

SRI RAMKRISHNA ASHRAM, NIMPITH
R & D WING



VIVEKANANDA INSTITUTE OF BIOTECHNOLOGY
(VIB)
ANNUAL REPORT

2024 – 2025

Science for the Soil. Skills for the Soul. Solutions for Rural India.

01 | INSTITUTE AT A GLANCE

About VIB

A rural biotechnology platform connecting research, skills, knowledge and community action.

Vivekananda Institute of Biotechnology (VIB) was established in 1991 as the Research and Development (R&D) wing of Sri Ramkrishna Ashram, Nimpith. Since its inception, VIB has been working at the interface of science, technology, and rural development, guided by four interlinked objectives:

15,000+	1991	4	SIRO
HOUSEHOLDS REACHED	ESTABLISHED	INTERLINKED OBJECTIVES	NATIONAL RECOGNITION

01	Research & Development (R&D) designing and developing rural-friendly biotechnological solutions tailored to local needs.
02	Capacity Building designing and implementing multi-skill training programs in biotechnology to empower rural youth with employable skills, ensuring lab-to-land technology transfer.
03	Knowledge Network Creation building and sustaining a community of trained “knowledge workers” who act as technology disseminators and catalysts of change at the grassroots.
04	Village-Level Knowledge Hub acting as a service centre that validates Indigenous Traditional Knowledge (ITK) and provides villagers with accessible, eco-friendly, low-cost technological solutions.

- VIB focuses on livelihood generation and upgradation through sustainable natural resource management, ensuring that science directly supports rural well-being.
- Reached nearly 15,000 households, impacting rural livelihoods through training, technology transfer, and enterprise development.
 - Developed and nurtured a strong network of Community-Based Organisations (CBOs) and Self-Help Groups (SHGs), enabling collective action and sustainable community development.
 - Earned national recognition as a Scientific and Industrial Research Organisation (SIRO) by the Department of Scientific and Industrial Research (DSIR), Government of India — a testimony to its credibility in research and grassroots innovation.

02 | RESEARCH & DEVELOPMENT

Applied research for rural biotechnology

Selected research activities reported during 2024–25.

As the R&D unit of Sri Ramkrishna Ashram, Nimpith, VIB continues to pursue a diverse portfolio of applied research aimed at rural biotechnology solutions.

Nitrogen Fixation in Azotobacter

A completed and published study examined mitigating the inhibitory effect of ammonia on nitrogen fixation in Azotobacter. Findings revealed that increasing the C:N ratio — either by raising glucose concentration or lowering ammonia concentration — enhanced nitrogenase activity in Azotobacter chroococcum, through enhanced respiration (reducing intracellular oxygen and protecting nitrogenase from oxygen toxicity) and increased alginate production, which positively correlated with nitrogen fixation. Notably, bacterial growth was not significantly inhibited by ammonia, while higher glucose levels promoted both growth and nitrogenase activity.

Plant Growth-Promoting Traits of Azotobacter in Chili

The assessment of plant growth-promoting (PGP) traits of Azotobacter and their contribution to yield improvement in chili has been completed, with a research paper submitted for publication. Path coefficient analysis revealed that phosphate solubilization and indole-3-acetic acid (IAA) production were the most significant factors influencing yield — both directly, by enhancing nutrient availability and root development, and indirectly, through effects on photosynthetic efficiency and plant vigor. The study validates Azotobacter's multifunctional bioinoculant potential for sustainable, low-chemical-input agriculture.



Effect of plant growth-promoting parameters of different isolates of Azotobacter on yield-attributing characters of chili — root biomass.

Phyllosphere Diazotrophic Bacteria

A dedicated research program is assessing the potential of phyllosphere diazotrophic bacteria for plant growth-promoting efficiency through foliar application. Six promising isolates obtained from the phyllosphere of natural plants are being evaluated for nitrogen-fixation ability, phytohormone production, and stress-tolerance induction, with the goal of developing a scientifically validated bioinoculant for foliar application — expanding beyond traditional soil or seed inoculants.

From laboratory innovation to usable formulations



*Phyllosphere diazotrophic bacteria isolated from Telakucha (*Coccinia grandis*) leaf for further exploration.*

Granular Trichoderma viride Biopesticide

Building on earlier success with its liquid culture, VIB has successfully developed a granular formulation of the biopesticide *Trichoderma viride*. The granular form offers easier handling and packaging for smallholders, improved transport and storage stability, extended shelf life, and enhanced field applicability — supporting the national agenda of integrated pest management (IPM) and climate-resilient agriculture.



Granular formulation of Trichoderma-based biopesticide.

