

# 21 BIO PESTICIDES



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## 1. INTRODUCTION

Bio Pesticides represent a significant segment within the broader agricultural sector, especially in India, where there's a growing emphasis on sustainable farming practices. Bio Pesticides, derived from natural materials like animals, plants, bacteria, and certain minerals, offer an eco-friendly alternative to conventional chemical pesticides. Their role is pivotal in integrated pest management systems, promoting healthier crops and a safer environment.

## 2. PRODUCT & ITS APPLICATION

Biopesticides in India encompass a variety of products including biofungicides, bioinsecticides, and bionematicides, with biofungicides gaining particular popularity due to the widespread occurrence of fungal infections in crops. These eco-friendly alternatives to chemical pesticides are applied through different methods such as foliar sprays, seed treatments, and soil applications, proving to be effective in managing pests across a range of crops including fruits, vegetables, cereals, and plantations. Notable examples of biopesticides include Dalpon, a bioherbicide effective against weeds, baculoviruses which are virus-killing pathogens, and canola oil and baking soda, both of which have pesticidal properties. Phytophthora serves as another bioherbicide, whereas Trichoderma is recognized for its biofungicidal capabilities. *B. sphaericus* and *Bacillus thuringiensis* are bioinsecticides, with the latter being the most commonly used microbial biopesticide. Additionally, neem-based products, particularly those containing Azadirachtin, are widely utilized as biopesticides, showcasing the diverse arsenal of biological agents available for pest control in agriculture.

## 3. DESIRED QUALIFICATION FOR PROMOTER

The ideal promoter for a Bio Pesticides production project should have a background in agricultural sciences, with a good understanding of microbiology, entomology, or related fields. Familiarity with sustainable farming practices and integrated pest management is crucial. Entrepreneurial skills combined with knowledge about the agricultural market dynamics in India would be beneficial.

## 4. INDUSTRY OUTLOOK AND TRENDS

The Indian biopesticides market is showing promising growth, driven by factors such as increasing demand for organic products and government initiatives promoting sustainable agriculture. However, challenges include a lack of awareness among farmers about the benefits of biopesticides and the comparatively higher cost of these products compared to chemical pesticides. The market is expected to grow at a CAGR of 9.38% from 2022 to 2029, indicating a significant potential for growth and investment in this sector.

## 5. MARKET POTENTIAL AND MARKETING ISSUES; IF ANY

The biopesticide market in Uttarakhand, India, is emerging as a promising sector within sustainable agriculture, driven by the global shift towards environmentally friendly farming practices. The region's rich biodiversity offers a unique opportunity for developing diverse biopesticides. The broader Indian biopesticide market, valued at around \$102.3 million in 2020, is forecasted to grow significantly, indicating a positive trend that could influence the state's market.

The biopesticide market in Uttarakhand, India, reflects a growing interest in sustainable agriculture, with its potential buoyed by the presence of leading brands in the Indian biopesticide sector. Notable companies like Bayer Crop Science, Biotech International Limited, T. Stanes & Company Limited, Pesticide India, and International Panaacea Limited (IPL) are key players. These companies, known for their innovative and eco-friendly products, likely influence the market dynamics in Uttarakhand, either directly or indirectly. They exemplify the sector's growth and the increasing adoption of sustainable farming practices.

However, the sector faces challenges such as limited farmer awareness, production and storage difficulties, and distribution constraints. Ensuring the efficacy and consistency of biopesticides is also a key concern. Despite these challenges, the outlook for biopesticides in Uttarakhand remains optimistic, supported by the state's commitment to sustainable agriculture, government initiatives, and technological advancements. The success of this sector hinges on continuous research, development, and farmer education to fully realize the potential of biopesticides in the region.

