



## **ANNUAL REPORT (2006-2007)**

**Vivekananda Institute Of Biotechnology**

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Vivekananda Institute of Biotechnology has stepped into its 16<sup>th</sup> year of journey. The significant recognition during these years are i) an institute under Core Support Programme of Department of Science and Technology (DST), Government of India, ii) Technology Resource Centre of Council for Advancement of Peoples Action and Rural Technology (CAPART), Government of India, iii) Post Graduate Research Laboratory of Burdwan University, and iii) Scientific and Industrial Research Organization of DSIR, Ministry of Science & Technology, Govt. of India. **Recently Central Board of Direct Taxes, Dept. of Revenue, Government of India has approved this institute for the purpose of income tax exemption under section 35(1) (ii) of Income Tax Act 1961.**

With a mission of application of Science & Technology at grass root level this institute is working in following areas:

### **Programme on Biofertilizer Technology:**

Biofertilizer Technology typically means the production and application of efficient, region specific quality culture of biofertilizer. But for the proper functioning of biofertilizer in the farmers' field several other subjects are integrated with biofertilizer.

#### **i) Soil testing and fertilizer recommendation:**

With a realization that the loss of natural fertility of soil is due to excess and unregulated use of chemical fertilizers and so soil environment should be maintained properly for the proper functioning of biofertilizer, the service of soil testing must reach the grass root level. For this purpose a model was developed here to provide soil testing services to the farmers at grass root level. In addition to testing of N, P, K, pH, EC and OC, this centre also provides the assessment of micronutrients. A program to provide soil testing facility at the door step of the farmers was executed with the financial support of Sunderban Development Board (SDB), Govt. of West Bengal. Total 9000 soil samples were analyzed, were analyzed, this year.

#### **ii) Isolation, purification and maintenance of microbial strains:**

This is a routine work to enrich the germplasm of different microbial strains to be used as biofertilizer. This program also helps to develop a map for soil microbial

diversity in Sunderban region. This year, 50 BGA, 2 *Rhizobium*, 3 *Azotobacter* and 2 PSM strains have been isolated and added to our stock. Presently, the total number of different strains maintained are: *Azolla*- 6 spp., Blue Green Algae- 490, *Rhizobium*-17, *Azotobacter*- 38, Phosphate Solubilizing Microorganisms- 46 and Vesicular Arbuscular Mycorrhizae – 2.

**iii) Evaluation and selection of suitable strains in zone specific manner:**

This is one of the most important task in Biofertilizer Technology. Suitable strains of different biofertilizers are selected for specific agro climatic zone through, laboratory analyses, pot experiments and field experiments. *Azolla microphylla* has been selected for all the zones of West Bengal. *Azotobacter chroococcum* Strain No. VIB-1 for coastal alluvial zone; *Azotobacter chroococcum* Strain No. VIB-8 for laterite zone, and *Azotobacter chroococcum* Strain No. VIB-3 for damodar alluvial and gangatic alluvial zone. Strains of phosphate solubilising bacteria have also been selected for the above zones.

**iv) Production and distribution of biofertilizers:**

By virtue of maintenance of good quality of biofertilizer and continuous effort for the promotion of biofertilizer, the level of production and supply of biofertilizer has been boosted significantly. This year VIB has produced and supplied *Rhizobium*-1.832 MT, *Azotobacter*- 0.9206 MT, PSM-1.1292 MT and *Azospirillum* 0.1481 MT. Thus total 4.02 MT of microbial biofertilizer was produced and supplied in this year and more than 3000 ha of land area are brought under biofertilizer application. So far biofertilizer was supplied mainly in South 24 Parganas district. But a significant amount of biofertilizer (1.8124 MT) was supplied to other districts mainly Murshidabad and Hooghly. The methodology for the production of liquid biofertilizer has been standardized and to be adopted very soon. A project for the establishment of biofertilizer production unit with a capacity of 150 MT per year has been submitted to SBI and NABARD and expected to be launched very soon.

