

SRI RAMKRISHNA ASHRAM, NIMPITH • RESEARCH & DEVELOPMENT
WING

VIVEKANANDA INSTITUTE OF BIOTECHNOLOGY

A Scientific & Industrial Research Organisation (SIRO), DSIR, Government of India



Vivekananda Institute of Biotechnology, SIRO (DSIR), is completing 33 years

33

YEARS OF SERVICE

SIRO

DSIR RECOGNITION

STI HUB

DST • SEED DIVISION

PGDC

CALCUTTA UNIVERSITY

ANNUAL REPORT 2023 – 2024

01 About VIB

Vivekananda Institute of Biotechnology (VIB), established in 1991, has been at the forefront of biotechnological research and innovation for over three decades. Recognized as a Scientific and Industrial Research Organisation (SIRO) by the Department of Scientific and Industrial Research (DSIR), Government of India, VIB has been instrumental in developing, adapting, and modulating relevant agri-biotechnologies for rural development.

It is now a Science, Technology and Innovation Hub (STI Hub) for the Sundarban region, supported by the SEED Division of the Department of Science and Technology, Government of India — further solidifying its position as a hub of scientific excellence. VIB is also affiliated to the University of Calcutta, offering a Post Graduate Diploma Course in Biofertilizer Technology, enabling it to share expertise with the next generation of biotechnologists.

With its strong research focus and commitment to innovation, VIB continues to make significant contributions to agri-biotechnology, aligning with its mission to harness the power of science for the betterment of society, especially in rural areas of West Bengal.

02 Research & Development

Integrated Nutrient Management & Nitrogen Fixation

The technology of integrated nutrient management in paddy with endophytic diazotrophic bacteria has been further up-scaled with a new isolate showing better adaptability to Sundarban soil — an effort to mitigate the adverse effect of soil conditions on biofertilizer efficiency, as this symbiotic bacterium is allowed to infect and establish in rice roots in the seed bed.

Research on mitigating the inhibitory effect of nitrogen compounds on nitrogen fixation in *Azotobacter* has been completed. Findings show that increasing the C:N ratio to over 10 can counteract the inhibitory effect of ammonia on Acetylene Reduction Activity, even at high concentrations of ammonium sulfate (500 gm/L) in artificial media.

Integrated Pest Management

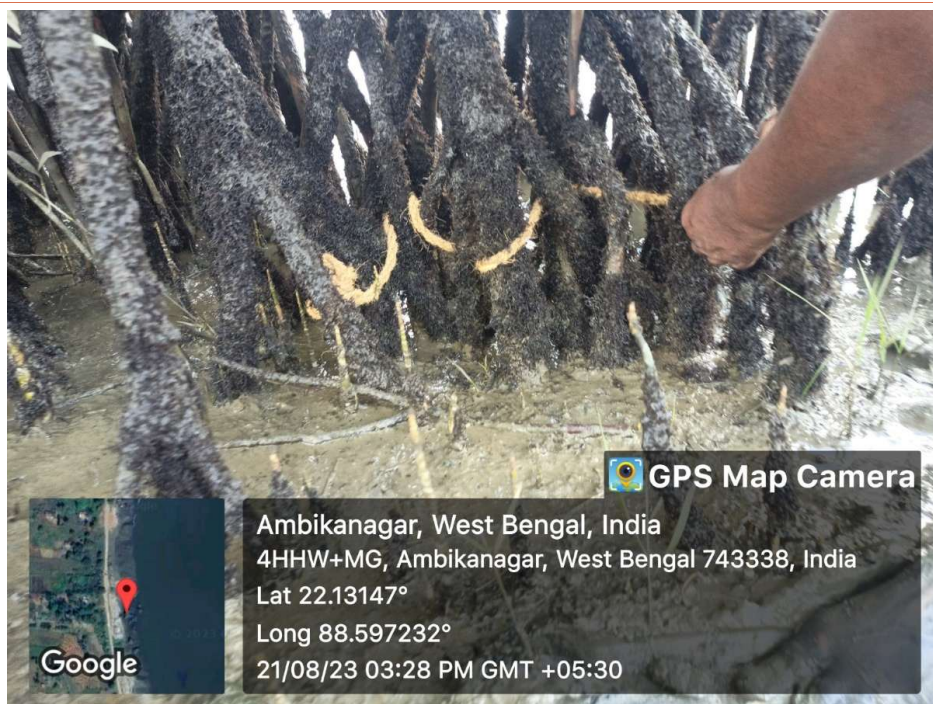
A new mechanical device — a fruit fly / melon fly trap — has been introduced for integrated pest management of vegetables. Alongside this, VIB has successfully introduced seed treatment with *Trichoderma viride* and *Pseudomonas fluorescens* as a biological alternative to chemical seed dressing.



