

CHAPTER-2

Industrial R&D Schemes

I Access to Knowledge for Technology Development and Dissemination (A2K+)

1.0 A2K+ - Studies

2.0 A2K+ - Events

3.0 Technology Development and Utilization Programme for Women (TDUPW)

3.1 Projects Supported under TDUPW Programme

3.2 Skill Satellite Centres

4.0 Technology Development and Demonstration Programme (TDDP)

4.1 Status of TDDP Projects on-going from Eleventh Plan and monitored during the financial year 2018-19



ACCESS TO KNOWLEDGE FOR TECHNOLOGY DEVELOPMENT AND DISSEMINATION (A2K+)

1.0 A2K+ STUDIES

The objectives of A2K+ Studies program is to support studies in emerging areas of technology aimed at providing useful information and knowledge base to industry, industry associations, academia, research institutions, consultants, entrepreneurs, research students and policy makers for doing any further work in these areas; to study and analyze the developments in the emerging technology areas and document the findings, learnings and outcomes for wider dissemination and preparation of status reports on technologies from public funded institutions that are ready for commercialization with a view to catalyze the translation of research output from institutions to market.

1.1 On-going Studies

1.1.1 Framework of Industry-University Linkage (UIL) in Research study being conducted by PHD Chamber of Commerce and Industry, New Delhi

The objective of the report is to analyze university – industry linkages (UIL) in 29 states of India based on a survey. 214 responses were received from universities and institutes and 840 responses were received from industries across the country. The UIL were analyzed based upon 10 parameters, which included availability of research institutes, frequency of interaction between institutes and industry, student – industry interaction, MoUs/Collaborations forged and patents filed/granted.

The findings of the study based upon draft report are:

- Average UIL across the states in India is moderate, although the linkages vary from strong to moderate to weak across states. University – Industry linkages (UIL) were found to be strong in 14 states, which included Karnataka, Kerala, Gujarat, Maharashtra, Andhra Pradesh, Tamil Nadu, Punjab and Haryana. UIL were found to be moderate in 10 states, which included West Bengal, MP, Bihar, Goa and J&K. UIL were found to be weak in 5 North-eastern states of Assam, Arunachal Pradesh, Mizoram, Nagaland and Manipur.
- There are 32 sectors, in which the states across the country are engaged in R&D and innovation activities. Of these, 10 sectors, common in 6 or more states are agriculture, agro food processing, drugs & pharma, automotive & auto components, power, IT & ITeS, cement, textiles, handicrafts & handlooms and tourism. Steps need to be taken to strengthen UIL in these sectors.
- Of the 500 odd industrial clusters across India, 30 to 35% do not have any research institute or university in their vicinity.
- Need to locate a university/institute or incubation centre near the concentration of industrial clusters so as to facilitate translation of research into products and processes.
- To reintroduce Public Funded Intellectual Property Bill that will provide incentives to academicians and scientists to commercialize their R&D.



1.1.2 Technology diffusion in the Millet processing industry specific to Karnataka, Andhra Pradesh and Maharashtra states study being conducted by CSIR-Central Food Technological Research Institute (CFTRI)

The study covers the technology diffusion in the millet processing industry with emphasis on ragi processing technologies specific to Karnataka, barnyard millet & foxtail in Andhra Pradesh and Sorghum in Maharashtra. The study also aims on evolving an appropriate platform for technology transfer mechanism targeted at millet farming community.

The output of the study is as follows:

- Brochures on Millet based technologies in English, Hindi and Kannada were brought out for reaching out to the entrepreneurs. These were distributed widely in major exhibitions/platforms.
- Millets-Pro Mobile application is also developed to popularize and educate the importance of Millets. In this application, user will easily get to know about millets and it consists of sliding menus which quickly navigates to respective modules. The App is hosted on Google Play Store for potential entrepreneurs to download and use it on Android based Mobile sets.
- Web Site for promoting the Millet based Technologies also developed and the main purpose is to enhance the visibility and innovations related to Millet based products in the rural and urban populations. This compilation is brought in order to help in creating a sustainable ecosystem for the growers and processors.

1.1.3 Effective Grain storage for better livelihoods of Indian Farmers for food and nutritional security in the new millennium by Indian Institute of Food Processing Technology (IICPT)

The study has been supported with following objectives;

- To determine safe storage guidelines based on moisture, temperature and quality of pulses for tropical weather conditions, with special emphasis on the coastal regions of Tamil Nadu.

- To design and develop eco-friendly safe storage structures with provisions for physically eliminating insect pests to store pulses for small scale enterprises, retailers, rural livelihoods, pulse growers, millers and farmer producer organizations.
- To disseminate the technology to small and medium enterprises and to pulse growers in the coastal regions of Cauvery Delta.

The Output of the study is as follows:

- i. Safe storage guidelines for storing black gram under tropical conditions with respect to different moisture and temperatures. Safe storage guidelines chart for black gram has been developed which will be helpful to the farmers by notifying them the number of days before which the grain has to undergo post harvest treatment without spoilage.
- ii. Airtight bins were designed and fabricated at IIFPT for storing pulses at farm and household level. The main aim of designing the bins are to store the pulses without usage of chemicals and pesticides at farm level.
- iii. Bulk storage of pulses using cocoon bags for long term storage under open storage conditions
- iv. Multi layered bags were found to be effective for storing pulses for more than six months without altering the quality parameters and the usage of chemicals and pesticides were curtailed
- v. Development of insect traps to mechanically eliminate insects during storage of pulses.

Electronic stack probe trap with UV-LED strip was used for attracting insects from the stack. It is a simple, compact and comparatively cheap trap, which can be effectively adopted by the farmers and stakeholders for the early detection and removal of stored pests. Two in one trap was designed to control and monitor storage of black gram. This setup consists of a hopper bottom bin painted on the sides with yellow colour, which makes the trap to be more attractive to insects. This trap could collect insects more effectively.

1.2. New Studies

During the year, following 8 key theme areas were identified and advertised on the DSIR website in which proposals were invited:

- i. Commercialization status of technologies developed at public funded research institutions.
- ii. Building industrial capabilities for adoption of state of the art technologies that will dominate the industrial scenario in the near future.
- iii. Enabling linkages amongst academia, R&D and industry for building a strong and thriving innovation ecosystem.
- iv. Enhancing depth in manufacturing and value addition in industry.
- v. Technology brand building.
- vi. Conformity to Standards by industry.
- vii. Emerging requirements of MSME sector with reference to globalization and technological advancement.

Support system for knowledge enterprises and micro-enterprises.

