

IV. PUBLIC SECTOR ENTERPRISES

IV-A. National Research Development Corporation

1. INTRODUCTION

The National Research Development Corporation (NRDC) is a premier organisation, engaged in the development, promotion and commercialisation of the R&D results/technologies emanating from Research Institutes/ Universities/Industries, etc. The Corporation provides comprehensive technology transfer services and acts as a catalyst for transforming innovative research into marketable industrial products. NRDC is a unique organisation because it is the only public enterprise wholly dedicated to transfer of technologies developed at R&D laboratories to industry. During the past five decades of its existence, the Corporation has developed strong links and networks with various R&D organizations, in the country as well as abroad, for transfer of technologies. Its operations cover the entire spectrum of industrial technologies ranging from chemicals to metallurgy, mechanical engineering, electrical engineering, electronics, biotechnology and so on.

The Corporation continued to maintain its good overall performance in all its operations during the year 2008-09. During the year, the Corporation's income from its principal source of revenue i.e. Lumpsum Premia and Royalty on licensing of technologies to industry was Rs. 762.54 lakhs, as compared to Rs 419.29 lakhs in the previous year.

2. PROFIT

A motivated strategic drive coupled with the dedication of officers and staff of the Corporation has resulted in an enhanced Surplus before Tax of Rs. 61.81 lakhs as compared to Rs. 61.58 lakhs in the previous year.

The Gross Income of the Corporation from all sources, including premia and royalties, was Rs. 1220.29 lakhs as compared to Rs. 882.61 lakhs in the previous year. The Department of Public Enterprises has given an 'Excellent' rating to the Corporation for its MoU performance during the previous year.

3. ACHIEVEMENTS

3.1 Processes Assigned

To enlarge its pool of technologies, the Corporation continued its efforts to increase its inflow of technologies from various R&D laboratories, universities etc. As a result, 27 new processes were assigned to the Corporation for commercialisation. Some of the commercially important processes assigned to the Corporation are:

- Double Life Bulb
- Tomato Hybrid – CoTH2



- Synthetic Milk Detection Kit
- Silver Nanoparticles as antidandruff agent
- Brain targeted polymeric nanoparticles for the treatment of Ischemia
- Area specific Mineral Mixture for livestock
- Vacuum Packed Fish Products

3.2 Major Technologies Licensed

The Corporation has signed 26 licence agreements during the period under report. Some of the major technologies licensed by the Corporation during the year were:

- Extraction of Potassium Humate from Lignite
- Evaporative Cooling Apparatus Resistant to vector Breeding
- White pepper processing machine
- 2-in-1 Sunflower thresher-cum-maize sheller

3.3 Prize Award

National Research Development Corporation gives Tax Free Cash Awards for Meritorious Inventions and WIPO Gold Medals for outstanding inventors (fig 90) and women inventors on behalf of World Intellectual Property Organisation (A Geneva Based UN subsystem).

Dr. Satya Nand Sushil and Associates of Vivekananda Parvatiya Krishi Anusandhan Sansthan (ICAR), Almora have been awarded WIPO gold medal for the Best Invention of the year 2008 for the development of 'Eco-friendly novel technology for managing white grubs in north west Himalayas'.

Innovate India

In order to give more visibility and build the brand image of the Corporation, NRDC organizes its annual conference under the theme 'Innovate India'.

During the period under report, the conference was also coupled with interactive I³ Forum (figs 91 and 92). Under interactive I³ Forum, three parallel sessions were conducted which are as follows:

Gender Program: A competition was organized among prospective women entrepreneurs for framing and implementing business plan proposals. The programme was organized to promote and develop entrepreneurial skills and create business opportunities by identifying and selecting appropriate technologies for entrepreneurship in their own areas. A total number of 30 proposals were received from all over India. After following a due-dilligence process through the Experts Committee constituted, 8 proposals were selected for Prize Awards (3 Prizes of Rs. 10,000/- and 5 Consolation Prizes of Rs. 1,000/- each).



