

MINISTRY OF SCIENCE AND TECHNOLOGY**DEMAND NO.86****Department of Biotechnology**

A. The Budget allocations, net of recoveries, are given below:

Major Head		Budget 2009-2010			Revised 2009-2010			Budget 2010-2011			
		Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total	
Revenue		1000.00	24.00	1024.00	902.00	23.90	925.90	1200.00	22.00	1222.00	
Capital		...	...	...	...	...	...	...	...	...
Total		1000.00	24.00	1024.00	902.00	23.90	925.90	1200.00	22.00	1222.00	
1.	Secretariat - Economic Services	3451	...	12.00	12.00	...	11.90	11.90	...	10.00	10.00
Other Scientific Research											
2.	Support to Autonomous R&D Institutions	3425	279.10	2.00	281.10	227.10	2.00	229.10	328.10	2.00	330.10
3.	Assistance to Other Scientific Bodies										
3.01	Human Resource Development	3425	35.00	...	35.00	36.00	...	36.00	54.00	...	54.00
3.02	Bioinformatics	3425	20.00	...	20.00	22.00	...	22.00	19.00	...	19.00
3.03	Research and Development	3425	340.90	...	340.90	308.90	...	308.90	394.40	...	394.40
3.04	Biotechnology for Societal Development	3425	10.00	...	10.00	9.40	...	9.40	13.00	...	13.00
3.05	Grand Challenge Programmes	3425	40.00	...	40.00	38.00	...	38.00	54.00	...	54.00
3.06	Programme for Promotion of Excellence and Innovation	3425	45.00	...	45.00	42.40	...	42.40	42.50	...	42.50
3.07	Biotech Facilities	3425	20.00	...	20.00	20.00	...	20.00	27.00	...	27.00
	<i>Total</i>		510.90	...	510.90	476.70	...	476.70	603.90	...	603.90
4.	I&M Sector										
4.01	Assistance for Technology Incubators, Pilot Projects, Biotechnology Parks and Biotech Development Fund	3425	5.00	...	5.00	3.00	...	3.00	5.00	...	5.00
4.02	Public Private Partnership	3425	90.00	...	90.00	90.00	...	90.00	118.00	...	118.00
	<i>Total</i>		95.00	...	95.00	93.00	...	93.00	123.00	...	123.00
5.	International Cooperation	3425	15.00	...	15.00	15.00	...	15.00	25.00	...	25.00
6.	International Centre for Genetic Engineering and Biotechnology	3425	...	10.00	10.00	...	10.00	10.00	...	10.00	10.00
7.	Provision for projects/schemes for the benefit of the North Eastern Areas and Sikkim*										
7.01	Human Resource Development	2552	...	...	...	...	...	...	6.00	...	6.00
7.02	Programme for Promotion of Excellence and Innovation	2552	...	...	...	...	...	...	9.50	...	9.50
7.03	Biotech Facilities	2552	...	...	...	...	...	...	3.00	...	3.00
7.04	Bioinformatics	2552	...	...	...	...	...	...	6.00	...	6.00
7.05	Research and Development	2552	...	...	...	...	...	...	62.50	...	62.50
7.06	Grand Challenge Programmes	2552	...	...	...	...	...	...	14.00	...	14.00
7.07	Biotechnology for Societal Development	2552	...	...	...	...	...	...	2.00	...	2.00
7.08	Support to Autonomous R&D Institutions	2552	...	...	...	...	...	...	15.00	...	15.00
7.09	I&M Sector	2552	...	...	...	...	...	...	2.00	...	2.00
7.10	Lumpsum provision	2552	100.00	...	100.00	90.20	...	90.20	...	...	...
	<i>Total</i>		100.00	...	100.00	90.20	...	90.20	120.00	...	120.00
Grand Total			1000.00	24.00	1024.00	902.00	23.90	925.90	1200.00	22.00	1222.00

* Scheme wise provision for the benefit of the North Eastern Areas and Sikkim depicted separately w.e.f Budget 2010-2011 for better capture of data.

