

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

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

1.0 PREAMBLE

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 Study Theme Areas

A2K+ has supported the studies in the following 8 key theme areas:

- 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.

viii. Support system for knowledge enterprises and microenterprises.

1.2 During the period under report, following studies are ongoing

1.2.1 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 (IIFPT)

The study has been supported with objectives (i) 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; (ii) 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; (iii) To disseminate the technology to small and medium enterprises and to pulse growers in the coastal regions of Cauvery Delta.

The study found out that (i) Multi layered bags were effective for storing pulses for more than six months without altering the quality parameters and the usage of chemicals and pesticides. (ii) Developed 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. (iii) Two in one trap was designed to control and monitor pulses. This trap could collect insects more effectively. Usage of natural insect repellents in addition to light is also possible to attract more number of insects in short span.



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

The study is supported with main objective to find out emerging requirements of Ultra Precision Machining Technology, gaps & challenges in development and deployment of indigenous technology, in the Indian market scenario. The study (i) Explores the demands of assimilation for Ultra Precision Machining Technologies; (ii) 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.

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

The supported study would look into the feasibility of commercial scale coating on copper alloys, using radio-frequency plasma technology. The main objectives is to (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.

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 and this study would create ready reckoner for developing commercially viable facilities for plasma coating on copper alloy products. This study would pave the way for commercially viable

Plasma Coating on copper alloys, either via private enterprises or via Common Facilitation Centers at manufacturing clusters.

1.2.4 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 supported qualitative study would look into technologies designed using Artificial Intelligence for improving healthcare services in the Indian context. The specific objectives of the study are to (i) identify technologies in the area of Healthcare based on Artificial Intelligence; (ii) facilitate collaboration amongst industries and startups working in Artificial Intelligence- Health to improve healthcare services in India

The study would focus on aspects of Artificial Intelligence applicability in Healthcare and bring out the technologies being developed by academic institutions and R&D labs. As Artificial Intelligence area is an emerging area and it 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 outcome of the study would be useful for various R&D labs, industrial organizations including startups, which can adopt and build upon the identified technologies and roll out to the Indian populace.

1.2.5 Developing a framework for Commercialization of technologies developed at public funded research



institutions by CSIR-Central Scientific Instruments Organisation (CSIR-CSIO), Chandigarh

The supported study would look into Developing a framework for Commercialization of technologies developed at public funded research institutions. The specific objectives of the study is to (i) find 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 focus for technologies transferred in the past three years by CSIR-CSIO and it will be 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.

1.2.6 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 supported study would inventorize microbe based technologies developed in National Agricultural Research System (NARS) for catalyzing their effective translation from lab to land. The study would (i) document and develop user-friendly database for microbe based technologies developed/available at different ICAR institutes and State Agricultural Universities (SAUs); (ii) evaluate selected potential technologies for commercialization; (iii) identify key issues in commercialization of

microbe based technologies; (iv) prepare a status report/policy paper for catalyzing the commercialization of microbe based technologies.

The study would lead to creation of a database containing all relevant information on microbe based technologies available in different NARS institutes/universities. key issues in commercialization of microbe based technologies will also be identified and possible solutions will be worked out to maximize the commercialization of the technologies.

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

The study supported would assess (i) 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 help MSMEs to understand their business strength, USPs & skills for leveraging their strengths and will guide SMEs in establishing a brand for their products. Study would help in increasing the acceptability of the MSME products globally which would lead to enhancement of export earnings

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



The supported study in technology forecasting and projecting market trends for agricultural machinery manufacturing Sector for India would assess the (i) present status of agricultural machinery manufacturing Industries in India; and (ii) forecast the potential demand for agricultural machinery manufacturing sector.

The study would 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. The study would lead to creation of database, as 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.

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

The supported study on Access to Energy Efficiency Technology Information for Indian Industries would assess 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. Study would assist industry to know about the best available technologies in energy sector and benchmark their operations.

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 supported study on Role of Standards in Diffusion of Emerging Technologies: Internet of Things (IoT) is set 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 would 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)

The supported study on Formulating a suggestive model for India for facilitating university- industry linkages in research aims to prepare a model for India for an enabling environment to facilitate university- industry linkages for research in India. The study objectives includes (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.