Germplasm maintained at VIB

For its research, development, and production activities, VIB maintains germplasm of Biofertilizers (Azotobacter, various Rhizobium, Phosphate-Solubilizing Bacteria, Potash-Mobilizing Bacteria, Endophytic and Phyllosphere diazotrophs), Biopesticides (Trichoderma viride, Pseudomonas fluorescens, Bacillus thuringiensis, Paecilomyces lilacinus), Mushroom cultures (Oyster, Milky, Paddy Straw and Button mushroom), and Higher plants (Banana — G9, Kanch Kela, Doodsagar, Red Banana, Kanthali, Robusta, Mortaman).

03 | SUSTAINABILITY & PRODUCTION

Sustainable agriculture, aquaculture & livelihood development

Nypa – Mangrove Conservation Initiative

The Rotary-funded Nypa – Mangrove Conservation Initiative in the Sundarbans successfully planted 6,047 saplings across approximately 11.62 km, erected around 8 km of protective fencing, organized mass awareness programs on the future income-generating value of these young mangroves, and — with support from local leaders — formed two forest protection committees in the coastal hamlets of Paschim Dwarikapur and Madhabnagar.



Measurement of growth rate of Nypa fruticans at Madhabnagar, Patharpratima.

VIB's integrated approach improves rural resilience and income through environmentally sound practices, promoting Integrated Farming Systems (IFS) that synergize horticulture, livestock, poultry, aquaculture, and biogas to optimize farm productivity and sustainability.

6.67 MT	19.52 MT	5 MT	8,018
BIOFERTILIZER SUPPLIED	BIOPESTICIDES SUPPLIED	VERMICOMPOST SUPPLIED	BANANA PLANTLETS SUPPLIED

50,000
MUSHROOM SPAWN PACKETS (200 G)

Homestead gardening is promoted among women through training, technical support, and input supply, strengthening food and nutritional security of Sundarbans households.

04 | SUNDARBANS

DST Science & Technology (S&T) Hub

Under the DST-supported project to establish a Science & Technology (S&T) Hub in the Sundarbans, six Gram Panchayat (GP)-level nurseries have been established and are managed by selected, trained Master Farmers, serving as demonstration centres supplying quality planting material to surrounding communities.

6	90 HH	10 HH	38 HH
GP-LEVEL NURSERIES	BEE FLORA	LEIBA	GAP & IFS DEMONSTRATIONS

- Cultivation of bee flora: 90 households supported to cultivate bee-friendly plant species, promoting apiculture and enhancing biodiversity.
- Low external input aquaculture (LEIBA): 10 households participated in demonstrations reducing dependency on costly external inputs.
- Good Agricultural Practices (GAP) & integrated farming: 38 households selected for GAP-based paddy-vegetable and integrated farming demonstrations.

During the reporting period, awareness programmes on the promotion of bee flora reached 150 beneficiaries and master farmers; bee flora saplings were supplied to 240 households; LEIBA demonstrations covered 10 households and GAP/IFS demonstrations 23 households; training on low-input aquaculture reached 110 beneficiaries, and on GAP/integrated farming, 86 beneficiaries. Polyculture practices were introduced to diversify production and optimise income from household water bodies.



Preparation for Integrated Farming in the field of Sri Jagannath Hembram at Gangasagar village, Sagar.



Paddy cultivation following INM & IPM at Bharatgarh village, Basanti.

Field demonstrations & farmer learning



Field training on homestead cultivation at Gangadharpur village, Kakdwip.



Demonstration field on vegetable cultivation in Baikunthapur village, Kultali.



Field demonstration on preparation of ITK-based Jibamrita as an organic input in agriculture.



Hands-on training on plankton measurement at Sagar.



Growth of Catenella on coir rope under STI Hub project.

Integrated livelihood technologies



Field visit for pest and disease management at Gangadharpur village, Kakdwip.



Demonstration on health management of animal husbandry at the doorstep, by Dr. Santanu Bera, WBUAFS, at Sapkhali village, Sagar.



Distribution of cookstoves in Rajapur village.



Installation of a micro-solar dome in a fishing boat at Paschim Dwarikapur village.

Technology portfolio

The field portfolio combines crop management, livestock health, household energy solutions and renewable-energy applications with community-level demonstrations under the STI Hub project.

Expert engagement & technology dissemination



Prof. Durgesh Panth and Prof. Dipak Mondal, Members of the DST Expert Committee, visit a fish farming unit at Sagar.



Prof. O. N. Tiwari, Member, DST Expert Committee, visits a betel vine field at Gangasagar.