68 proposals were received from public funded bodies or institutions having a distinct legal entity, viz. institutions of higher learning in research and management, R&D institutions, Industry associations, chambers of commerce and industry, technical consultancy organizations, etc. A Technical Advisory Committee was conducted and 17 study proposals were recommended. 11 during the 1st meeting and 6 during the 2nd meeting. Following are the details of the recommended proposals:

1.2.1 Demand, opportunities and challenges for development and deployment of Ultra Machining Technology in India by Central Manufacturing Technology Institute, Bangalore

The main objective of the study is to find out emerging requirements of Ultra Precision Machining Technology, gaps & challenges in development and deployment of indigenous technology, in the Indian market scenario. This includes the following:

- i. To explore the demands of assimilation for Ultra Precision Machining Technologies

- ii. To identify the technology gaps (Machine & machining technologies, process developments, measurements) in Ultra Precision Technologies
- iii. Identify indigenous development works required
- iv. To study the challenges in development and deployment of indigenous technology for Ultra Precision Machining Technology

1.2.2 Feasibility study on commercial scale coating on copper alloys, using radio-frequency plasma technology by Institute of Advanced Study in Science & Technology, Guwahati

Following are the main objectives of the Study:

- i. To study the techno-commercial status of surface protection of bell metal and brass in the main production centers of India
- ii. To find the proper mechanism for transferring the surface coating technology, developed.

The study would create ready reckoner for developing commercially viable facilities for plasma coating on copper alloy products and would also pave the way for commercially viable Plasma Coating on copper alloys, either via private enterprises or via Common Facilitation Centers at manufacturing clusters. Brass & Bell metal, which are the largest art metal exported from India, would further get an edge in the international markets due to deployment of plasma coating.

1.2.3 Qualitative study of technologies designed using Artificial Intelligence for improving healthcare services in the Indian context by Centre for Development of Advanced Computing (C-DAC), Mohali

The specific objectives of the study are:

- i. To identify technologies in the area of Healthcare based on Artificial Intelligence,
 - ii. To facilitate collaboration amongst industries and startups working in Artificial Intelligence-Health to improve healthcare services in India
- Artificial Intelligence area is an emerging area that could be deployed to improve healthcare services as well as to bridge the healthcare divide in urban and rural areas. With AI and associated machine



learning algorithms, technology can be used to assist healthcare practitioners in (i) diagnosing the disease quicker, (ii) forecast the spread of the disease, and (iii) design customized treatment plans for patients, even for those situated remotely. The study would focus on these three aspects of Artificial Intelligence applicability in Healthcare and bring out the technologies being developed by academic institutions and R&D labs. The outcome of the study would be useful for various R&D labs, industrial organizations including start-ups, which can adopt and build upon the identified technologies and roll out to the Indian populace.

1.2.4 Developing a framework for Commercialization of technologies developed at public funded research institutions by CSIR-Central Scientific Instruments Organisation (CSIR-CSIO), Chandigarh

The specific objectives are-

- i. Finding the status of commercialization of technologies developed at CSIR-CSIO
- ii. Identification of lacuna in the commercialization process
- iii. Developing a framework to strengthen commercialization process

The study will be conducted for the technologies transferred in the past 3 years by CSIR-CSIO and it will cover Chandigarh, Punjab and Haryana regions for technologies related to in the areas of bio-medical instrumentation, agri-instrumentation (post-harvest and pre-harvest), waste-to-wealth etc. The study will provide an understanding of the factors that play a key role in the commercialization process.

1.2.5 Inventorization of microbe based technologies developed in National Agricultural Research System (NARS) for catalyzing their effective translation from lab to land by ICAR-National Bureau of Agriculturally Important Microorganisms (NBAIM)

The specific objectives are:

- i. To document and develop user-friendly database for microbe based technologies developed/available at different ICAR institutes and State Agricultural Universities (SAUs)

- ii. To evaluate selected potential technologies for commercialization
- iii. To identify key issues in commercialization of microbe based technologies
- iv. To prepare a status report/policy paper for catalyzing the commercialization of microbe based technologies

A database containing all relevant information on microbe based technologies available in different NARS institutes/universities will be developed and Key issues in commercialization of microbe based technologies will be identified and possible solutions will be worked out to maximize the commercialization of the technologies.

1.2.6 Role of Branding in Enhancing Competitive Growth for MSME Sector by All India Management Association (AIMA)

The proposed study would attempt to:

- i. Study the role of branding in growth of MSME sector.
- ii. Explore the key branding strategies for MSMEs in India.
- iii. Assess the acceptability of branding for MSMEs in India.
- iv. Suggest the way forward for MSMEs to create their brand.

The study will give an insight to MSMEs about branding their products and services within modest budgets and will help MSMEs in becoming successful in the current challenging economic environment. The study will also help MSMEs to understand their business strength, USPs and skills for leveraging their strengths. The study will guide SMEs in establishing a brand for their products.

1.2.7 Technology forecasting and projecting market trends for agricultural machinery manufacturing sector for India by ICAR-Central Institute of Agricultural Engineering (ICAR-CIAE), Bhopal

The specific objectives are:

- i. To study the present status of agricultural machinery manufacturing Industries in India.
- ii. To forecast the potential demand for agricultural machinery manufacturing sector.

The study aims to examine the trends of market growth for selected agricultural machinery and

also the technology transfer from R&D institutes to industries with possible solutions to make the technology transfer process more effective and efficient. The need for setting up of manufacturing units for specified machinery, region wise would also be assessed. As of now, no authentic database is available for agricultural machinery manufacturing sector which can facilitate effective and efficient planning by the policy makers to assess agricultural machinery manufacturing growth trends and forecasting the demand. The study will evolve such a database.

1.2.8 Access to Energy Efficiency Technology Information for Indian Industries by The Energy and Resources Institute, New Delhi

The objective of the study is to enable access to energy technology information services to Indian industries by collecting, collating and disseminating technology use and energy consumption with special focus on energy efficiency in Indian industries. The study aims to provide information on a host of parameters which could be used to assess the performance and make comparisons using latest information and communication technologies. The study will also help promote exchange of information between R&D institutes and energy intensive industries such as iron & steel, paper & pulp, cement, etc. and cater to the information needs of the researchers, policymakers, and other users working in this field. Also it will help industry to know about the best available technologies in energy sector and benchmark their operations.