**v) Production and supply of vermicompost:**

This centre has also integrated biofertilizer technology with vermicomposting as soil organic content is an important factor for the efficiency of biofertilizer and vermicompost is an efficient, economical and reliable source of soil organic matter. Using the previously adopted model of integration of biogas and vermicompost production, total 69.445 MT of vermicompost was produced and supplied. Apart from this district, some pockets of North 24 Parganas, Murshidabad and Hooghly district were brought under vermicompost application covering total 70 ha area.

vi) A project entitled, “An effort to introduce *Azolla*-rice –fish culture system in low land rice cultivation of Sagar Island, Sunderban, West Bengal” is in its second year. In the first year a combination of fish species and *Azolla* species has been selected after trial in net house tank.

### **Programme on Biocontrol of Pest and Diseases:**

Under the programme of promotion of production and application of neem seed kernel powder as eco-friendly pest control agent, the collection, processing of neem seed and distribution of neem seed kernel powder to the farmers is done. This year, 23.794 MT of ripe neem fruit and 3.259 MT of dry neem seed were collected and 3.983 MT neem seed kernel powder was supplied for trial and demonstration as well as for the use of farmers' field. During processing of neem fruit employment of 360 man days for male and 342 man days for female were generated. A mechanized neem fruit processing unit comprising of de-pulper, drier, decorticator and grinder has been installed. Under the programme of promotion of application of neem seed kernel extract 58 awareness building camps were organized. More than 1700 demonstrations were organized in different blocks of Sunderbans. So far 821 results have been collected and the results shows positive effects of extract of neem seed kernel powder in pest control. A set of promotional materials comprising of posters, booklet and calendar has been developed and distributed among the Nodal Persons.

A team from Panjab State Council for Science & Technology visited to see our facility during the month of February, 2007.

Production of bio-pesticides has been started in the last year. A program is taken to maintain and produce different biopesticides including predators, egg parasites, pathogenic fungus and pathogenic bacteria. Germplasm of *Trichograna* – an egg parasite, *Cryosperala* – a predator, *Trichoderma* sp – a pathogenic fungus and *Bacillus thuringiensis* (Bt) – a pathogenic bacteria are maintained. This year 0.220 MT of *Trichoderma*, 0.063 MT of Bt and 0.174 MT *Pseudomonas* were produced and supplied.

A project entitled, “A study on the potentiality of biological pesticides production as a source of income for rural youths/women in Sunderban, West Bengal”.under the Young scientist programme of Department of Science & Technology, Government of India.

### **Programme on Plant Tissue Culture**

Micro propagation is one of the most efficient methods for multiplying banana plants and also for maintaining a number of elite varieties in a small space. We are maintaining eleven cultivars / varieties of banana under culture room conditions in the production center of our institute. These are *Kanai bansi*, *Amrit sagar*, *Robusta*, *Giant governer*, *Grand naine*, *Red banana*, *Kanthali*, *Dood sagu*, *Champa*, *Chatim* and *Kachakel*. In addition we have certain cultivars maintained under the field conditions which are not much in demand by the farmers of this region. These are *Rasthali*, *Patkapura*, *Nendran*, *Pachanadan* and *Monthan*. Around 14,000 banana plantlets were produced, majority being *Robusta*, *Giant governer*, *Red banana* and *Kachakela*. About 87% survival of the plantlets could be achieved and 12180 plantlets were available for the farmers and interested growers. Experiments were also conducted during this period to study the effect of application of vermiwash on the survival and growth of the banana plantlets at the primary hardening stage, which showed a 15% increase in the survivability rate of the plantlets over the control.

*In vitro* culture studies of papaya was continued using axillary bud explants from the field grown dioecious papaya varieties. The axillary buds from the male and female plants were cultured and maintained separately. The explants were cultured first in plain

agar medium without any nutrient addition. This helped the explants to acclimatize with the culture conditions. The first subculture was in a basal salt mixture which further enhanced the growth of the explants on the expense of their own endogenous hormones. For further growth of the papaya plantlets under the culture conditions a carbon source and an exogenous auxin at a very low concentration is helpful. Seasonal effects are also very prominent in the case of papaya explants establishment with the late winter being the best suitable one.