VIB has successfully introduced the seed treatment with *Trichoderma viride* and *Pseudomonas fluorescens*.

Domestication of *Catenella* (Mangrove Alga)

Efforts to domesticate the mangrove alga *Catenella* sp. for commercial production have begun on Prentice Island. To optimize biomass yield, five different gear types — mangrove branches, bamboo poles, coir ropes, cylindrical nylon tubes, and flat nylon nets — have been installed in brackish-water regions to evaluate their performance.



Standardization process for the domestication of *Catenella* sp. in selected sites of the Sundarbans is being carried out by VIB.

Plant Tissue Culture

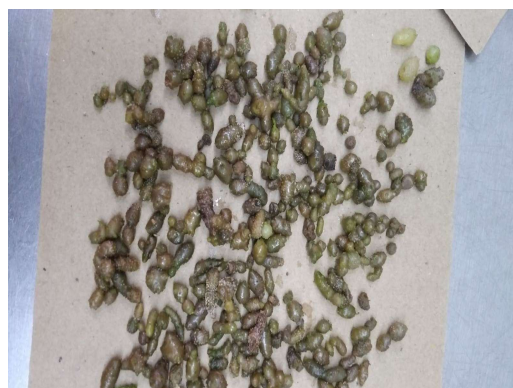
A program on standardization of quality seed potato through micropropagation is underway, targeting two varieties — Kufri Jyoti and Kufri Chandramukhi. Work on Kufri Jyoti has progressed in detail: the protocol for optimum multiple

shoot production has been standardized, around 1,300 micro-tubers have been produced, and the mass tuberization process is now standardized.

Ornamental foliage plants — Syngonium, Aglaonema, Diffenbachia and Philodendron — are in strong demand in local nurseries near Kolkata. For Aglaonema and Diffenbachia, induction of axillary buds by injecting 30 µl of 30 mg/L 6-benzyl amino purine into the corm region was required prior to successful in-vitro establishment. Syngonium pink is maintained at the multiplication stage in vitro, and micropropagated Aglaonema Red has been successfully hardened and maintained under nursery conditions by nursery women; Philodendron and Diffenbachia remain under establishment.



In-vitro production of Aglaonema red, a foliage ornamental plant, in the Plant Tissue Culture Lab, VIB.



Potato microtubers (Kufri Jyoti) produced in vitro in the Plant Tissue Culture Lab, VIB.

Other Research

One research effort on arsenic-tolerant plant growth-promoting bacteria continues with a team of scientists from Sripat Singh College, Jiaganj, led by Dr (Ms) Debjani Mondal. Two bacteria have been isolated and characterized for plant growth-promoting properties and genomic analysis, and will be further evaluated through field trials.

Germplasm maintained: Azotobacter–22 ♦ Rhizobium–13 ♦ PSB–17 · KSB–12 ♦ Endophytic Diazotrophs–26
♦ **Blue-Green Algae–210**

VIB also maintains germplasm of biopesticide microbes (*Trichoderma viride*, *Pseudomonas fluorescens*, *Purpureocillium lilacinum*), earthworms, mushroom fungi (*Pleurotus ostreatus*, *P. eous*, *P. sajor-caju*, *P. florida*, *Volvariella volvacea*, *Calocybe indica*, *Agaricus* sp.), banana (Grandnaine, Robusta, Chatim, Desi Kanthali, Doodhsagu, Red banana), two varieties of elephant foot yam, 17 indigenous paddy varieties, and 64 thermosensitive cytoplasmic male sterile (TCMS) lines of paddy.

03 Technology Dissemination

Good Agricultural Practices (GAP)

This sustainable, eco-friendly and economical method of agriculture was transferred to 235 farmers this year, in addition to 15,850 farmers across 77 villages, 11 districts and 6 agro-climatic zones of West Bengal.

32% ↓ chemical fertilizer use ♦ 64% ↓ chemical pesticide use ♦ up to 21% ↑ profit — paddy ♦ up to 37% ↑ profit — vegetables



Swami Sadanandaji, Chairman, VIB and Secretary, SRAN, delivers the Welcome Address at the GAP Workshop, NBSSLUP, Kolkata, in the presence of Sri Prabhat Kumar Mishra, IAS, Addl. Chief Secretary, GoWB.