1.2.9 Studies on Technology and Management by CSIR-Institute of Himalayan Bioresource Technology (CSIR-IHBT), Palampur

The specific objectives are:

- i. To study the extent of linkages (collaborative, sponsored, consultancy, transfer of technology, incubation etc.) amongst academia, R&D and Industry
- ii. To study the innovation policies of various academia, R&D institutes and industry of the

region and its mechanism for industrial research, IPRs and transfer of technology.

- iii. To study the R&D needs of Industry and the extent of in-house R&D and technology out sourcing.
- iv. Two case studies (success/failure) for linkages amongst academia, R&D and Industry.

The study will be undertaken in H.P, study for linkages amongst Academia, R&D with food processing Industries. This study will help us in the following ways:

- i. Generation of baseline information w.r.t academia, R&D institutes
- ii. Database of academia, R&D, their competencies and area of their linkages with industries
- iii. Technological and research need from industrial perspectives
- iv. Status of IPR policies

Expectations of food processing industries from academia and R&D institutes

1.2.10 The Role of Standards in Diffusion of Emerging Technologies: Internet of Things (IoT) by Indian Council for Research on International Economic Relations (ICRIER), New Delhi

The study proposes to analyze the complex process of standardization of an emerging technology, viz, the 'Internet of Things', and specifically, understand the role of Standard Setting Organizations (SSO) and the industry in setting and conforming to standards. The study aims to provide policy suggestions for designing an efficient ecosystem, which will allow the Industry, SSOs and the State to better coordinate and collaborate towards enabling an IoT environment. It will explore the features of an efficient architecture of standards and SSOs that promote conformity, competition and efficiency of the IoT industry.

1.2.11 Formulating a suggestive model for India for facilitating university- industry linkages in research by PHD Chamber of Commerce & Industry (PHDCCI)

To prepare a model for India for an enabling environment to facilitate university-industry linkages for research in India.



The specific objectives are:

- i. To assess the problems in The Protection and Utilization of Public-Funded Intellectual Property (PUPFIP) Bill and to suggest changes in it.
- ii. To suggest a model for India on lines of Bayh Dole Act of USA for building a strong and thriving innovation ecosystem in the country.

India does not have legislation in place to facilitate University-Industry Linkages in Research. The Protection and Utilization of Public-Funded Intellectual Property (PUPFIP) Bill has now been withdrawn from the Parliament. It is on the lines of Bayh-Dole Act in US, which led to great benefit for the country and many other countries have benefited by adopting a similar legislation. The study proposed aims to undertake pin pointed suggestions and recommendations from the Universities and Industries pan India in order to develop a model/framework for policy on the lines of Bayh Dole Act suitable for India.

1.2.12 To assess the commercialization status of the technologies from Govt. funded national institutions by Amity University, Noida.

The Study intends to look at the design of effective technology transfer process for Indian Academic/ Technical institutes. The study aims to address (i) state of the commercialization of patented technologies from public funded research institutes. (ii) incubation level of maturity of technologies in IITs and NITs. (iii) the type of technologies, which have received joint development support from industry (BIRAC, DST, DBT, etc.). (iv) the status of patenting facility in the institutions. (v) Launching of product or services in the market, based on the technology developed by public funded institutions. (vi) To assess critical elements of a successful technology transfer and commercialization process, of a research organization. Study intends to cover selected (sample size) public funded higher educational institutions and national labs of India and investigate, if there are basic technological transfer needs which need to be fostered, that eventually may lead to sophisticated technology development within India.

1.2.13 “Increasing competitiveness of SMEs with Fourth Industrial revolution Technologies” by Asian and Pacific Centre for Transfer of Technology (APCTT), New Delhi.

The study is proposed with broad objective as “To enhance knowledge and understanding of policymaker and other stakeholder on policy options and strategies to make Indian SME more competitive with 4th Industrial revolution technologies”. The study would look into (i) foresight of the opportunities and challenges in industrial ecosystem in the emergence of 4th Industrial revolution. (ii) Examination of current readiness and challenges of Indian SMEs in India to adopt 4th Industrial revolution technologies. (iii) Case studies on the successful adoption of 4th Industrial revolution technologies, innovative business processes and services, based on the result of field research. Identification of gaps and opportunities for Indian SMEs. (iv) Best practices and lessons learnt from other Asian countries on successful adoption of 4th Industrial revolution technologies by SMEs and transformation of SMEs. (v) Policy recommendation and strategies to enhance the capacity of SMEs to adopt 4th Industrial revolution technologies for enhanced productivity and competitiveness.

1.2.14 “Emerging requirement of Nano coating in the fields of Automotive, Aerospace, Machine tool, Healthcare & sanitization sectors in the Country and the means to achieve it” by Central Manufacturing Technology Institute (CMTI), Bangalore.

The study under the theme emerging requirements of MSME sector with reference to globalization and technological advancement would look into one of the technologies which has a potential to increase per capita revenue of capital goods sector is by addressing the Nano coating technologies. The intended study would (i) understand the requirement of MSME in different sectors in Nano coatings. (ii) understand the problems faced due to existing coating techniques and address the issues faced by interaction with industries. (iii). understand the technologies required for addressing various problems of coating by industries in country and find the availability of such facilities in public domain.

1.2.15 “Alternative materials for improving response and damping properties of machine tool structure” by Central Manufacturing Technology Institute (CMTI), Bangalore.

The main objective of the study is to find out emerging requirements for alternate materials for machine tool structure & bed. It aims to identify technological gaps & challenges in development and deployment of indigenous technology, in the Indian market scenario. This includes the following (i) To explore the demands of alternate damping materials for machine tool structure & beds. (ii) To identify the technology gaps (fabrication methods, material properties & characteristics). (iii) Identify indigenous development works required.

1.2.16 “ Technology strategies and Branding manifestations for better firm performance- A comparative study from the year 2000 to 2019, after different phases of liberalization of the Indian Economy” by Symbiosis School of Media and Communication, Bangalore

Under the theme, Technology Brand Building, the study intends to show the importance of technology strategies amongst Indian companies vis-à-vis MNCs companies and show how technology strategies affect branding and marketing strategies of these companies and ultimately culminate into market and financial performance of these companies in the consumer durables categories in India. The study would compare the results of changes in technology and branding strategies over years and proposes to find out how some Indian companies could not compete with MNCs and how some companies survived the onslaught of the MNC’s technology based competition and how they managed to steer themselves away for better financial performance.

Study would assess how by subscribing to ‘Make in India’ technology theme based strategy, firms were able to compete with MNCs successfully. Study would detail the determinants, antecedents and consequences of technology based strategies on a firm’s market and financial performance. Study would detail how different components of technology

manifest into branding and marketing advantage variables and how they in turn affect the performance variables and also how preferences for technology based strategic variables lead to competitive advantage.

