7. REPOSITORIES, PROGRAMME SUPPORT, ADVANCED CENTRES AND BIOTECH FACILITIES

Under this programme, efforts have been made to create advanced facilities to facilitate research and services.

7.1. REPOSITORIES

The main objective is to promote the establishment of repositories for living microorganisms to enable their sourcing for useful purposes. The progress made by the major repositories is given below:

Microbial Type Culture Collection (MTCC) at IMTECH, Chandigarh: With consented collective efforts, the MTCC is now established as an up-to-date culture collection centre. At present it holds nearly 4000 cultures in its collection and maintains a computerised database. Ups to the present time 3045 cultures were supplied to various academic and research institutions and to industry. Nearly 200 new isolates were identified on requests from investigators. A new updated brochure on MTCC was published and was mailed to many existing and potential user laboratories.

Blue Green Algae Collection (BGAC) at IARI, New Delhi: The BGA Collection centre presently holds 650 unialgal strains of blue-green algae and six species of *Azolla*. During the period, 71 strains were added to the culture collection isolated from parts of Uttar Pradesh, Karnataka, arid zones Rajasthan and IARI fields and 50 unialgal cultures were supplied to different research/private organisations. Sizeable quantities of different grades of BGA biofertilizer was produced and supplied or distributed to farmers and entrepreneurs during the year.

Marine Cyanobacterial Germ Plasm Collection (MCGPC), Bharathidasan University, Trichy: Scientists of MCGPC surveyed the North Andaman island and adjoining smaller islands, which resulted in the identification of 70 species of marine cyanobacteria belonging to 25 genera of 10 families of which eight species were unique to these islands and not recorded in the main land. As many as 46 new strains were added to the germplasm taking the total number to 290 strains. A training workshop on "Research Techniques in Cyanobacteriology" involving 13 participants from 12 states of India was conducted.

National Facility for Plant Tissue Repository (NFPTCR), Pusa, New Delhi: During this year, micro-propagation and *in vitro* conservation protocols were developed or standardised, in several new plant species. More than 100 accessions of various crops were added taking the total germplasm holdings in the repository to 968. Over 100 accessions of recalcitrant or suborthodox seed species were established as base collection under seed cryopreservation. Through the MOU between ICAR and INIBAP, Belgium, 57 accessions of banana were introduced as *in vitro* cultures. Several new accessions were added in the repository, bringing the germplasm holdings to more than 1010. In

sweet potato, 22 accessions from CIP, Peru and 52 of banana from INIBAP, Belgium, were introduced as *in vitro* cultures.

Repository for Filarial parasites and reagents: About 300 filarial sera belonging to different groups i.e. Microfilaraemia, Acute, Chronic and Occult clinical cases from different endemic zones of India like, Vidarbha, Raipur, Calicut, Bhubaneshwar and Rourkela have been collected. Filaria sera samples were supplied to Filaria Research groups in CBT, Anna University, Chennai and CDRI, Lucknow. Bulk filarial kits were provided to Institute for Vector Control and Zoonoses, Hosur, NICD Regional Centre, Calicut, RMRC, Bhubaneshwar and ISPAT General Hospital, Rourkela. People were also trained. Work on establishment of diagnostics facility at this institution for screening clinical filariasis is in progress.

Repository for Medicinal and Aromatic Plant Materials at CIMAP, Lucknow: Upto the present time about 200 accessions were added to the live gene bank of the Repository, which were incorporated in the herbarium. A phytochemical repository of around 100 pure compounds, many of them being marker phytochemicals for various medicinal and aromatic plants (MAPs) has been developed after isolation and confirmation of their structure through spectral analysis. Analytical methods developed for active compounds in *Piper mullesua; Catheranthus roseus; and Papaver somniferum* these would be suitable for rapid screening.

Repository for Cryopreservation of Blood Cells (RCBC) at Institute of Immunohaematology, Mumbai: Upto the present time at RCBC, five hundred unrelated heterozygotes were screened with a view to detection of mutation and genetic counselling; antenatal diagnosis provided for 130 β-thalassemia families; a total of 15 mutations detected. A total of 2559 samples were screened for G6PD deficiency, out of which 90 samples were screened for G6PD Mediterranean and G6PD Orissa mutations. 50 families of haemophilia A and 20 families of haemophilia B were analysed by gene tracking techniques for the detection of carriers. Antenatal diagnosis provided in seven haemophilia families. The laboratory investigations for the subtyping of von Willebrand disease standardised. Flow cytometry and immunoblotting techniques established for Glanzmanns thrombasthenia.