C. Plan Outlay		Head of Dev	Budget Support	IEBR	Total	Budget Support	IEBR	Total	Budget Support	IEBR	Total
1.	Other Scientific Research	13425	900.00	...	900.00	811.80	...	811.80	1080.00	...	1080.00
2.	North Eastern Areas	22552	100.00	...	100.00	90.20	...	90.20	120.00	...	120.00
Total			1000.00	...	1000.00	902.00	...	902.00	1200.00	...	1200.00

NO.86/Department of Biotechnology

1. **Secretariat - Economic Services:** Provides for Expenditure on the Secretariat of the Department.

2. **Support to Autonomous R&D Institutions:** Under the administrative control of the Department, there are 14 autonomous institutions; the institution-wise activities are given below:

(a) **National Institute of Immunology (NII), New Delhi:**

Besides continuation of major on-going areas of interest, works on Incubator laboratory facility in Campus II at Faridabad, building staff quarters in Dwarka, New Delhi and construction of additional research scholar home/guest house in the main campus will be continued. The construction work at genetically defined MACAQUE primate animal strain facility shall be undertaken.

(b) **National Centre for Cell Science, Pune:**

Besides continuation of existing R&D programmes and services, major programmes for Diabetes and Identification of anti-viral compounds with potential for development of microbicides to prevent HIV infection and transmission will be ongoing. Network programmes on systems Biology of Global Regulatory Networks and unraveling Sequence Features in Promoters that Dictate Tissue-Specificity of Gene Expression will be continued. Activities on establishment of centres for cell and tissue engineering and immuno-therapeutics, microbial repository would continue.

(c) **Centre for DNA Fingerprinting and Diagnostics (CDFD), Hyderabad:**

Improvisation of methodologies for high throughput DNA fingerprinting and new diagnostics tools development to continue. Activities such as National Facility for Training in DNA Profiling (NFTDP), Disaster Victim Identification Cell (DVIC), Secretariat for DNA Profiling Advisory Board and Creation of National DNA Database, Quality control and accreditation, and Other DNA profiling services will be strengthened.

(d) **National Brain Research Centre (NBRC), Manesar:**

The on-going research activities would be continued besides emphasis on evaluation of the pharmacological potential of traditional medicinal preparations used in the treatment of dementia including Alzheimer's disease and proteasomal dysfunction and Parkinson's disease and identification of the modulators of ubiquitin proteasome system. The neural stem cell research programme comprising of both basic and translational components including understanding the basic biology of *neural stem cells* and the use of stem cells to treat disorders relating to the nervous system will be continued. Beside the core grant, Clinical Research Centre for Brain Disorders and Brain Machine Interface, and network programme on genetics and pathogenesis of neurological and psychiatric disorders will be priorities.

(e) **National Institute for Plant Genome Research, New Delhi:**

Research programmes on transgenics, genomics, genome diversity are undertaken. In addition, phytotron facility for transgenic testing and evaluation facility will be established.

(f) **Institute of Bioresources and Sustainable Development (IBSD), Imphal:**

The following areas of research shall be continued on Medicinal and Horticultural Plant Bioresources Programme; Microbial Resources Programme; Aquatic bioresources programme; Insect bioresources programme and Bioinformatics. It is also proposed to establish a Genome Club for regular interaction between bio-entrepreneurs, graduate students and researchers on biodiversity conservation and bioresources management. Building construction activities approved in the plan will be started.

(g) **Institute of Life Sciences, Bhubaneswar:**

This undertakes vertical translational activities such as Development of DNA chip based diagnostics, nano-medicine alongwith establishment of National Repository of *C.elegans*, a model genome for all fundamental biological studies.

(h) **Translational Health Science and Technology Institute, Faridabad:**

New autonomous institution to facilitate development, optimization and evaluation of technologies for public health and individual health as an independent interdisciplinary centre where basic scientists, physician scientists, technologists and chemical-epidemiologists would work together. The key feature of this institute would be a dynamic inter-relationship of health, science and technology sectors and with small and medium biotech industry, pursuing grand challenges in public health to produce affordable technologies through group excellence. The two main components of the institute would be (a) Health Science Technology (HST) centre which bridges engineering, biomedical, biological and physical scientists and (b) Translational centre which does preclinical and clinical product development in partnership with other stakeholders and industry. Interim facility and labs will be set up. The construction activities at main site in Faridabad will be taken up.