1.2.17 “An assessment study of the commercialization of already developed technologies of the Public Funded Research Institutes established in Madhya Pradesh and to evaluate their relevance in synchrony to the technical requirement of the local industries” by Rabindranath Tagore University, Raisen.

Under the study theme Commercialization status of technologies developed at Public funded Research Institution, the study would look into the difficult economic scenario is being observed across the country that requires innovative and technology backed up approach to cope with it. The MSME units covered under study area are unaware of the new technologies and related technological advancements even though research institutes of national importance established in the region around MSME are capable of solving the technical challenges of these units but due to lack of awareness and interaction platforms the issue remains unsolved. The study intend to (i) assess the status of the technologies developed at the public funded institutes with respect to their commercialization. (ii) relevance of the developed technology in relation to local specific problems. (iii) analyse the gap between the existing industrial requirements and ongoing researches in these regional institutes. The study would be of great significance as it would assess the present situation of the technologies already developed with these institutions in accordance to the scope of their commercialization to the local MSMEs and also the synchrony of the ongoing research in relation to the actual technical requirements of the industrial clusters.

2.0 A2K+ EVENTS

The Access to Knowledge for Technology Development and Dissemination (A2K+) – Events





Industrial R&D Schemes

programme of DSIR provides a platform for exchange of views among industry, consultancy organizations, academic and research institutions that would lead to useful insights on issues relating to industrial research and technological innovation and help in evolving tools and techniques to remain competitive in today's business climate

The objective of A2K+ Events program is to support the organization of workshops, interactions, training programmes, exhibitions and other events for identification of collaborative projects between academia, institutions and industry participating in the events.

Achievements:

During the financial year, proposals were received from a number of agencies to organize workshops, stakeholder meetings, interaction meets, training programmes, exhibitions and other events on topics related to promotion of industrial research and innovation. These proposals were discussed in Technical Advisory Committee (TAC) Meeting and 11 proposals recommended by TAC were processed for financial concurrence & approval before sanctioning of the event.

Events that were supported by the department during the year are listed below:

Sl. No.	Title of Event	Organized by	Date	Nature of Support
1	India Intellectual Property Convention	Confederation of Indian Industry, Gurugram	26 Apr 2018	Logo Support
2	Seminar on Technology Assistance to Food Processors on Food Preservation & Hygienic Packaging	Odisha Assembly of Small & Medium Enterprises, Cuttack	12 Aug 2018	Partial financial support
3	International Conferences and Exhibitions on Materials, Engineering, Technology and Heat Treat Show	ASM International India Chapter, New Delhi	27-29 Sep 2018	Logo Support
4	Indian Cyber Congress (INCYCON)	National Cyber Safety and Security Standards, New Delhi	29 Sep 2018	Logo Support
5	4 th International Conference on Ease of Doing IP Intensive Business in India	Confederation of Indian Industry, Gurugram	8-9 Oct 2018	Logo Support
6	15 th CII National Pharmaceutical Conclave 2018	Confederation of Indian Industry, Gurugram	19 Nov 2018	Logo Support
7	National Conference on Agri-Smart 2018: Using IoT for driving Smart Agriculture	Centre for Development of Advanced Computing (C-DAC), Mohali	19-20 Nov 2018	Partial financial support
8	International Conference on Innovations for the Elimination and Control of Visceral Leishmaniasis	JamiaHamdard, New Delhi	23-25 Nov 2018	Partial financial support
9	National Conference-cum Exhibition & Awards: Managing Urban Waste (Solid Waste, Plastic Waste, Electronic Waste)	ASSOCHAM, New Delhi	10 Jan 2019	Partial financial support
10	Conference of Asian Special Libraries on Libraries and Librarianship in Digital Plus Era	Ambedkar University, Delhi	14-16 Feb 2019	Partial financial support
11	Seminar on Smart Manufacturing Cluster Collaboration and Way Forward during IESS VIII	EEPC India, New Delhi	15 Mar 2019	Partial financial support

Industrial R&D Schemes

In addition to above, four proposals of events to be held beyond March 2019 (as listed below) were recommended by the TAC in its meeting held on 25 February 2019.

Sl. No.	Title of Event	Organized by	Date	Nature of Support
1	International Conference on Nanotechnology for Better Living	National Institute of Technology, Srinagar	07-11 Apr 2019	Partial financial support
2	India Intellectual Property Convention	Confederation of Indian Industry, Gurugram	26 Apr 2019	Logo Support
3	Quality Infrastructure for Clean and Sustainable Development	Consulting Engineers Association of India, New Delhi	07-09 Jul 2019	Partial financial support
4	3 rd International Conference on Calcined Clay for Sustainable Concrete	Indian Institute of Technology, Delhi	15-17 Oct 2019	Partial financial support

3.0 TECHNOLOGY DEVELOPMENT AND UTILIZATION PROGRAMME FOR WOMEN (TDUPW)

The program is aimed to meet the specific needs of women and to enhance their technological capabilities. The objectives of the programme are:

- Promoting the adoption of new technologies by women.
- Awareness creation and training of women on technology related issues with regard to women related occupations.
- Promoting Technology up gradation (through technologies developed by scientific establishments) of micro, small and medium enterprises run by women Self Help Groups (SHGs)/entrepreneurs.
- Showcasing of appropriate technologies developed by scientific establishments and organizing demonstration programmes for the benefit of women.
- Design and development of products, processes (e.g.by utilizing waste) beneficial to women.
- Deployment of technologies developed by scientific establishments for reduction of drudgery and empowerment of women.

The **Technical Advisory committee (TAC)** which recommends projects for funding under the scheme "Technology Development and utilization Programme for Women (TDUPW)" was reconstituted in December,

2017, on expiry of the tenure of the earlier TAC. Two meetings of the TAC have been convened since then.