Dr. Pradip Sen, Ex-MD, WBSSC Ltd, Dr. Sampad Ranjan Patra, Ex-Director, Dept. of Agriculture, GoWB, and other dignitaries at the GAP Workshop, NBSSLUP, Kolkata.



Sri Durgashankar Pradhan, Resource Person, VIB, interacts with SHG members on Homestead Cultivation at Bijoybati village, Namkhana block.



Sri Dhritiman Biswas, Technical Officer, VIB, interacts with SHG members on Good Agricultural Practices at Bhajna village, Patharpratima block.

STI Hub Program

Under this DST SEED Division-supported program, work is being carried out in 8 blocks of the Sundarbans, aiming to improve the livelihood status of the SC community through Science & Technology intervention, promoting enterprise and building a sustainable system for technology transfer.

548 households surveyed ♦ 55 women SHGs ♦ 9 awareness programs · 465 participants ♦ 32 off-campus trainings · 698 participants

Additional activities included 8 mentoring programs for CBOs (32 participants), 4 skill-development programs for VRPs (40 participants), 8 technology-based interactive discussions with 200 women master farmers, the launch of mobile

app-based digital crop advisory services, and documentation of prevalent practices and traditional knowledge in the target area.



Swami Sadanandaji, Chairman, VIB and Secretary, SRAN, and Dr. Debopriya Dutta, Former Head, SEED Division, DST GoI, launch the STI Hub project.



Dr. Debopriya Dutta, Former Head, SEED Division, DST GoI, presents the objectives of the STI Hub project during the Launching Workshop.

Nypa Conservation & Apiary Initiative

Supported by Rotary Club, Kolkata, this initiative promotes the growth of Nypa — a threatened mangrove species — by planting 10,000 plants along 5 km of river embankments in the Kultali and Patharpratima blocks of the Sundarbans, enhancing vegetation cover and creating a natural barrier against cyclone-related disasters.

Seed Germination Unit: 5–34% growth/day ♦ Nursery capacity: 5,000 · 1,282 planted ♦ 7,022 seeds collected · 70% germination ♦ 5,047 plants prepared for plantation



VIB has established a nursery for *Nypa fruticans*, supported by Rotary Club, Kolkata.

A complementary apiary and bee-flora initiative trains beneficiaries in nursery management and bee-flora cultivation, and supports rock-bee boxes in Sundarbans villages under the Rotary-supported project.



Hands-on training on Nursery Management and Bee Flora at VIB, for beneficiaries from Kalitala village, Hingalgunj block, North 24 Parganas.



Sri Nilay Modak, Program Officer, Rotary Club, Kolkata, visits bee boxes at Deulbari village, Kultali block, South 24 Parganas, under VIB's Apiary project.

Biogas from Kitchen Waste

A biogas plant fuelled by kitchen waste has been installed at APC College, Madhyamgram, North 24 Parganas, generating cooking fuel for the student hostel.



A biogas plant from kitchen waste is installed at APC College, Madhyamgram, North 24 Parganas, by VIB.

04 Support Services

Digital Farmers' Advisory Service

VIB has developed a mobile app-based farmers' advisory service for weather forecasting and pest and disease management, with 500 farmers registered under the program. The betel vine yards of 100 farmers in Sagar have been brought under an online QR-code system that records complete farm details, including nutrient and pest-management history.

Analytical & Diagnostic Services

6,380 soil samples analyzed ♦ 100 water samples analyzed ♦ 80 in-house + 145 external ARA samples

VIB provides soil, water and manure analysis services, and Acetylene Reduction Assay (ARA) services for nitrogen-fixation efficiency — serving both its own microbial collection and samples from institutions such as West Bengal State University and North Bengal University.

Bio-input & Planting Material Supply

Biofertilizer: 4.6 MT ♦ Bio-pesticides: 14.9 MT ♦ Vermicompost: 40 MT ♦ Mushroom spawn: 5,00,000 packets (200 g)

VIB also produced and supplied 7,000 micro-propagated banana plantlets and 70,000 nursery plants, including flowering plants, fruit plants, vegetable seedlings and indoor plants.