(i) **Rajiv Gandhi Centre for Biotechnology (RGCB), Thiruvananthapuram:**

The institute shall carry out and promote advanced research in frontier areas of biotechnology such as Translational Cancer Research, Human Genetics, Protein Engineering, Molecular Reproduction, Molecular Microbiology, Cancer Research, Neurobiology & Plant Molecular Biology. Work will be initiated at new centres.

(j) **UNESCO Regional Centre for Education and Training in Biotechnology, Faridabad:**

The institute aims at producing human resource through education and training in a milieu of research and development for application of biotechnology for sustainable development towards building a strong biotech industry through regional and international cooperation with emphasis on novel interdisciplinary education and training programmes, currently not available in the country. It will serve as a region hub of biotechnology expertise in South Asian Association of Regional Cooperation (SAARC) region, Asia and promote South-South & South-North cooperation. Interim facility and lab have been set up and construction at the main site will be undertaken.

(k) **National Agri-Food Biotechnology Institute and Bioprocessing Unit, Mohali:**

The institute is dedicated to promoting translational research in the area of Agri-Food processing and fostering entrepreneurship. The cluster will comprise of the following constituents:

- National Agri-Food Biotechnology Institute (NABI)
- Bio-Processing Unit (BPU)
- Agri-Food Biotech Park & Incubator

The Agri-Food Biotechnology Cluster will be a unique facility with an inter-disciplinary approach reinforced by the synergy and co-location of various institutions and forward linkages with prospective entrepreneurship. It will link biotechnology of crops with that of food and nutrition while facilitating bench to market progression of products and services and act as a catalyst of innovation in state of Punjab as well as the entire region. Interim facility and lab have been set up and construction at the main site will be undertaken.

(l) Institute of Stem Cell Research and Regenerative Medicine, Bengaluru:

This institute shall work on integrated basic research in stem cell biology with pre-clinical and clinical research for the development of multidisciplinary, interactive groups of scientists and clinicians besides training & education and partnership with industry. Interim facility and lab have been set up and construction at the main site will be undertaken.

(m) National Institute of Biomedical Genomics (NIBMG), Kalyani, West Bengal

The Institute is proposed to be set up with the aim to enhance knowledge on human health & disease through genomics and translate the knowledge using appropriate technologies for promotion of wellbeing and improvement of genetics based health care in India. The mission is to create necessary physical infrastructure and build capacity to serve as expert base for the establishment of principles and practices of medical genetics and to conduct and promote cutting edge research in biomedical genomics. It is also envisaged to establish state-of-the-art infrastructure for genomics and proteomic analyses, research, education, translation and service networks among clinicians and researchers for promotion of better public health through the establishment of genomics infrastructure in hospitals and medical schools. Recognising the facts that medical genetics cuts across various disciplines of sciences, a "Star Alliance" will be formed to create synergy and symbiosis. Construction at main site at Kalyani and procurement of equipment and setting up interim facility will be undertaken.

(n) National Institute of Animal Biotechnology, Hyderabad:

The major focus of this new institute is to conduct basic and translational research in conservation, characterization of live stock and their improvement for enhanced productivity, developed innovative methods for multiplication allied genotypes, production of new vaccines and diagnostics, biomarker development and genomic research. The institute also has a mandate of services and human resources development involving building of genebanks and databases, policy, planning and monitoring of biosafety issues and bioresource engineering. A business development and Intellectual Property unit is the internal part of the institute focusing on development of portfolios of innovative products and research, licensing technology and forging global and national partnerships.

3. ASSISTANCE TO OTHER SCIENTIFIC BODIES:

3.01. Human Resource Development:

Besides continuation of ongoing programmes, new Post Graduate teaching programme in the areas of food and nutrition biology, clinical pharmacology, bioenterprise management, bio-financing and regulatory efforts shall be initiated. M.D/Ph.D programme will be supported in some medical colleges/institutions. At least ten star under graduate colleges in biotechnologies/ life sciences will be in place. Few teacher and technician training centres will be set up. The existing programmes like Ph.D., Post-doctoral Fellowships and others will be scaled up. Besides continuing and expanding the fellowship, need based new fellowships to promote innovation will be instituted.