3.1 Projects Supported Under TDUPW Programme :

The following projects were in progress:

3.1.1 Capacity Building of Economically Backward Rural Women Through Participatory Training on Integrated Fish Farming with Improved Backyard Poultry Breeds in Homestead Ponds

The main objectives of the proposal received from Bidhan Chandra KrishiViswhavidyalaya, Directorate of Research, Kalyani, District Nadia, West Bengal are capacity building of rural women on integrated poultry-fish farming in their homestead ponds through participatory training and demonstration programmes for income generation and nutritional support as well as for dissemination of the technology in the adjoining villages through organizing training and demonstration programmes in association with different panchayats of adjoining block of the village. Twenty integrated poultry-cum-fish farming units have been developed and are being utilized for both participatory training and demonstration purposes. Two Self-Help Groups have been formed with ten beneficiaries in each group. Chicks of improved poultry breeds (Vanaraja/Haringhata Black/Black Australorp) were given to each trainee. 20 ponds were renovated and 20 poultry houses (made up of MS&GI-5'x4'x4') were made for the women trainees. Training



programmes were organized to train 150 women in association with Kadambagachi Samabay Krishi Unnayan Samity & Mahesh chandrapur Samabay Krishi Unnayan Samity. Protein intake of trainee women increased 2-3 folds. 9 women entrepreneurs out of the women trained have started their own business. Savings Bank Account of each beneficiary has been opened. Earning from the activity is being deposited in their respective bank accounts. Group meetings are organized from time to time in the presence of Panchayat Member of Dewli GP and villagers. Regular monitoring is being done of each and every unit from time to time. Vaccination programmes of chicks are being followed according to the schedule of standard poultry farming method. The integrated poultry-fish farming offers great efficiency in resource utilization, as waste or by-products from one system is effectively recycled. It also enables effective utilization of available farming space for maximizing production. Fish culture in combination with agriculture or livestock is a unique and lucrative venture and provides a higher farm income, makes available a cheap source of protein for the rural population, increases productivity on small land-holdings and increases the supply of feeds for the farm livestock. Thus, it provides more employment, and improves socio-economic status of farmers and contributes towards betterment of rural economy. The project activities have been completed within the approved project duration and Project Completion Report has been submitted by Project Investigator.

3.1.2 Enhancing the Livelihoods of Tribal Women through Technological Intervention and Trainings on Non-Wood Forest Products (Identification, collection, storage, processing and marketing of Non-Wood Forest Products)

The objectives of the proposal, received from Department of Agricultural Extension and Rural Sociology, Tamil Nadu Agricultural University, Coimbatore are to train the tribal women on collection, storage, processing, value addition and marketing of Non-wood Forest Products (NWFPs) and to assess the impact of the trainings on the livelihood status of tribal women. The project deals

with strengthening the NWFPs sector by means of training the tribal people regularly on aspects related to proper collection methods, storage, processing, value addition techniques and marketing of NWFPs to improve socio-economic status of the beneficiaries of the project areas. During the total project period, twenty two training programmes were organized, which covered three districts (Coimbatore, Erode and Nilgiris), eleven Taluks (Pollachi, Mettupalayam, Thondamuthur, Bhavanisagar, Sathayamangalam, Anthiyur, Kotagiri, Coonoor, Kunda, Ooty, Gudalur), twenty two blocks and around twenty two self-help groups (SHG) including around 550 beneficiaries. They were given theoretical and hands on training on collection, storage, processing, marketing and demonstration of value added products/value addition of non-wood forest products like amla, tamarind, honey, kadukkai, shikakai, Nutmeg, amla candy, amla pickles, leaves powder, broom stick and squash etc. The beneficiaries were distributed technical manual on value added product development from NWFPs. The project activities have been completed within approved project duration and Project Completion Report has been submitted by Project Investigator.

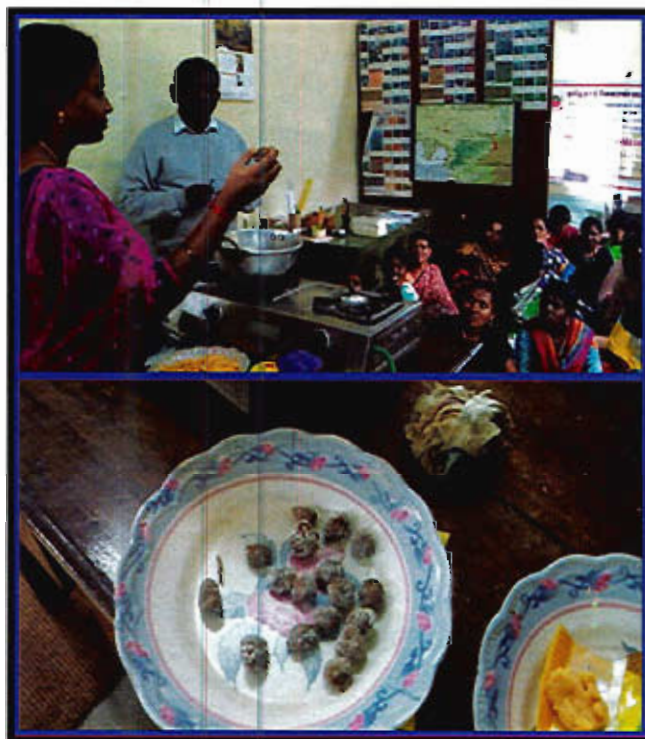


Fig. 1 Training cum Demonstration – Tamarind Candy Preparation

3.1.3 Empowerment of rural women by Promoting the adoption of appropriate Sericulture Technologies in Chittoor (Dist) of Andhra Pradesh undertaken by Department of Sericulture, Sri Padmavati Mahila Visvavidyalayam, Tirupati, Andhra Pradesh

The main objectives of the project are to disseminate knowledge and technological skill improvement for adoption of scientific sericultural practices for bringing improvement in production and quality of silk for self-sustenance and empowerment of women through on-farm training cum demonstrations, to enhance the bio-organic based technological interventions towards improvement of environment, productivity and sustainability of sericulture, Promotion of sericultural entrepreneurship among women and to entice women farmers to adopt Sericulture as a source of livelihood and enhance their economic status through improving profitability in cocoon production. A total of six batches of training

programmes were conducted up to November 2018 at different locations namely i) GurravariKandriga, ii) Padmapuram G.D. Nellore Mandal, iii) Gajulapalem, iv) Yeduru Gangavaram Mandal, v) Beripalli Palamaner Mandaland Kothapallimitta. About 240 women sericulture farmers were trained on advanced sericulture technologies and each participant was given the Handbook on "Advance Sericulture Practices". The impact of training programme was also analyzed and found that post-training the farmers are harvesting 10-12 cocoon crops/year with a better quality cocoon by adopting the advanced package of practices. So that they are getting higher market price (about ₹ 400/- per kg cocoon). Earlier farmers were harvesting only 5-6 cocoon crop/year and getting only ₹ 300/- for one kg of cocoon. The income of farmers is nearly doubled (₹ 4.0 lakh to ₹ 4.6 Lakh per acre per year from ₹ 2.1 lakh to 2.2 lakh per acre per year).