Prof. Durgesh Panth, Chairman of the DST Expert Committee, Government of India, visits the Institute.



Technology dissemination on improved fish farming under the SCSP project at the Women's Technology Park, Sagar, in collaboration with CIFE, ICAR, Kolkata.



Training on value-added products from low-cost fishes at the Women's Technology Park, Sagar, in collaboration with CIFE, ICAR, Kolkata.

05 | PARTNERSHIPS

Azim Premji Foundation (APF) Project

Launched in September 2024, the project supported by the Azim Premji Foundation strengthens improved agriculture- and aquaculture-based livelihoods of marginal farmers in the Sundarbans. A baseline household survey covering 1,168 marginal farmer families generated a comprehensive socio-economic and production database, which has since been analysed to identify key livelihood characteristics, constraints, and opportunities.

1,168	28	4 + 8	600,000
HOUSEHOLDS SURVEYED	SHGS MOBILIZED	NURSERY + REARING PONDS	IMC SPAWN STOCKED

A two-day orientation programme for project staff and Village Resource Persons (VRPs) was followed by a two-day technical training covering agricultural and aquaculture technologies. Community mobilization is well underway, with 28 Self-Help Groups (SHGs) mobilized for collective action.

On the aquaculture front, four nursery ponds and eight rearing ponds have been finalized, and 600,000 Indian Major Carp (IMC) spawn were released into the four nursery ponds at Bhagabatpur and Madhabnagar villages, following a stocking ratio of 40:30:30 for Catla, Rohu, and Mrigel.

Standard Operating Procedures (SoPs) and Package of Practices (PoPs) are under development ahead of the Kharif season.

APF Project at a glance

1,168 households surveyed | 28 SHGs mobilized | 4 nursery + 8 rearing ponds developed | 600,000 IMC spawn stocked

APF project — mobilisation & field action



Orientation programme of the Azim Premji Foundation-sponsored project at the project-cum-field office, Patharpratima, in the presence of Srimat Swami Sadanandaji Maharaj.



Interaction of Srimat Swami Sadanandaji with members of the Village Development Committee at Bhagabatpur, Patharpratima.



Staff capacity-building programme at VIB under the APF Project.



Distribution of bioinputs, paddy and dhoincha seed to beneficiaries at Patharpratima, under the APF project.

APF project — aquaculture implementation



Acclimatization of fish spawn during release at the nursery pond, Bhagabatpur, Patharpratima.



Sampling of fish species (IMC) in the beneficiaries' pond at Madhabnagar, Patharpratima.



Participation of the VIB team at SPS Indore (an APF network NGO) on the promotion of non-pesticide management practices.

Implementation emphasis

The APF programme links baseline evidence, staff and VRP capacity building, community institutions, improved agricultural practices and aquaculture infrastructure into a coordinated livelihood-development pathway.

06 | LIVELIHOODS

Mushroom cultivation & beekeeping

Mushroom Cultivation

VIB promotes mushroom cultivation as both a nutritious food source and a sustainable income-generating activity for rural households. During the year, 44 structured training programmes covered substrate preparation, spawn inoculation, bed management, pest and disease control, harvesting, post-harvest handling, and marketing, resulting in 30 additional potential mushroom producers equipped to initiate commercial cultivation.



Summer variety of Milky mushroom being cultivated at VIB.

Beekeeping

VIB promotes beekeeping as an eco-friendly, sustainable livelihood option in the forest-fringe areas of the Sundarbans, providing an additional income source through honey and wax while enhancing pollination and biodiversity. VIB has facilitated the formation of a cooperative of traditional rock bee (*Apis dorsata*) honey collectors, ensuring sustainable harvesting and fair returns. To strengthen the value chain, a Common Facility Centre (CFC) has been established for honey processing, quality control, packaging, and marketing — transforming raw honey into a standardized, market-ready product and reducing the risks of unorganized collection.

07 | BIOTECHNOLOGY FOR FARMERS

Plant tissue culture

VIB is engaged in producing high-quality, disease-free, and synchronized planting materials of banana and elephant foot yam — two crops of significant economic and nutritional importance in the region.

Through tissue culture and scientific propagation techniques, VIB ensures large-scale production of disease-free, genetically true-to-type banana plantlets that offer better survival rates, faster growth, uniform flowering, and synchronized harvesting. Similarly, for elephant foot yam (*Amorphophallus paeoniifolius*), VIB focuses on producing quality planting corms free from disease and physiological disorders, supporting higher yields and reliable harvest cycles.