As country does not have legislation in place to facilitate University-Industry Linkages in Research. The Protection and Utilization of Public-Funded Intellectual Property (PUPFIP) Bill was 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 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 supported study in the Emerging requirement of Nano coating in the fields of Automotive, Aerospace, Machine tool, Healthcare & sanitization sectors in the Country 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.

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

The supported study in Alternative materials for improving response and damping properties of machine tool structure 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 study would assess 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.

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

The proposed study intent to assess the commercialization status of the technologies from Govt. funded national institutions. The study would 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.

2: ACCESS TO KNOWLEDGE FOR TECHNOLOGY DEVELOPMENT AND DISSEMINATION (A2K+) - EVENTS

The Access to Knowledge for Technology Development and Dissemination (A2K+) - Events 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 17 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	International Conference on Nanotechnology for Better Living	National Institute of Technology, Srinagar	7-11 April 2019	Partial financial support
2	Quality Infrastructure for Clean and Sustainable Development	Consulting Engineers Association of India, New Delhi	7-9 July 2019	Partial financial support
3	National conference on Summit on Bridging skill Gaps in Industry 4.0	PHD chamber of commerce and Industry, New Delhi	21st August 2019	Partial financial support
4	National conference on Frontiers in Neuroscience and Neurochemistry: Dynamic Challenges and Approaches	Jamia Hamdard New Delhi	10-12 October 2019	Partial financial support
5	3rd International Conference on Calcined clays for Sustainable Concrete	Indian Institute of Technology Delhi	15-17 October 2019	Partial financial support



Sl. No	Title of Event	Organized by	Date	Nature of Support
6	Seminar on Applications of Virtual Reality / Augmented Reality in MSMEs	PHD chamber of commerce and Industry, New Delhi	18th October 2019	Partial financial support
7	Fully Programmable Systems on Chip for Scientific Instrumentation	Gauhati University, Guwahati	2-9 November 2019	Partial financial support
8	International Conference ICDL 2019: Digital Transformation for an Agile Environment	The Energy and Resources Institute, New Delhi	06-08 November 2019	Partial financial support
9	12th International Conference on Plasma Science and Applications	University of Lucknow, Lucknow	11-14 November 2019	Partial financial support
10	5th International Conference on IPR	Confederation of Indian Industry, Gurgaon	3-4 Dec 2019	LOGO Support
11	International Conference on Next Generation Libraries	National Institute of Technology, Rourkela	12-14 December 2019	Partial financial support
12	National conference on Biomedical Engineering	National Institute of Technical Teachers Training and Research, Chandigarh	22-24 January 2020	Partial financial support
13	Advanced Welding Technology & Quality Systems for Developing economies	The Indian Institute of Welding, Mumbai	06-09 February 2020	Partial financial support
14	Role of Energy efficiency and Renewable Energy in Global Warming Mitigation	CSIR-Central Scientific Instrumentation Organization, Chennai	02-04- March 2020	Partial financial support
15	9th International Conference on Recent Advances in Food Processing, Fortification & Nutrition with emphasis on Vitamin D	Jamia Hamdard New Delhi	05-06 March 2020	Partial financial support
16	Innovate Punjab 2019: Innovation and Technology Summit	Punjab State Council for Science and Technology, Chandigarh	06 March 2020	Partial financial support
17	National Clean Tech Innovations Summit	PHD Chamber of Commerce and Industry, New Delhi	20 March 2020	Partial financial support
18	Industry meet on Latest Trends in R&D for Industry 4.0	CSIR- Central Scientific Instrumentation organization, Chandigarh	27 March 2020	Partial financial support



3: 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.

3.1. Projects Supported Under TDUPW Programme : The following projects were in progress:

i) Technical Skill Training in the field of Assembly of Scientific Instruments and their quality control

The objectives of the project received from Instrument Design Development & Facilities Centre (IDDC), Ambala Cantt., Haryana are promoting adoption of new assembly & quality techniques of instrumentation by women; awareness creation and training

of women in the field of science and its applications; application of science in the area of scientific instrument assembly by women entrepreneurs and application of Quality Measurement Techniques to independently initiate the part - assembly of science instrument for revenue generation and induce entrepreneurial skills in women to set up their own small scale enterprises.