Fig. 2 (a)



Fig. 2 (b)



Fig. 2 (c)

Fig. 2 Training on advance sericulture technologies

3.1.4 Socio-economic development of rural women of Uttar Pradesh by educating & training in the cultivation of medicinal plants, their processing for health care product development and marketing for gainful employment.

The main objectives of the proposal received from Amity Institute of Herbal Research & Studies, Amity University, Uttar Pradesh are to educate and train rural women of the SC/ST, backward and economically weaker sections of the society in the identification, cultivation, and uses of medicinal plants and to train women of the target area/population (Muzaffarnagar district, UP) in the cultivation of medicinal plants at home stead and community land for personal health care product development and their marketing for gainful employment and income generation. Training programmes are being conducted to educate and train the target group of women for the cultivation, processing, storage, pre and post-harvest methodology and techniques for the processing and cultivation of a number of selected medicinal plants. They will be encouraged to utilize the possibility of growing medicinal plants in home stead, kitchen garden or available under-utilized land and marketing for gainful employment. Some important medicinal plants having good market potential and utility in Indian system of medicines have been selected depending on the agro-climatic condition of the selected area. The project is being implemented through coordination with local NGOs, village panchayat, Gram Pradhan, Angan-wadi workers, local school teachers, Krishi Vigyan Kendras (KVKs), followed by formation of Self-Help Groups of the beneficiaries. Six training programs have been conducted in four villages namely Hussainpur, Bopada, Ghasipura, Beghrajpur and Jaroda (Dist. Muzaffarnagar). A total of one twenty nine rural women attended and participated in the training programmes. They were trained on the medicinal values of the selected medicinal and aromatic plants, their cultivation practices and method of preparation of herbal health care products from lemon grass and moringa.



Fig. 3 Moringa plantation at village Sandhawali, Dist. Muzaffarnagar

3.1.5 Empowerment of women through bee keeping and value addition of honey products for income generation in rural areas undertaken by Regional Research Station, Aruppukottai of Tamilnadu Agricultural University(TNAU).

The main objectives of the project are to create awareness among women on bee keeping, post-harvest technology, honey based value added products through trainings, exposure field visit; motivation of women groups by training, demonstration on bee keeping and post harvest technology of honey products, motivation of land less women entrepreneurs on paid bee pollination in increasing productivity of various crops and empowerment of women and entrepreneurship development through Hands-on-training on bee keeping and value addition. A total of 90 women farmers were selected from Alankanallur block, Madurai East block and Sedapatty block with one batch of 30 women farmers from each block for training. The training covered advanced bee keeping technologies and each participant was issued a Handbook developed by Principal Investigator (PI) on "Bee Keeping for Women Empowerment" in local language (Tamil). All 90 participants were

given hands on training on various aspects related to honey bee rearing viz., identifying bee species, bee keeping appliances, apiary installation, handling methods of bee, colony management techniques, bee pasturage and role of bees in pollination to increase crop yield and productivity. The hands on training on value addition of honey and honey products such as Honey cake, honey amla, honey jelly, etc. was also provided to all participants. An exposure field visit to commercial apiary unit viz. M/S Shamee bee farm, Rajapalayam, Virudhunagar district was also conducted to familiarize the participants with the honey processing plant.



Fig. 4 Training on advance bee keeping technologies

3.1.6 Training of women groups in processing of horticultural and wild fruit resources for marketable health product development and employment generation in Higher Himalayan region.

The main objectives of the proposal received from Society for Environment & Employment Development (SEED), Uttarkashi are to organize village women of border areas of Uttarakhand in groups for capacity building in utilization of wild tree based fruits for self employment, training and technology transfer. Utilization of pulp and oil for development of marketable products and support for small entrepreneurship development for income and employment generation is being provided to village women groups. Training is also imparted to women groups for processing of horticultural and wild fruit resources for marketable health product development with special focus on Chulu, Apple, Plums and Peaches.



Fig. 5 Awareness Programme in Progress

3.1.7 Capacity building of rural women for enhancing household income and nutrition through mushroom cultivation

The main objectives of the proposal, received from ICAR-Indian Institute of Horticultural Research, Bengaluru are to enhance awareness about mushrooms and their nutraceutical properties amongst women; impart skill development & training to rural women for oyster, mushroom cultivation; methods to fortify daily diet with dry mushrooms to enhance nutrition and to impart training for production of mushroom value added products. The emphasis has been given on creating awareness about the health



and nutrition benefits of mushrooms, methods to utilize fresh and dried oyster mushrooms in daily diet and make mushroom cultivation as a part of kitchen garden as well. The rural women are initially being helped through the Ready to Fruit (RTF) bag concept developed by ICAR-IIHR which helps rural women with minimal resources to grow a nutritious vegetable like mushroom at home. Hands on training to 200 women belonging to 5 villages (Sadenahalli, Chokkanhalli, Honnenahalli, Rajankunte and Chikkanahosannahalli) of Rajankunte and Dodaballapur Taluk were given in oyster mushroom cultivation and preparation of daily diet products like Mushroom rasam, mushroom chutney powder, mushroom powder to enhance the daily nutrition. Hands on training to women will help in development of knowledge as well as skill among the beneficiaries and the women will learn the technique of mushroom production at home as well as to develop the necessary expertise in making value added products from fresh/dry mushrooms.

3.1.8 Nutrition on Reproduction of Ornamental Fishes and Transfer of Ornamental Fish Culture Technology for Employment Generation of Rural Women from SC/ST and Fishers Population of Thiruvananthapuram District, Kerala.

The main objectives of the proposal, received from Amity Institute of Marine Science & Technology, Amity University Uttar Pradesh (AUUP), Noida is to impart training on ornamental fish culture and breeding. Training Programmes were conducted for women from rural areas belonging to the SC/ST/Fisher folk's population of Trivandrum district of Kerala. A total of one hundred (100) women were imparted hands on training on all aspects dealing with ornamental fish culture and aquarium management. The natural breeding of live bearers like guppy, molly and platy and the egg layer, gourami was shown to the trainees as these fishes breed in the demonstration tanks. Larval rearing of the common ornamental fishes like, gourami, and rearing of the young ones of guppy, molly and platy were also demonstrated during the training. Training on culture of live feeds such as, diatoms, rotifers and artemia larvae, paramecium, micro worm, grindal worm, vinegar eel, tubiflex worms, were imparted to the trainees and the culture technology

was demonstrated during the training program. Feed formulation, selection of ingredients, supplementary feed preparation by pelletization was demonstrated and the trainees were also given opportunity to prepare pelletized supplementary fish feed during the training period. All trainees were given a chance to construct their own glass aquarium tanks for their own use in future. Each trainee had fabricated her own glass aquarium tank during the training period. Hands on training was also given on the setting up of aquarium tanks with facilities for aeration, water filtration and water circulation and their upkeep and maintenance and the same was demonstrated during the training programmes. Water quality parameters, testing of water quality using test kits and their maintenance in aquarium and ornamental fish hatchery were also discussed and demonstrated in the training program. The trainees were given a hand book on ornamental fish culture.