## 6. RAW MATERIAL REQUIREMENTS

The production of biopesticides relies on a diverse range of raw materials, primarily consisting of microbial agents or substances sourced from natural origins. These include specific strains of bacteria, fungi, or other microorganisms renowned for their capabilities in controlling pests. In addition to these biological agents, natural substances such as plant extracts and pheromones are integral to the manufacturing process. The precise selection of raw materials is dictated by the specific type of biopesticide being developed, whether it be biofungicides, bioinsecticides, or bionematicides. Key examples of such raw materials encompass a variety of plants like eggplant stalk, onion, fistular onion stalk, chili, pepper, pine tree leaf, and plant ash. Agricultural and industrial by-products also play a significant role, with maize glucose, soybean flour, peanuts, sugarcane molasses, and liquid swine manure being utilized. Minerals, notably azadirachtin from neem, are crucial components as well. Interestingly, biopesticides can also be derived from solid waste; this involves collecting municipal and animal waste, mixing it, and then spreading it out to dry in the sun for a period of 5–10 days to eliminate pathogens and odors. Plants such as neem and turmeric, known for their pesticidal properties, are employed in organic farming as biopesticides, showcasing the innovative and environmentally friendly approaches to pest management in agriculture.

Here are the details of suppliers:

- Himalayan Nursery & Seeds: 182, Street 6, Khanna Nagar, Jwalapur, Uttarakhand 249407
- Nainileaf – Succulents, Cactus, Plants Nursery: Naukuchia Tal Rd, behind Hotel Rama Blue Point, Bhimtal, Dungsilrawat, Uttarakhand 263136
- Evergreen Blossom Nursery: Khamia Block No 2, Farm Villa, Satyapur Shantipuri 2 Shantipuri, 2, Pantnagar, Uttarakhand 263149

## 7. MANUFACTURING PROCESS

The manufacturing of biopesticides encompasses a series of critical steps beginning with the cultivation of microbial agents, which is essential for those biopesticides that utilize living microorganisms. This initial stage demands precisely controlled environmental conditions to foster the growth and maintain the potency of these microorganisms. Following cultivation,

plant-based substances or extracts that are used must undergo extraction and processing to isolate the active ingredients. These ingredients are then formulated into a usable product, which may take the form of liquids, powders, or granules. This formulation process often includes the addition of other substances to improve the stability and efficacy of the biopesticide. Rigorous quality control checks are an indispensable part of the manufacturing process, conducted to ensure that the biopesticide adheres to stringent safety and effectiveness standards. Finally, the biopesticides are packaged in appropriate materials and readied for distribution. The entire manufacturing process is underpinned by a deep understanding of the biological agents involved, their interactions with target pests, and the environmental conditions that might influence their performance. Quality assurance and a series of technical tests play crucial roles in confirming that the biopesticides produced are safe, effective, and of consistent quality, ready for application in the field.

In India, biopesticide businesses must comply with regulations set by the Central Insecticides Board & Registration Committee (CIB&RC) under the Ministry of Agriculture & Farmers Welfare, including product registration, adherence to the Insecticides Act, 1968, and maintaining Good Manufacturing Practices (GMP). Specific BIS standards for biopesticides are not detailed, but manufacturers should ensure quality control, proper labeling, and potentially align with ISO standards like ISO 9001 for quality management to ensure product safety, efficacy, and market acceptance.

## 8. MANPOWER REQUIREMENT

Sr. No	Particulars	No. of Person	Months	Monthly Wages Amount/Person (Rs in Lakhs)	Monthly Wages - Total (Rs in Lakhs)	Annual Expenses (Rs in Lakhs)
1	Skilled	2	12	0.20	0.40	4.80
2	Semi-skilled	3	12	0.15	0.45	5.40
3	Unskilled	2	12	0.10	0.20	2.40
	<b>Total</b>					<b>12.60</b>

## 9. IMPLEMENTATION SCHEDULE

Sr. No.	Activity	Time Required (months)
1	Acquisition of Premises	2
2	Construction (if applicable)	3
3	Plant & Machinery Procurement	2
4	Arrangement of Finance	2
5	Recruitment of Manpower	1
	<b>Total Time Required</b>	<b>6-8</b>

Assumed production capacity is 50 Litres per day and thus annual capacity is approximated to 15000 Litres with 300 active days.