3.02. Bioinformatics:

Support to ongoing activities shall be continued. The other activities include network projects on application of Biotechnology in Rice Genome Research; consortium projects involving experimentalist and the theoreticians for computation biology useful in application to major areas like Agriculture, Medical and Environment; global partnership projects in Bioinformatics;

human resource development in bioinformatics and special fellowships and programmes in computational biology.

3.03 Research & Development:

Besides the ongoing programme, following areas will be taken up. In agriculture biotechnology, a network of interdisciplinary programme on molecular characterization of genes involved in apomixis, fine mapping of crops, transgenic for pest and disease resistance, drought, etc., will be supported alongwith development of RNAi technology applications. State Agriculture University will be supported to start interdisciplinary translational research centres. A major programme on nutritional quality improvement of vegetable crops with special emphasis of underutilized crop R&D projects in the area of plant development, host pathogens interaction, chemicals from plant cultures, apomixis, transformation systems and genetic events SOL genome initiative would be strengthened and continued. A network programme on biotechnology for improvement of conservation and utilization of forest resources will be taken up. New Programmes on wheat genome sequencing, cancer genomics, etc. will be taken up.

In animal biotechnology, multi-centric programmes on animal nutrition and development of buffalo pox in animal biotechnology will be initiated. In aquaculture, functional genomics of native freshwater and brackish water species and frontline demonstrations to prove techno-economic viability of aquaculture of non-traditional species for diversification in aquaculture are priorities.

Under national bioresources board, new programmes on bioprospecting of bioresources for gene and molecules and centres of bioprospecting for screening characterization and validation will be continued.

In medical biotechnology, new programmes include pathogen biology, host genetics, vector biology, drug development for HIV, tuberculosis, malaria. Specilised virus research centres to address viral biology, pathogenesis, biomarkers etc. will be established. A nation wide network of centres are proposed for development of simple low cost diagnostics for infectious and others diseases. 5-6 clinical research centres, biobanks, biomedical research and schools, transgenic animal facility are certain infrastructure proposals for vaccine and diagnostics development. Development of novel platform technologies for vaccines delivery systems will be established, besides continuation of genetic counseling centres, new facilities. R&D programmes in genomics of diseases, pathogens shall be taken up. The department will participate in international initiative on human cancer genome project- the cancer genome atlas. Stem cell and bioengineering programmes and R&D projects in network mode for clinical trials, biodesign and development will be undertaken.

New initiatives in environmental biotechnology include multi-institutional networks for biodegradation of xenobiotics, bioremediation, biodiversity conservation and bio-polymers. In food and nutritional science technology, multi-institutional network R&D programmes would be generated for understanding the role of nutrition in chronic diseases like cardiovascular diseases. Major programmes would be initiated on fortification of foods specially to address the incidence of malnutrition in school going children. R&D based re-entry grant scheme in collaboration with Welcome Trust will be implemented for overseas scientists returning to India. Programmes on affordable health care, nano-medicine projects in cancer, a new bio-energy centre are some other priorities.

3.04 Biotechnology for Societal Development:

The scheme covers three sub-schemes namely rural area plan; SC/ST special component plan and women component

plan. The details of activities under each sub-component are given below:

(a) Rural Component of the Programme

Proven and field tested technologies shall be demonstrated to help the target population in their skill development, employment and income generation in the field of agriculture, sericulture, production and manufacture of biopesticides and biofertilisers, awareness programmes on health and nutrition diet. Rural bioresource complexes established in five states shall be continued.

(b) Details of Tribal Sub-Plan and Special Component Plan

Resource based programme will be implemented for employment generation, skill development and awareness. Self Help Groups will be supported for cultivation and marketing of medicinal and aromatic plants, fodder cultivation, animal rearing, promotion of handicrafts, piggery, food processing, aquaculture and dairy, health care and nutritional interventions.

(c) The Details Regarding Women Component Plan

The programme include several field based extension, demonstration and training projects on proven and field tested technologies for women. Some examples include: value added floriculture; processing of horticulture produce; cultivation and processing of medicinal and aromatic plants; production and application of vermicompost, biopesticides and biofertilisers; high value mushroom cultivation, aquaculture, poultry and rabbit rearing for wool extraction and transfer of modern agriculture practices. In health sector, projects will be implemented for awareness and counselling on genetic disorders and creating awareness on nutrition including traditional food and healthcare.