3.1.9 Adding value to Fish- A potential livelihood option for rural women of Odisha.

The main objectives of the proposal received from ICAR-Central Institute of Women in Agriculture, Bhubaneswar are to assess the consumer preference of value added fish products and by-products and development of innovative products based on consumer preference; to build the capacity of rural women of Odisha in the preparation of value added products and by-products from fish and fish wastes; to demonstrate the importance of adequate packaging, labeling and quality certification of processed and value added fish products and to enhance entrepreneurial skills of the SHG groups in managing their business. The value added products about which the skills were imparted to fisherwomen, were finalized based on the assessment of consumer preferences on the parameters such as, the consumption pattern of fish, awareness on the health benefits of fish, awareness on quality attributes of fish, consumer perception towards the different value added fish products with respect to its price, taste, flavor, appearance, packing etc. Different innovative value added products like fish chutney powder, fish papad, fish cutlet, fish momos and organic manure from fish silage have been prepared. The popularization of the attractively packed value

added fish products and the organic fish manure has been done through participation and display of the products in fairs and exhibitions. Linkage with Odisha Fisheries Cooperative Corporation (FISHFED) for marketing of value added fish products has also been initiated. In order to equip the women with adequate knowledge and skill on scientific preparation of value added fish products and by products as potential livelihood option, several capacity building programmes were conducted. The programmes also imparted entrepreneurial skills.



Fig. 6 Glimpses of the Project Interventions

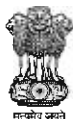
3.1.10 Introduction of small agricultural equipment to address the problem of drudgery and morbidity among the women farmers in Jagatsinghpur district of Odisha.

The main objectives of the proposal submitted by GREEN India, Jagatsinghpur, Odisha are to undertake a survey to understand the level of farm equipment usage by the farmers and especially women farmers;

to sensitize and undertake awareness programmes to educate the women farmers regarding the benefits of using farm equipment; to introduce farm equipment for select women farmers; to introduce modern forms of farming for enabling to use of farm equipment and to provide training on modern methods of farming and to introduce small equipment in farming practices in the district of Jagatsinghpur. The project will help to enhance productivity through introduction of small equipment in farming among women farmers which will reduce drudgery among the women farm workers. As part of the project, intensive awareness campaign will be undertaken on the issue followed by training through field demonstrations. The target farmers will be provided training to adopt modern methods of farming so that they can use small farming equipment. The project will be implemented in about four Gram Panchayats of Tirtol block of Jagatsinghpur District. About 500 women farmers will be covered under the project. The farmers will also be provided small farm equipment which they can access from the user's groups that will be formed as part of the project.

3.2. Skill Satellite Centres

The main aim of DSIR is to set up Skill Satellite Centres to enhance the quality of life of women by imparting knowledge and skills. Women thrive when their community truly values women's work both at home as well as in the public sphere and therefore, this initiative of DSIR is committed to working towards gender parity and making women's work visible at all levels of development. DSIR will support proposals for setting up "Skill Satellite Centres" in close vicinity of rural/tribal or other needy groups of women, which would be different from the usual vocational training centres for women, established by various other organisations. In addition to the skill training, all the women enrolled with the satellite centres will also go through a short duration literacy curriculum. In addition to training on specific technical subjects, training will also be given on financial literacy and enterprise development. This will ensure that after completion of the training, they are not only financially independent but can also face social challenges more effectively. The programme is expected to help the local women uplift their socio-economic status significantly.



4.0 TECHNOLOGY DEVELOPMENT AND DEMONSTRATION PROGRAMME (TDDP)

The Department has been providing partial financial support to research, development, design and engineering (RDDE) projects proposed by industry in the following areas:

- (a) Development of a new or improved product resulting in prototype development and ending with demonstration in commercial environment.
- (b) Development of a new or improved process resulting in establishment of process know-how, development of process equipment and demonstration of yield, efficacy etc on a pilot plant.
- (c) Absorption and up-gradation of imported technology.
- (d) Priority technology development projects of PSUs in consultation with and co-financing from economic ministries. Under this, consortium projects for development of technologies of common interests for group of industries or associations to be undertaken by industrial units, national laboratories, user industries in important focused areas such as Electronics and Communications, Railways, Drugs, Chemicals and Fertilizers etc.
- (e) Development and demonstration of technologies for common use by industry clusters.
- (f) Development and demonstration of technologies for government's flagship and mission mode projects.

The partial financial support by DSIR in the above areas primarily covers prototype development and pilot plant work, testing and evaluation of products from such R&D, user trials, etc. Bulk of the cost of the project is met from the proposer industry's resources.

The Technology Development and Demonstration Programme (TDDP) started in 1992, and the department has supported 254 R&D projects

of Industrial units with a total project cost of ₹ 750.60 crores in which DSIR support is ₹ 280.40 crores. The projects cover a number of industry sectors and the share of these industry sectors in the project supported are: 32% engineering; 27% electronics; 21% Chemical; 7% energy and waste utilization and 13% Health & Pharma. The projects supported have been spread over 22 states of the country and the share of top five states in the number of project supported is: Andhra Pradesh 18%, Karnataka 15%, Maharashtra 13%, Delhi 10% and Tamil Nadu 10%.

101 technologies developed under the scheme have been commercialized (Annexure 11) and the Department has received a cumulative royalty of ₹ 72.52 crore during the period 1997-2019.