## 10. COST OF PROJECT

Sr. No.	Particulars	Amount (Rs in Lakhs)
1	Pre-operative Expenses	2.00
2	Land and Building	10.00
3	Machinery	32.50
4	Equipment and Furniture	0.60
5	Working Capital	5.00
	<b>Total Project Cost</b>	<b>50.10</b>

## 11. MEANS OF FINANCE

Bank-term loans are assumed @ 75 % of fixed assets.

Sr. No.	Particulars	Percentage Share	Amount (Rs in Lakhs)
1	Promoter's Contribution	25%	12.53
2	Bank Finance	75%	37.58
	<b>Total</b>		<b>50.10</b>

## 12. LIST OF MACHINERY REQUIRED

### A. Machinery

Sr. No	Particulars	Unit	Unit Cost (Rs in Lakhs)	Total Amount (Rs in Lakhs)
1	Fermentation Vessels	2	3.00	6.00
2	Centrifuge Machine	1	2.00	2.00
3	Spray Dryer	1	4.00	4.00
4	Mixer/Blender	1	1.00	1.00
5	Packaging Machine	1	2.50	2.50
6	Quality Control Lab Equipment	1	3.00	3.00
7	Storage Tanks	2	0.50	1.00
8	Filtration Equipment	1	1.50	1.50
9	Cooling System	1	2.00	2.00
10	Pumps and Piping	Set	1.00	1.00
11	Electrical Fittings and Installations	Set	0.50	0.50
12	Miscellaneous Tools and Equipment	Set	0.50	0.50

	<b>Total Amount</b>	<b>25.00</b>
	Tax, Transportation, Insurance, etc.	5.00
	Electrification Expenses (Wiring)	2.50
	<b>Grand Total Amount</b>	<b>32.50</b>

## B. Furniture & Equipment

<b>Sr. No.</b>	<b>Particulars</b>	<b>Unit</b>	<b>Unit Cost (Rs in Lakhs)</b>	<b>Total Amount (Rs in Lakhs)</b>
1	Office Furniture	Set	0.50	0.50
2	Laboratory Furniture	Set	0.50	0.50
3	Computers and Printers	2	0.40	0.80
4	Air Conditioning for Lab	2	0.30	0.60
	<b>Total Amount</b>			<b>2.40</b>

1. Scigenics (India) Pvt. Ltd.  
Plot H4,5,&6,3rd Cross Street,  
Nehru Nagar, Perungudi, Chennai- 600096,  
Tamil Nadu, India.
2. Ahlstrom Fibercomposites India Pvt. Ltd  
Mundra Sez Textile & Apparel Park (MITAP) Plot No. 7,  
Survey No. 141, Mundra,  
Kutch – 370 421, Gujarat India.
3. Amcor Flexibles India Private Limited  
Level-6, Tower 3, Equinox Business Park CTS No. 83/1-19,  
L.B.S Road, Kurla (W) Mumbai,  
MH 400070, India.

## 13. SALES REALIZATION CALCULATION

<b>Sr. No</b>	<b>Product</b>	<b>Quantity (in Kgs)</b>	<b>Total Sales (Rs in Lakhs)</b>
1	Biopesticides	15000	75.00
	<b>Total</b>		<b>75.00</b>

## 14. PROFITABILITY CALCULATIONS

Sr. No	Particulars	Year-I (Rs in Lakhs)
A.	Sales Realization	
	Sales (Assuming 15% growth per year)	75.00
	Other Income (Assuming constant)	
	Total Sales Realization	75.00
B.	Cost of Production	
	i) Raw Materials	41.25
	ii) Utilities (Assuming constant)	0.42
	iii) Manpower (Salaries/wages)	12.6
	iv) Administrative Expenses (Assuming constant)	0.36
	v) Selling & Distribution Expenses (Assuming constant)	0.48
	viii) Interest (Assuming constant)	5.01
	Total Cost of Production	60.12
	No of Units Produced	17,177
	Cost of Goods Sold	0.0035
	Gross Profit/Loss (A – B)	14.88
	Less: Depreciation	4.01
C.	PBIT (Profit Before Interest and Tax)	10.88
D.	Income-tax (Assuming 28% tax rate)	3.05
E.	Net Profit/Loss (C - D)	7.83
F.	Repayment	5.01
	Retained Surplus (E - F)	2.82

Assumed production capacity is 50 Litres per day and thus annual capacity is approximated to 15000 Litres with 300 active days.

