung: Add 1350 kg of cow dung
- Earthworms: Add 5 kg of earthworms (preferably Eisenia fetida species).

2. Initial Decomposition:

- First 10-12 Days:

- Monitor moisture levels and maintain them by sprinkling water if necessary.
- After 10-12 days, spray the mixture with a solution of 2 kg each of jaggery and besan (chickpea flour) dissolved in water to promote microbial activity.

3. Covering:

- Shelter: Cover the mixture with a shed or a plastic sheet to protect it from direct sunlight and rain. Ensure proper aeration to facilitate the decomposition process.

4. Inoculant Addition:

- After 45 Days:

- Add the inoculants (Trichoderma, Pseudomonas, PSB, Mycorrhiza, Rhizobium, and NPK Consortia) to the decomposed mixture. (2 Kg each)
- Mix thoroughly to ensure uniform distribution of inoculants.

5. Final Composting:

- Allow the mixture to compost further for an additional 45 days. Maintain moisture and aeration during this period.

6. Harvesting:

- After 45 days, the Super vermicompost will be ready for use. Sieve the compost to remove any larger particles or undecomposed materials.

Application:

1. Soil Amendment:

- Apply Super vermicompost at a rate of 1-2 tons per hectare as a soil amendment before planting.
- It can be mixed into the topsoil to enhance soil structure and fertility.

2. Seed Treatment:

- Use Super Vermicompost as a seed treatment by coating seeds with a mixture of water and compost before planting. This improves seed germination and seedling vigour.

3. Plant Growth:

- Apply Super vermicompost around the base of plants during the growing season to provide a continuous supply of nutrients.
- It can also be used as a top dressing for established plants to boost growth and yield.

4. Compost Tea:

- Prepare compost tea by steeping Super vermicompost in water (1 kg in 10 litres of water) for 24-48 hours. Use this liquid as a foliar spray to provide nutrients directly to plant leaves and improve plant health.

At the end of this process we will get the end product called super-vermicompost which will then be sent to FPOs for packaging and transportation. This entire process will take place in 5 cycles per year, with production ranging from 600-650 kgs of compost per cycle or approximately 3000 kgs of Super-vermicompost per year from 1 bed.

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