The project envisages to promote adoption of new assembly & quality techniques of instrumentation by training 150 female candidates in six batches (25 women/batch). The women trainees were imparted theoretical knowledge of optical and mechanical components, fabrication technique to manufacture the requisite components, Quality Assurance technique and tools, use of Jigs & Fixtures in assembly and study of Instrument Standards and also practical hands-on training on measuring Instrument, requirement, final assembly of complete instruments, practical test methods etc. The women trainees were taken for industrial visit to related manufacturing firms to acquaint trainees with industry requirement and fabrication technique/process. A total of 100 trainees have been trained so far in 04 batches of 25 candidates each. Training to 50 number trainees is under progress.

Out of 100 girls trained so far, 06 girl candidates (passed out) have already got employment in the industrial units such as M/s V.K. Electronics, Ambala Cantt, M/s Geeta Optical, Ambala Cantt, M/s Sun Tech Engineers, Ambala Cantt, M/s Himanshu Milling Works, Ambala Cantt and one girl is working in a family business. Continuous efforts are being made for employment and establishment of small businesses by the trained girl candidates through interaction with local manufacturers of Scientific Instruments.



Training of girls in progress

ii) Women empowerment and skill development through technological intervention in cooking stove undertaken by Department of Energy, Tezpur University, Napaam, Sonitpur, Assam

Biomass is one of the widely used primary source of thermal energy both for domestic as well as commercial applications. These traditional cook stoves are highly inefficient and create high indoor air pollution. In order to minimize the adverse effects of using traditional cook stove, Department of Energy, Tezpur University with support from DSIR, Govt. of India has undertaken an initiative of empowering women from villages to improve their lifestyle as well as health through adoption of better cooking devices. The initiative also focuses on promoting the entrepreneurship skills of women participants and undertaking the construction of Improved Cook Stove (ICS) as a business model. The objectives of the project are to educate and create awareness among traditional cook stove users regarding the use of improved cook stove (ICS); to provide technical training on construction of improved cook stove to 200 women; to impart hands-on training on construction of improved cook stove to the women/women groups using locally available materials and an improved metallic stove for possible entrepreneurial activity and to facilitate

the women groups to develop a business model to enable them to construct ICS on a commercial scale and sell ICS to prospective buyers and train other women/women groups.

The methodology adopted under the project includes selection of a suitable site/village(s), conduct survey of households, hands-on training and demonstration on construction of ICS and train them to take it up as a business activity. During the current year, the team has selected two villages. Women participants have been selected for 1st phase of training. One of the selected village is Amola Pam Gaon which is located in Tezpur Circle of Sonitpur district, Assam. After completion of the survey of Amolapam village about 54 women participants were selected for training. The training included classroom training to impart the preliminary knowledge on improved cook stoves, their benefits as well as construction. The women participants were then trained to undertake the cook stove construction as an entrepreneurship activity. In this course they have built improved cook stoves at various locations.

iii) 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 sericulture 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 sericulture entrepreneurship among women and to encourage women farmers to adopt sericulture as a source of livelihood and enhance their economic status by adopting cocoon production. Training programmes were conducted at various locations namely i) Gurramvarikandriga, ii) Padmapuram G. D Nellore Mandal, iii) Gajulapalem, iv) Yeduru Gangavarma Mandal, v) Beripalli palamaner Mandaland Kothapallimitta. About 408 women sericulture farmers were trained on advanced sericulture technologies and each participant was given a 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. The women trainees are getting better price for cocoons (about Rs. 400/- per kg). Earlier farmers were harvesting only 5-6 Cacoon crop/ year and getting only Rs. 300/- for one kg of Cacoon. The income of farmers have almost doubled (Rs. 4.0 lakh to Rs.4.6 lakh per acre per year from Rs. 2.1 lakh to 2.2 lakh per acre per year).

iv) Adding Value to Fish: A Potential Livelihood Option for Rural Women of Odisha

The main objective of this project is to build the capacity of fisherwomen of Puri district of Odisha in the preparation of value added products and by products from fish and fish wastes. The project envisages to enhance the entrepreneurial skills of the fisherwomen in managing their business and to assess the consumer inclination towards value added fish products and by-products. Adoption of fish processing as a source of livelihood will improve their economic status. 20 women SHG's from 2 blocks of Puri District, Astaranga and Puri Sadar were selected for implementation of the project. The socioeconomic profile of 203 rural women was assessed with the help of a questionnaire.