Benefits to farming households

The availability of such scientifically standardized planting material directly benefits farming households by:

- Enhancing crop yield and quality.
- Reducing losses due to pests and diseases.
- Ensuring synchronized crop maturity for better marketability.
- Lowering dependence on uncertified and inferior planting sources.

Through these interventions, VIB contributes not only to food and nutritional security but also to sustainable livelihood enhancement in rural communities, integrating biotechnology with farmer-friendly solutions.

Disease-free	True-to-type	Higher yields	Better
PLANTING MATERIAL	BANANA PLANTLETS	QUALITY PLANTING MATERIAL	marketability
			SYNCHRONIZED MATURITY

08 | INSTITUTIONAL IDENTITY

Science, service & community

A catalyst for rural transformation

Thus, VIB has established itself as a powerful catalyst for rural transformation — integrating science with service, technology with tradition, and innovation with inclusiveness — aiming for sustainable development and community empowerment.



Vivekananda Institute of Biotechnology — front view.

Institutional Events

World Soil Day celebration at VIB.

The annual report brings together VIB's research, technology dissemination, capacity building, production, partnerships and livelihood initiatives into a single institutional narrative — from laboratory science to field-level impact.

09 | PUBLICATIONS

Research outputs

Selected publications reported for 2024–25:

01 Mandal Debjani, Das Sadhan Kumar, Jishu Adhikari, Debashis Chatterjee, Tapas Kr Bondopadhyay and Abhishekh Basu (2024). Genome sequencing, annotation, and application of a strain of *Microbacterium paraoxydans* – a heavy metal hypertolerant and plant growth promoting bacterium. *The Microbe* 4(2024): 100132.

02 Das S.K. and Das T.K. (2025). Mitigation of Inhibitory Effect of Ammonia on Nitrogenase by Increasing C:N Ratio in *Azotobacter*. *International Journal of Creative Research and Thoughts*, 13(3): 103–108.

03 Das S.K. and Das T.K. (2025). Assessment of Plant Growth Promoting Parameters of *Azotobacter* for their Contribution to Yield of Chili (*Capsicum annum*) through Path Coefficient Analysis. *Int. J. Curr. Microbiol. App. Sci.* (Accepted).

Research-to-impact pathway

VIB's publication record complements its applied programme portfolio, reinforcing a model in which research findings, validated technologies, training and grassroots dissemination work together.

10 | HIGHLIGHTS

2024–25 in numbers

15,000+	6,047	11.62 km	8 km
HOUSEHOLDS REACHED	NYPA SAPLINGS PLANTED	NYPA PLANTING STRETCH	PROTECTIVE FENCING
6.67 MT	19.52 MT	5 MT	8,018
BIOFERTILIZER	BIOPESTICIDES	VERMICOMPOST	BANANA PLANTLETS
50,000	44	30	1,168
MUSHROOM SPAWN PACKETS	MUSHROOM TRAINING PROGRAMMES	POTENTIAL MUSHROOM PRODUCERS	APF HOUSEHOLDS SURVEYED
28	600,000	240	150
APF SHGS MOBILIZED	IMC SPAWN STOCKED	BEE-FLORA HOUSEHOLDS SUPPLIED	BEE-FLORA AWARENESS BENEFICIARIES

What the numbers represent

The figures reflect a combination of research, production, capacity building, ecological restoration, community mobilisation and technology dissemination. Together they illustrate the breadth of VIB's rural biotechnology mandate.

11 | PORTFOLIO

Integrated technology for rural transformation

BIOINPUTS Biofertilizers • Biopesticides • Vermicompost Science-based inputs for sustainable agriculture.	CROP & PLANTING MATERIAL Banana tissue culture • Elephant foot yam • Nursery Quality, disease-free and farmer-friendly planting material.	MUSHROOM & BEEKEEPING Mushroom production • Honey value chain Nutrition, enterprise development and sustainable livelihoods.
AQUACULTURE LEIBA • Polyculture • IMC nursery & rearing Improved use of household water bodies and diversified income.	IFS & NATURAL RESOURCES Horticulture • Livestock • Poultry • Aquaculture • Biogas Integrated systems for productivity, resilience and resource efficiency.	COMMUNITY & KNOWLEDGE Training • SHGs/CBOs • Master Farmers • ITK validation Grassroots knowledge networks supporting local action.
Institutional proposition Science for the Soil. Skills for the Soul. Solutions for Rural India.		

VIB's work integrates modern science with traditional wisdom to promote sustainable development and self-reliance in rural India.

12 | CLOSING

Science with service



VIVEKANANDA INSTITUTE OF BIOTECHNOLOGY (VIB)

R & D Wing • Sri Ramkrishna Ashram, Nimpith

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Guiding statement

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