### **Programme on Mushroom Technology**

Mushroom technology is taken as a tool for rural entrepreneurship development specially for women. At present 4 genera (*Pleurotus*, *Volvariella*, *Calocybe* and *Agaricus*), 12 species & 22 strains of mushroom are maintained in the laboratory. A project entitled, “Popularization of mushroom as a protein rich vegetable among the villagers of Kaikhali, Kultali block, Sundarban”, financed by Directorate of Food processing Industries & Horticulture, Government of West Bengal, is being executed. Total 61,400 packets of mushroom spawn (200 g each) were supplied to the successful mushroom growers.

The most significant achievement in this regard is the assignment with Mother Dairy for the marketing of fresh mushroom. Total 3.00 MT of fresh mushroom (trainees’ product) was sold through the sale points of Mother Dairy.

### **Programme on sustainable use of mangrove plants:**

The Young Scientist programme on domestication of *Nypa fruticans* (Golpata)-an important endangered mangrove plant, funded by DST, Government of India, is completed. This plant has been identified as a source of sugar. From the study, it was noted that 4 – 5 litre juice can be obtained from 15 inflorescence of this plant within 30 days.

### **Programme on Vocational Training and Entrepreneurship Development:**

VIB has a well developed infrastructure for training and entrepreneurship development. Following achievements can be noted:

- i) For the purpose of entrepreneurship development, training on mushroom production is given regularly twice in a month. Total 100 such training programme were organized in the last year and total 1000 persons were trained. Amongst them, 400 trainees started mushroom production in 150 clusters.
- ii) Recently, VIB has developed a computer training centre with 15 computers and a capacity of 30 trainees per batch. The students from different schools are taking basic computer training here.
- iii) Under a program on “Promotion of Bio-manure” by KVIC, 4 awareness building camps ( with 220 persons) and 4 skill development programs ( with 74 persons) were organized in S. 24 Pgs, Hooghly, Purba Medinipur and Paschim Medinipur districts.
- iv) A training programme was organized on the extraction of banana fiber and manufacture of value added products like bag, purse, wall hanging etc.

with two trainers from KVIC, Trivandrum, Kerala. Total 35 women were trained.

- v) A Food Processing unit has been established with Sarada Swabalambi Mahila Group, for training as well as production. Fifteen women have been completed a three-month training programme on “The production of value added products from mushroom, mango, tomato and other horticultural crops”.
- vi) **Establishment of Vivekananda Centre for Skills (VCS):**

Under the project SKILLS ( Skills & Knowledge for Improved Livelihood and Living Standards), supported by UNDP & DST, Govt. of India, Vivekananda Centre for Skills (VCS) has been established in two regions; one at Patharpratima of South 24-Parganas district and other at Jiaganj of Murshadabad district. The main objective of the centres is to provide training and escort service to the farmers for improved production with greater benefit and sustainability. A well equipped training hall with audio-visual system has been developed in each centre. The farmers take training on different aspects of agricultural practices after paying a reasonable fee. Farmers also get escort services at a reasonable price at this centre.

Total 76 rural youths, from different districts of West Bengal have taken 10 weeks training under the trade Biofertilizer Technology at VIB. The training curriculum also includes a module on the “Business plan and entrepreneurship development. The trainees are expected to develop there own enterprise.

**Other activities (R & D):**

**i) Ph. D. Program:**

A thesis entitled, “Studies in microbial diversity of soil in Sagar Island with special reference to algae.” has been submitted to the University of Burdwan for the award of Doctor of Philosophy

**ii) Young Scientist (YS) programme (funded by DST, Government of India):**

a) Three YS programmes have been completed this year:

- A) Establishment of papaya tissue culture and standardization of its micropropagation
- B) A Study on the potentiality of *Nypa fruticans* as domesticated plant in brakish water
- C) An effort to introduce Vesicular Arbuscular Mycorrhizal fungi amongst the farmers for the cultivation of micro propagated banana, Sunderban area, West Bengal.

b) The other running YS programmes are-

- A) Introduction of honey bee culture as a tool for income generation in Sunderban area.

- B) A study on the potentiality of biological pesticide production as a source for income for rural youth/women in Sunderban, West Bengal.
- C) A study on the potentiality of locally available plant products in managing pest problems and income generation in Sunderban, West Bengal.