The only form of value added fish product available in Odisha is dry fish. Hence, a variety of value added products like prawn pickle, fish pickle, prawn chutney powder, hygienic dry fish, fish papad and prawn sev were developed and the consumer acceptance of these products was studied. Popularization of the products was done through different exhibitions and melas in which ICAR-CIWA participated. 25 training programs (618 rural women) were conducted on and off campus including capacity building programmes, skill training on hygienic preparation of fish value added products and entrepreneurship management training for developing marketing skill to SHGs. 40 Master trainers were selected depending upon their interest and enthusiasm in taking up the production of these products. Two master trainers were selected from each beneficiary SHG group. Hands on training was imparted to these master trainers. The master trainers eventually trained the remaining members in the village at their household level.

Management training of beneficiaries on business enterprise development was also imparted, to educate master trainers about marketing strategy and marketing. Trainings include marketing orientation technique, methods, advertising, promotion (marketing communication) distribution and product management, which will facilitate beneficiaries to set up successful enterprises. For strengthening the market linkages, and meeting the quality standards in the competitive markets, discussions with "Mission Shakti" was conducted. Mission Shakti is Odisha's flagship self-aid organisation launched by government of Odisha for promoting women's talent and endeavor to make them financially independent. They provide support for registration, licensing, getting institutional finance, quality assurance certification (fssai certification) etc.

v) Empowerment of women through silk and cocoon based handicrafts (Wealth from Sericulture Waste)

The main objectives of the project undertaken by the Department of Biosciences and Sericulture, Sri Padmavati Mahila Visvavidyalayam Women's University, Tirupati, Andhra Pradesh are to impart training to women in preparation of handicrafts with cocoons and silk and to promote the women to become entrepreneurs to enhance their economic standards. Five training programs were conducted in various places of Chittoor District and 132 women were trained. The selected women were trained on preparation of cocoon based handicrafts. Duration of each training program was 15 days. As part of training program exposure visits were arranged to Cocoon Handicraft preparation centers. Trainees were motivated to take up the sericulture as an enterprise. After completion of the training program, the trainees were monitored as part of the follow-up programme, for helping them to solve their practical problems in



Training in progress



Handicrafts preparation

taking up the activity. The trainees were guided for marketing of products through personal selling; displaying in shops, displaying in exhibitions etc. A few trainees have started getting getting orders from various places and have started earning.

vi) Skill up-gradation of women potters in fabricating fine terracotta pottery products in Tirunelveli District, Tamilnadu

The project aims to upgrade the existing status of the rural women potters and train them in advanced technology of clay body formation, methods of fabrication, firing techniques by utilizing affordable mechanical devices evolved through a series of experiments. The overall effort is to equip the women potters with adequate technical skill and to help them in availing financial assistance to make them successful entrepreneur in the pottery trade. Diversified red clay pottery products are having very good market not only in local area but also in other states. The upgraded technology in pottery improved the quality of the products eventually adding to the income of women potters. Various products adopted by the women includes decorative items, utensils etc. Training was imparted to 100 women beneficiaries on pottery technologies and fabrication of fine terracotta pottery products. The products were assessed for its quality, usage and health standard. 50 trainees were trained in the upgraded pottery products fabrication technologies. Various new designs of the consumer oriented products were introduced in the market. 15 entrepreneurs units were established for production.

vii) Building Capacity of Tribal Women Farmers in Production of a Farm Based Nutritious Food Product for Tackling Malnutrition, Drudgery Reduction and Income Generation through Enterprise



The main objectives of the project are to build capacity of 742 tribal women farmers so that they can earn a better livelihood through food processing. Cluster of 20 Villages in Naswadi block of Chhota Udepur District of Gujarat were selected based on the survey conducted in the project area. Training was imparted to 268 tribal women from 20 villages, who are members of Women's Farmer Producer Company. In each batche, specified number of trainees (23 and 20 respectively trainees in each batche) were selected and training was imparted to the tribal women. Hands on training was given to all selected women on dal mill operations and processing unit operation.