3.05 Grand Challenge Programmes:

Grand Challenge Programmes approved in the areas of vaccine development, microbial prospecting, bio-design, accelerated molecular breeding, medical devices and genomics will be continued. A national platform for crop molecular breeding for breeding crops by design in collaboration with ICAR will be setup.

3.06 Programmes for Promotion of Excellence and Innovation:

Besides continuation of support to existing centres, more centres of excellence and programmes support in priority areas for promotion of innovation in biotechnology across disciplines will be supported as per the guidelines envisaged. Few centres in four identified categories each with thematic focus; academic-industry relationship; biotechnology innovation will be supported. Molecular Medicine Centres will be started at least in two medical colleges. Technology Management System will be strengthened.

3.07 Biotech facilities:

Besides continuation of support to some existing facilities, new animal house facilities with GMP for testing candidate vaccines and biotherapeutics, facilities for testing and validation of GM plants will be taken up. Remodelling and upgradation of existing life science departments / universities will be expanded.

4. I & M SECTOR:

4.01 Biotech Parks and Incubators:

The proposals considered are to set up business Incubation Centre at University of Agricultural Sciences, Bengaluru; Biotechnology park at Guwahati; Nano Biosym Technology Park, Himachal Pradesh; Marine Biotech Incubation at Ahmedabad and Biotechnology Parks in Kerala, Karnataka, Orissa and

Rajasthan. Seed money for some of these parks have been given for making techno-economic feasibility reports. Depending upon these reports at least 2-3 parks will be funded for establishment. To catalyze and synergize R&D innovation, efforts will be made to develop strategies for locating the new institutions in four technology clusters namely, Agri-Food Technology Cluster, Mohali, Punjab; Health Science Biotechnology Cluster, Faridabad, Haryana; Animal Science and Biotechnology; and Marine Science and Technology Cluster. Appropriate investment should be made for design, architecture and constructs of these clusters with common facilities for the institutions to be located in consultation with other participating partners.

4.02 Public Private Partnership: The Small Business Innovation Research Initiative (SBIRI) scheme will be modified / expanded based on the review conducted by IIM, Bengaluru and the suggestions from various sources. The projects which have been initiated during the previous year(s) would be monitored for directive progress and development of product / processes. The SBIRI on-line system will be monitored for its effectiveness. Emphasis would be on innovation and validation & scaling-up of the proof-of-concepts obtained in various projects supported under this scheme. Some new ideas and concepts in different areas of biotechnology would be generated. The agriculture sector will be strengthened further. New entrepreneurs' will be encouraged. Funding of projects to the eligible private firms/companies in collaboration with institutions or independently would be continued. It is proposed to set up Biotechnology Industry Research Assistance Conglomerate / Council (BIRAC) as an independent autonomous organization. Under BIPP, so far 4 rounds have been announced. Project will be generated through advertisement for funding about 10 projects under BIPP schemes covering areas of futuristic research, infrastructure development and clinical / field trials.

5. International Cooperation:

The broad areas of collaboration would be human resource development, agriculture and food, medical and healthcare, molecular biology, bioinformatics and computational biology, industrial collaboration. Focus would be on strengthening the capabilities of the country in the area of systems biology, stem cell research and vaccines and diagnostics.

Besides ongoing programmes, new projects will be undertaken with Canada, Germany, Norway and other developing countries. The Indo-Swiss programme in biotechnology will be continued with new thrust.

6. International Centre for Genetic Engineering and Biotechnology (ICGEB), New Delhi:

The DBT's support to ICGEB, New Delhi will continue during the next five years. During the year, ICGEB continued its activity on basic as well as applied research in the field of human health and agriculture biotechnology.

7. Provision for North Eastern Areas including Sikkim:

Provision has been kept for projects / schemes for the benefit of North Eastern Region and Sikkim for human resource development, biotechnology infrastructure and R&D in priority areas of North East in collaboration and partnership with other public sector institutions & universities and private sector. Projects funded already will be continued and more programmes on human resource development; augmenting facilities in veterinary / agriculture colleges; and major joint projects in partnership with universities/institutions in rest of India will be initiated.