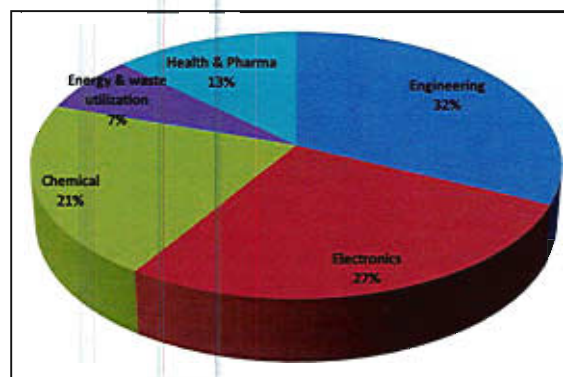


Fig. 7 Sector-wise TDDP Project supported

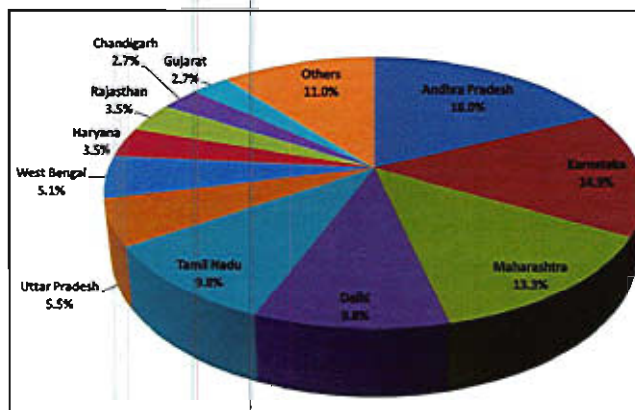


Fig. 8 State-wise TDDP Project supported

During the current financial year, progress of last three on-going projects was monitored.

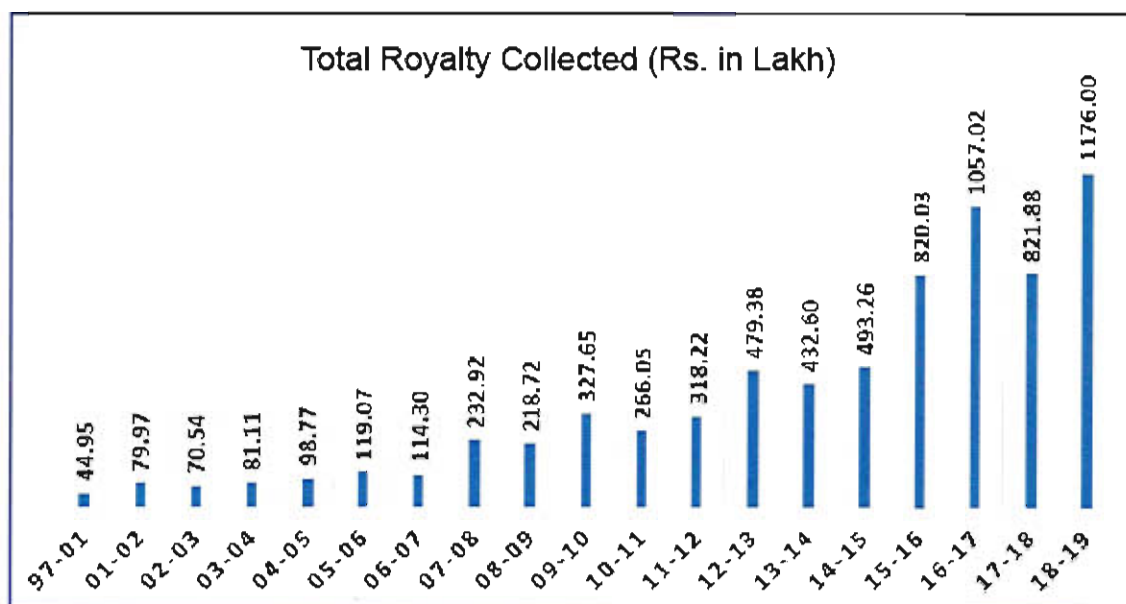


Fig. 9 Year-wise royalty received from the commercialized products/processes developed under TDDP projects.

4.1 Status of TDDP Projects on-going from Eleventh Plan and monitored during the financial year 2018-19

(i) Process Up-scaling & Clinical Evaluation- PBL 1427 – A Novel Long Acting DPP IV Inhibitor for the Treatment of Type 2 Diabetes by M/s Panacea Biotec Ltd., New Delhi

The main objectives of the project were to scale-up the process for producing B-amino acid based DPP - IV inhibitor using novel heterocyclic, structurally unrelated to any DPP-IV inhibitors known so far and to conduct clinical safety and efficacy trials of the drug molecule. It is a new DPP-IV inhibitor that has better half-life, advantageous potency, stability and selectivity, less toxicity and/or better pharmacodynamics properties. Preclinical Toxicology studies have been successfully completed on tablet formulations. The stability studies of 36 months duration and accelerated studies have been successfully completed. A modified controlled release formulation for once a week dosage form has been successfully developed and its long term stability studies are in progress. For this New Chemical Entity (NCE), the company has filed patents worldwide and has been granted patents in countries like China, France, Germany,

Japan, Switzerland, United Kingdom and United States of America. The project is technically complete and the clinical trials are under progress. After successful completion of clinical trials, the product will be commercialized.

(ii) Fuel Cell Bus development Programme by M/s Tata Motors Ltd, Mumbai.

M/s Tata Motors Ltd (TML), Mumbai has taken up project on development and demonstration of Fuel Cell Bus. Hydrogen is emerging as a leading contender for the energy carrier options of future. The project is aimed at design, development and demonstration of Fuel Cell Buses which will be fueled by Hydrogen. A total of seven prototype buses with successive design improvements have been fabricated. Hydrogen refuelling infrastructure with approval of Petroleum and Explosives Safety Organization (PESO), Ministry of Road Transport and Highways (MORTH) / Central Institute of Road Transport (CIRT) for testing of fuel cell bus at TML Sanand Gujarat and Indian Oil Corporation (IOCL) Faridabad has been created. Extensive field trials are being carried out at TML Sanand and IOCL Faridabad for perfecting the technology before bringing the bus on public road. The project is technically complete. With necessary safety approvals, buses shall be demonstrated on public road soon.



Fig. 10 FC Bus launched for trials at IOCL Faridabad by Dr. R Chidambaram, Former Principle Scientific Advisor to the Govt. of India

(iii) Development and Commercialization on Low Temperature Polymer Exchange Membrane Fuel Cell and Stack by M/s Elpro Energy Dimensions Pvt. Ltd., Bangalore

The project is aimed for Development of Polymer Exchange Membrane fuel cell stacks for stationary applications. The development of fuel cells is very critical in view of the energy and environmental considerations. The company has fabricated

1kW fuel cell stack and developed indigenous Membrane Electrode Assembly (MEA). The current density with indigenously developed MEA varied between 219-280 mA/cm². The company is facing difficulties in fabrication of economically viable indigenous MEA and development of Fuel cell stack with adequate life for commercialization. Therefore, the project is being terminated at this stage.