## 15. BREAKEVEN ANALYSIS

Fixed cost	Year-I (Rs in Lakhs)
Depreciation	4.01
Interest	5.01

Manpower	3.78
<b>Total Fixed cost</b>	12.80
<b>Variable cost</b>	
Raw materials	41.25
Utilities	0.42
Manpower	8.82
Administrative expenses	0.36
Selling & distribution expenses	0.48
<b>Total Variable cost</b>	51.33
<b>Contribution margin</b>	<b>20%</b>
Break-Even Point in Value	64.00

## 16. STATUTORY/GOVERNMENT APPROVALS

**1. Business Registration:** Register the business with Uttarakhand State Industrial Development Corporation (USIDC), which facilitates investments and supports the growth of industries in Uttarakhand.

**2. Factory Act Compliance:** If applicable, obtain a license from the Directorate of Factories and Boilers, overseeing industrial safety, health, and boiler-related matters.

**3. Environmental Clearance:** Secure clearance from the State Pollution Control Board (SPCB) and the Ministry of Environment, Forest and Climate Change (MoEFCC) for environmental compliance.

**4. Product Testing and Certification:** Obtain BIS (Bureau of Indian Standards) certification to ensure product safety, health, and environmental standards.

**5. Tax Registration:** Register for Goods and Service Tax (GST) as per business type and turnover.

**6. Customs and Trade Compliance:** If importing or exporting materials, comply with customs regulations and duties for international trade.

## 17. BACKWARD AND FORWARD INTEGRATIONS

### A. Backward Integration

- Raw Material Sourcing: Source bioactive agents and natural substances from reliable suppliers.
- Component Production: Produce active biopesticide ingredients in-house for quality control.
- Quality Control: Implement rigorous quality checks to ensure product efficacy and safety.

### B. Forward Integration

- Distribution and Sales: Establish a network for distributing biopesticides to farmers and retailers.
- Repair and Maintenance Services: Offer support for application equipment and usage guidance.
- Diversification: Explore expanding product lines or services related to sustainable agriculture.



## 18. TRAINING CENTERS AND COURSES

For individuals interested in pursuing a career or gaining expertise in the field of biopesticides, there are several educational and training opportunities available in India. These courses and programs offer comprehensive knowledge and practical skills necessary for the production and application of biopesticides.

- **MITCON Biotechnology & Pharmaceutical Technology Business Incubator (TBI) Center:**
  - They offer a Certificate Course in Biofertilizers & Biopesticides Production.
  - The course covers topics like biofertilizer types, media preparation, staining techniques, and biopesticides production including mass scale production, scale-up, and formulation.
- **Amrita Vishwa Vidyapeetham:**
  - Offers courses related to biopesticides and biofertilizers.
  - The curriculum includes an in-depth study of the history, concepts, importance, scope, and potential of biopesticides, as well as production technologies.
  - These courses are part of broader programs in agricultural sciences, providing a holistic understanding of sustainable farming practices.
- **National Institute of Plant Health Management (NIPHM):**
  - Conducts various training programs in organic and natural farming, which may include aspects of biopesticide production.
  - NIPHM's training modules are designed to cater to the needs of farmers, entrepreneurs, and students interested in sustainable agricultural practices.

Swayam portal (link: <https://swayam.gov.in/>) can also be accessed for enhanced learning on business commerce, accounting, production, marketing, and areas of entrepreneurship.

### Disclaimer

Only few machine manufacturers and institutes are mentioned in the profile, although many machine manufacturers/institutes are available in the market. The addresses given for machinery manufacturers have been taken from reliable sources to the best of knowledge and contacts. However, no responsibility is admitted, in case any inadvertent error or incorrectness is noticed therein. Further the same have been given by way of information only and do not carry any recommendation.