7.2. PROGRAM SUPPORT

Indian Institute of Science, Bangalore: The programme seeks to orchestrate the strengths of more than 50 faculty members and their research groups in the Division of Biological Sciences in three areas of national importance and high scientific interest such as: Infectious Diseases, Drug and Molecular Design and Gene Targeting, Gene disorders and Genetic Diversity. The work on *Mycobacterium tuberculosis* involving molecular immunology, crucial DNA functions and the proteins resulted in promising drug targets. The crystal structures of garlic lectin, physallis mottle virus, malarial triose phosphate isomerase and *E. coli* uracil DNA glycosylase have been determined. Generation of molecular data on genetic diversity among ethnic populations in Karnataka, relatedness in ants and variation in Indian populations of Asian elephant are other highlights.

Rajiv Gandhi Institute of Biotechnology, Thiruvananthapuram:

Inputs to be provided by DIR (AD).

7.3. ADVANCED BIOTECH FACILITIES

Service facilities were created at several institutes to promote biotech research as outlined below:

7.3.1. Animal House Facilities: Disease-free, genetically uniform laboratory animals are vital to biomedical research for generating reproducible research data. Such laboratory animals are also required for testing the quality of vaccines. Consequently facilities have been created to breed, maintain and supply quality lab animals to the users.

CDRI, Lucknow*:* A total number of 25 different strain of 8 species of rodent, including 8 inbred strains of mice, 3 inbred strains of rat, 2 strains of logomorph and 1 strain of nude mice were maintained and regularly made available to researchers of the country. Two new immunodeficient strains of mice were added to the breeding colony. Rhesus monkey breeding colony has been established. A unique colony of white hamster has been developed. Genetic and health monitoring of animals has been further strengthened. Training and consultancy has been provided to several national and international researchers.

NIN, Hyderabad: A modern laboratory for carrying out work related to molecular biology has been established. Vibrant inbred colonies of Obese-rat mutants have been established. A white rat colony from the local white rat population detected and bred. The characterisation of obese mutant rat has been completed and they were found to be distinctly different from similar obese rat model else where in the West. Its fully utility as a model for ageing, diet induced diabetes, and an *in vivo* systems for screening potential antidiabetic agents have been established. A total of 1,23,455 animals were bred and 1,13,853 animals were supplied to more than 150 institutions all over India. Besides, these animals the Centre also supplied 22,563 kg of quality animal feed to different laboratories in the country. The Centre also provided 3837 ml of blood and sera from various species to both local and outstation institutions. During the period a total 55 persons were trained in the laboratory, experimentation, animal ethics and welfare.

7.3.2 Centre for Genetic Engineering and Strain Manipulation at Madurai Kamraj University, Madurai: The achievements during the period include isolation and characterisation of stable mutants of *Streptomyces peucetius* defective in the biosynthetic pathway of daunorubicin (DNR), an anticancer antibiotic; Isolation and cloning of DNR cluster genes from the genetic DNA library. Cloning purification and sequencing of chitinase C from the chitinase overproducing mutant; overproduction of DNR by media optimisation; and isolation of 170 soil Actinomycetes and screening 50 of them for the presence of polyketide synthase involved in anthracycline biosynthesis.

7.3.3. National Facility for Biochemical Engineering Research and Process Development Centre (BERPDC) at IMTECH, Chandigarh: The BERPDC imparted training on various aspects of biochemical engineering and applied microbiology which included hands on training and lectures on selected topics to students from non-profit organisation such as research Institutions and Universities. A scale up work for the secondary metabolite production in 150 litre reactor was carried out for M/s Kopran Drugs Private Limited (KDPL), Mumbai. A process was optimised for the filtration of cephalossporin broth in Rotary Vacuum Filtration for M/s Max-GB, Ropar. Few biochemical processes were optimised in laboratory as well as Pilot scale reactor for M/s. Praneet Environ. Tech., Chandigarh, M/s. Livestock Biotech Research Foundation, New Delhi and for M/s. Alpha Drugs India Limited, Punjab. BERPDC successfully demonstrated the technology for the production of urokinase, protease, amylase and streptokinase to M/s. Cadila Pharmaceuticals Limited, Ahmedabad. Besides these, a few fermentation runs in laboratory fermenter and in 150-L reactor were taken for the production Thraustochytrids (unicellular marine protist with polyunsaturated fatty acid content). This work was done for National Institute of Oceanography, Goa. The facility was also used for in-house projects like streptoklinase fermentation, hydantoniase production and production of lipase, maringinase and DNA polymerase etc. During the period of report seven patents have been filed and twenty papers have been published. Scientists from many laboratories are using this for studying the structure and properties of biological molecules.