Women's Technology Park, Sagar — “Jeevan-o-Jeevika Kendra”

Established at the Women's Technology Park, Sagar, this centre trained 68 betel vine farmers on GAP-based production, 84 women on mushroom production, and 29 villagers on fish production, with an average of 20 farmers a day receiving consultancy on organic production. The centre distributed 9.65 MT of bio-inputs (*Pseudomonas fluorescens* – 4,562 kg, *Trichoderma viride* – 4,555 kg, *Azotobacter* – 112 kg, PSB – 95 kg, KSB – 95 kg, *Purpureocillium lilacinum* – 151 kg, VAM – 45 kg) and 282 packets of mushroom spawn.



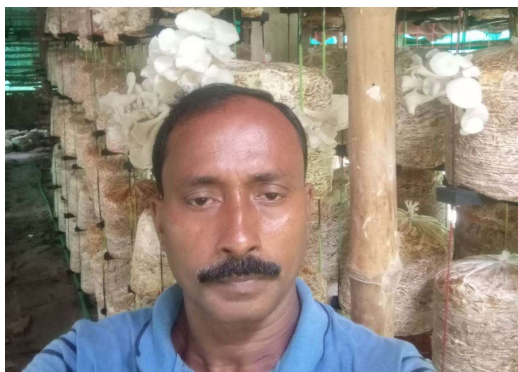
Pusa A5 variety of okra, grown at WTP, Sagar, for performance evaluation under the IARI–VO Partnership Program of VIB.



The non-shattering Mung variety IPM 02-03 is evaluated and selected under the DST Core Programme of VIB.

05 Social Enterprise

Rural entrepreneur generation is one of the key targets of VIB's activities. Training on mushroom production is provided, along with quality mushroom spawn, to interested growers; this year, 10 new mushroom growers were developed through the program.



Sri Achintya Naskar, Ranihati, Howrah — a successful mushroom grower trained and supported by VIB.



Production of Paddy Straw mushroom at VIB.

Eleven Village Resource Centres operate successfully, offering soil analysis, crop clinic, farmers' advisory, and supply of bio-inputs and elephant-foot-yam seed tubers, generating reasonable income for local entrepreneurs. The most successful, Sri Chandi Charan Singh of Chhatna block (Bankura district), has organized 250 farmers for organic production of turmeric and other spices, and now runs his own processing unit supplying organic spice powders to the local market.



Sri Chandi Charan Singh, a Para Worker of VIB in Bankura District, is now a successful entrepreneur with an organic spice-production unit.



Women SHG members produce seed tubers of elephant foot yam for supply to farmers.

VIB also nurtures women's entrepreneurship through structured development programs — such as the EU-GENIE program of TREC-STEP — that build business capability among rural women entrepreneurs.



Sri P. K. Dey, Director, Pranavananda Institute of Management and Technology, Kolkata, conducts the EDP for Women Entrepreneurs at VIB, under the EU-GENIE program of TREC-STEP.

06 Academic Activities

One Ph.D. student under the University of Calcutta has successfully completed all formalities and received a provisional certificate, having carried out his research at VIB under its co-guidance. The 4th batch of the Post Graduate Diploma Course in Biofertilizer Technology was completed this year, with 6 students.



Practical class of the Post Graduate Diploma Course in Biofertilizer Technology at VIB.

07 Institutional Engagements

VIB regularly hosts capacity-building programs for partner organisations. This year, it organized training on PFMS (Public Financial Management System) modules for NGOs from the eastern region, supported by the Department of Science and Technology.



Sri S. Francis, Financial Consultant, DST, during the “Training on PFMS Modules” organized at VIB for capacity building of NGOs from the eastern region.

08 Publications

- ▶ Modak M. K., Das S. K. and Mallick R. B. (2023). Organic Farming. In Innovative Research and Technologies in Agricultural Science, Vol. 6 (eds Saxena, A. K.), Scripown Publications, Rohini, North Delhi–110086, India. Pp. 1–11.
- ▶ Modak M. K., Das S. K., Mallick R. B., Datta B. K. and Kar S. (2023). Effect of Good Agricultural Practices (GAP) with soil amendment on production potential of Okra (*Abelmoschus esculentus*) in the new Alluvial Zone of West Bengal. *J. Soils and Crops* 33(2): 433–437.
- ▶ Mandal Debjani, Das Sadhan Kumar, Jishu Adhikari, Debashis Chatterjee, Tapas Kr Bondopadhyay and Abhishekh Basu. Genome sequencing, annotation and application of a strain of *Microbacterium paraoxydans* — a heavy metal hypertolerant and plant growth promoting bacterium. *The Microbe* (Accepted).