The trained women are associated with a Farmer Producer Company "Krushak Mahila Khet Utpadak Producer Company Limited". This FPC was registered in the year 2017 under the Company Act (2013) as a Producer Company (CIN.: U01114GJ2017PTC095232). As a part of the business development and sustainability plan for company, they were supported for setting up a pulse mill and a manufacturing plant in Naswadi for Instant Meal Mix (IMM) wherein these trained women are working for raw material supply, production and local marketing of Instant Meal Mix khichdi products. They have also developed and launched the following Instant Meal Mix khichdi products : i) Moong Dal Khichdi, Husk; ii) Moong Dal Khichdi, Green Chilly; iii) Moong Dal Khichdi, Plain and iv) Toor Dal Khichdi, Plain. Other products like Dal, and Spices (Garam Masala, Turmeric and Chilli powder) are also ready for selling in the market. The Instant Meal Mix (IMM) Products have been launched online on Qtrove and Better India Initiative. Further, MoU has also been inked with Amazon Saheli and product will go online in a few days. The product also has been

placed at Arogya Van at Statue of Unity. The products have been exhibited in various exhibitions like Yellow Ribbon NGO Fair-Pune, Statue of Unity, Narmada, Gujarat and Samaj Suraksha Sankul, Vadodara, Gujarat. For market linkage of the IMM product, airports, Prime hotels, tour and travel companies were also approached.

viii) 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 also 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 were covered under the project.

ix) Empowerment of women through bee

keeping and value addition of honey products for income generation in rural areas

The main objectives of the project undertaken by Regional Research Station, Aruppukottai of Tamilnadu Agricultural University (TNAU) were 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.

x) 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 on community land and processing 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.

The crop species selected were hard in nature & the choice depended on the soil & water availability conditions at the project implementation site. Lemon grass acts as soil binders and prevents soil erosion thus improving the fertility of the soil. Moringa is the power house of the nutrients and is an effective strategy to combat malnutrition and anaemia. Moreover, its leaves can also be used as feed stock for grazing and milking animals that helps to improve their overall health and milk yield. Specific attention was paid on the easy and cost effective availability of the ingredients and possibility to grow medicinal plants in their home stead/kitchen garden or community land by



the lower segment of the women/family and economically weaker section of the society.

Training programs were organized in villages Lachera, Sandhawali, Hoshiarpur, Dehchand and Behda Sadad in Dist. Muzaffarnagar (UP) where around 150 rural women & few farmers attended and participated in the training programs conducted on the importance of cultivation of lemongrass & Moringa, preparation of herbal health care products from them & their market demand. The training programs were focused on explaining to the rural women methods of cultivation, processing, post-harvest, their storage, and the income generation from the sale of their produce (leaves). Training were also imparted on their medicinal value, how to prepare value added products such as Tea bags, herbal tea, Lemon grass powder, Basil powder, Herbal Face toner and congestion, Herbal bath scent, Herbal Bath & Compress use, Lemongrass liniment, Herbal mosquito repellent agarbatti & spray, Herbal skin toning cleanser, Lemongrass astringent, Natural Hair oil, Herbal floor cleaner, and Herbal pain balm & their usage in day to day life. Training was also given on the preparation of herbal products from Moringa: Moringa soup, Moringa dried leaves powder, various food recipes prepared from Moringa leaves, pods, flowers, bark, Moringa seed use for water clarification, Moringa leaves as animal feed. The products prepared from Moringa are an effective remedy to combat the problem of malnutrition and anaemia that is quite prevalent in rural areas.

The training programs also focused on encouraging the rural women to adopt medicinal plant cultivation to generate their income-opportunities through creating the market linkages with the buyers identified for the sale of their plant produce. Through

this project, it was also ensured employment security for all sectors of rural families for those who possess land & who are land less.

xi) 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 area of Uttarakhand in groups for capacity building in utilization of wild tree based fruits for self employment, training and technology transfer to village women groups for utilization of pulp and oil for marketable products development and to provide support for small entrepreneurship development for income and employment generation. Training is being imparted to women groups in processing of horticultural and wild fruit resources for marketable health product development with special focus on Chulu, Apple, Plums and Peaches.

3.2. Skill Satellite Centres : The main aim of this component of TDUPW programme 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 skills



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 has been launched and the Department is getting proposals for setting up Skill Satellite Centres for women. The Skill Satellite Centres are expected to help the local women uplift their socio-economic status significantly.