7.3.4. National Facility for Biological and Organic Mass Spectrometry, IICT, Hyderabad: The National facility for Biological and Organic Mass Spectrometry at Indian Institute of Chemical Technology, Hyderabad was supported jointly by DBT with DST. The facility was installed and inaugurated in September 1999.

7.3.5. National containment/Quarantine facility for transgenic planting material, NBPGR, New Delhi: The Department realised the need for controlled testing of transgenic planting material, in containment greenhouse prior to release to the environment so as to avoid their potential risk to environment or health. To meet this requirement a 'National Containment/Quarantine Facility for transgenic planting material' is being established at National Bureau of Plant Genetic Resources (NBPGR), New Delhi which is the nodal agency in the country for giving clearance for import of any planting material and for undertaking necessary quarantine measures. The man objectives of the National Facility are: -

1. Facilitating the processing of the transgenic material from quarantine aspects.
2. Development of probes/markers as required for the containment and for evaluation of the transgenic planting material.
3. Training of the Human Resource in the area.

Presently, the existing quarantine facilities, glasshouses and molecular biology laboratories of NBPGR and National Research Centre on DNA Fingerprinting are being utilised for testing of the transgenic planting material. In addition, a medium term storage module of the NBPGR - National Gene Bank has been allocated for storing the transgenic

planting material. However, an appropriate containment facility is being developed to meet the long-term requirement for import of transgenic planting material. Design for the construction of environmentally safe containment facility meeting the necessary biosafety regulations for the purpose of testing and quarantine of transgenic planting material has been finalised in consultation with various national and overseas experts. The containment facility (app. 300 sq. mt. area) will be completely sealed to eliminate the ingress or egress of pathogens/pollens or viable plant materials. In this facility four bays with controlled atmosphere: air temperature 20°-30° C (+/- 1° C) and relative humidity 50-80% (+/- 5%) for pot cultures and one of the bays with ground soil-based plants growing systems are designed. Provision has also been kept for four chambers for undertaking molecular work of the transgenic material with controlled conditions. Global tenders have been invited for construction of the containment facility.

A total of 359 samples transgenic soybean were received in 1999 from USA for quarantine clearance; 140 of these were rejected because of infection by downy mildew fungus (*Peronospora manshurica*) which causes serious losses elsewhere and is not yet known to occur in India. The remaining samples were grown in containment in glasshouse. Observations were made for symptoms/expressions of seed transmitted viruses. Soybean Mosaic Virus (SMV) was recorded in few plants of 15 lines, which was confirmed by adopting DAC-Indirect form of ELISA test. However, seeds were harvested from virus-free plants of the accessions in case of which infected plants were detected. It was also observed that 78 lines were highly susceptible to red spider mite and 22 lines were highly susceptible to scales, though healthy seeds could be harvested from these lines. The harvested seeds of all the accessions grown in the containment have been kept safely till the decision for its release to the indentor is made.

For developing molecular probes/markers required for evaluation and molecular characterisation of transgenic material, methods for DNA extraction, quantification of DNA, polymerase chain reactions (PCRs) etc. have been standardised. The University of Delhi, south Campus has been involved in developing molecular probes with cre-sequences for screening the transgenic material with terminator gene. DNA was extracted from soybean transgenic lines grown in glasshouse, and PCRs with operon primers was done to standardise PCRs conditions etc. Extracted DNA of all the transgenic lines grown in the greenhouse will be kept as referral sample and will be used for undertaking different experiments. The protocol for regeneration of soybean has also been developed to shorten the life cycle for testing the stability of transgenic soybean.