4: Technology Development and Demonstration Programme (TDDP)

The Department provided partial financial support to research, development, design and engineering (RDDE) projects proposed by industry during the 10th & 11th Five Year Plans 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

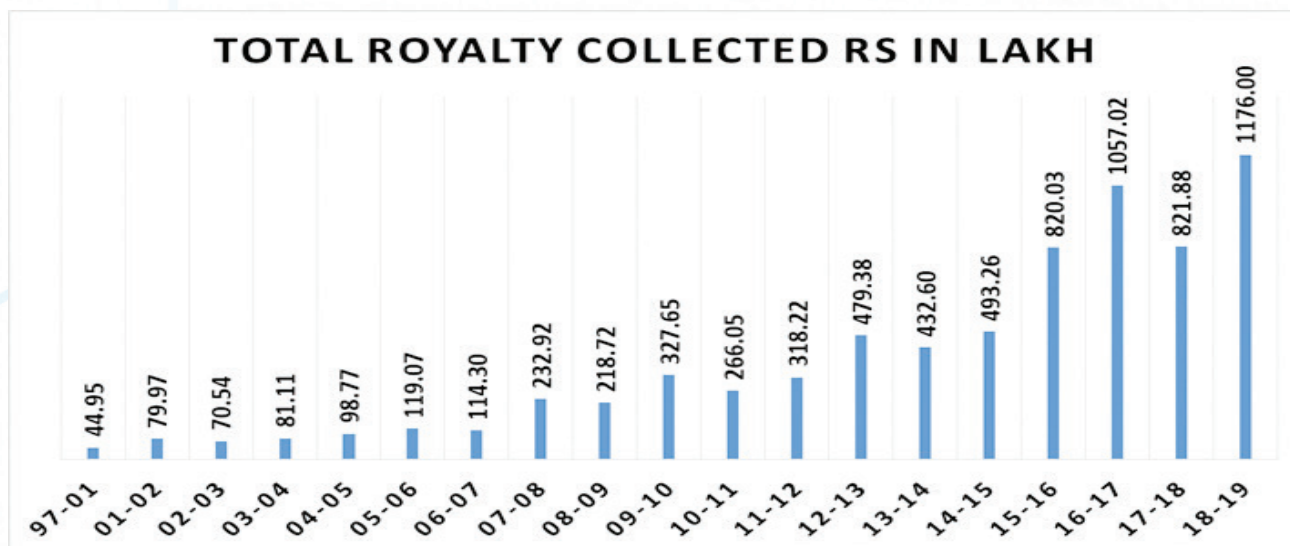
of common interests for group of industries or associations to be undertaken by industrial units, national laboratories, user industries in important focused areas such as Electronics and Communications, Railways, Drugs, Chemicals and Fertilizers etc.

- (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 department has supported 254 R&D projects of Industrial units with a total project cost of Rs. 750.60 crores in which DSIR support is Rs. 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 Rs.72.52 crore during the period 1997-2019.



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

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

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

1. 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 product will be commercialized after successful completion of clinical trials. The project is completed.

2. Fuel Cell Bus development Programme by M/s Tata Motors Ltd, Mumbai.

Hydrogen and electricity are being considered as exchangeable energy carriers as they can be derived from both renewable and fossil. Considering these, globally hydrogen and electricity are being considered widely as candidates as energy carriers. M/s Tata Motors Ltd (TML), Mumbai had taken up project on development and demonstration of Fuel Cell Bus. The project was 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 were fabricated and extensively tested. These

seven buses were put on field trials initially within TML campus and then on public roads on predefined route in Sanand, Ahmedabad by taking necessary approvals. This fleet has cumulatively completed more than 68000 KMs in various combination of laden/unladen with AC On/Off conditions. The development has been completed and TML is ready for commercialization of FC Buses. This technology development project led to demonstration of India's first Hydrogen Fuel Cell Bus. From this project, TML has generated 8 patents and few publications. The project has been completed with a total cost of Rs. 104.8925 Crores and DSIR support of Rs. 24.0 Crore.



Project Review Committee and TML team with the fleet of FC Buses and during ride on Public Road at TML Sanand during the final Review Meeting in June 2019

3. 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 with a success rate of 50%. The company faced difficulties in fabrication of economically viable indigenous MEA and development of Fuel cell stack with adequate life for commercialization. There was uncertainty to achieve the target in near future. Therefore, the project was abandoned as per Clause 13 (c) of the tripartite agreement.