Fig. 90: Dr. Balram, Director, IISc. giving away WIPO Gold medal to the Scientist



Fig. 91: I³ Forum: Innovative Technology contest for students of Engineering Colleges



Fig 92: I³ Forum: Gender Programme



Rural Technology: NRDC received 166 proposals on rural and food processing technologies for financial support. After detailed presentation, 10 projects were selected for financial support of Rs 1 lakh each. Some of the projects selected are: 'Palm juice and noongu', 'Nutritional drink from wild crafted amla', 'Dry fish processing', 'Stingless bee culture', 'Airlift checkdam shutter for rural irrigation' etc.

Innovative Technology Contest: NRDC had organized Innovative Technology Contest for students of engineering colleges in association with Centre for Emerging Technologies, Jain University, Bengaluru. The main objective of the competition was to encourage graduate students of engineering colleges to develop innovative technologies that can aid in the solution of scientific and technical challenges.

The final presentation was held on 19th-20th November, 2009 at IISc. Bengaluru. The judges, after evaluating the presentations/demonstrations made by the 20 finalists, unanimously recommended 3 teams for the prize money and 2 teams for consolation prizes.

3.4 Intellectual Property Consultancy and Management

Intellectual property has grown in importance and taken central stage in current times. It has become necessary to protect intellectual property in the face of stiff global competition. At the same time, it is also necessary to invest wisely to enhance the skill and knowledge base of scientists through secured in-house and external professional training programmes, interpreting and analysing the techno-legal and business information contained in IP documents. Realizing the importance, the Corporation continued its drive to create awareness about IP protection and management, developing specialized skills in certain sectors, besides conducting an advanced training programme for drafting of patent applications.

During the period under report, the Corporation has conducted 17 such awareness and training programmes in different parts of the country to

make the scientists IPR savvy. All these programmes have been conducted in collaborative mode either with the State S&T Councils or with Universities. The subject coverage in these programmes was appreciated and regular requests are being received.

The Corporation has reached out to various R&D institutions and universities for educating the scientific fraternity about the importance of protection of IP assets in the knowledge era by delivering lectures of importance on subjects such as 'Patenting System in India', 'Rationale of Protection of Geographical Indications of Goods', 'State-of-the-art searches', 'Trade Marks Registration Procedure', 'IP Valuation and Management', 'Agricultural Biotechnology' and many more. The Corporation organized and delivered 46 lectures in various institutes and remotely located universities.

The Corporation strengthened its patent portfolio by filing 52 patent applications in India in various sectors assisting individual inventors, universities and R&D institutes through its National Patent Protection Scheme and provided financial, technical and legal support to protect innovations and inventions. The success of the Corporation in this area has been noteworthy. Before filing any patent application, the Corporation ensures the novelty aspect of these inventions by conducting on-line international patent searches.

This facility of conducting on-line patent searches is not limited to the patent applications being filed by the Corporation alone. It also provided this service to universities, R&D institutions, different central and state govt. departments to facilitate evaluation of supported research projects involving the creation of intellectual property. During the period under report, 52 state-of-the-art searches have been conducted by the Corporation.

3.5 Promotion of Rural and Household Technology (PRHT)

To demonstrate the utility of rural technologies and ensure their faster dissemination, the Corporation is closely working with NGO's and other developmental agencies in taking appropriate technologies to rural areas. During the year,

various rural based programs were undertaken that have generated employment opportunities in rural areas by way of capacity building through technological intervention.

During the period under report, NRDC supported activities relating to Kewara Cluster development at Berhampur, Palm Candy Project at Thanjavur (TN), Candle making project at Mendhar (J&K), Blue Green Algae project at Tirupathi (AP), Electronics Design upgradation Project at Kundrakudi (TN), Agro processing unit at Almora (Uttarakhand) and others; and provided necessary financial support to NGO's involved in these activities.

3.6 Rural Clusters

Dairy Cluster:

Created awareness on new technologies, processes and methods to improve the quality of dairy products and also to increase the shelf life of milk products/by-products during a conference organized by Indian Dairy Association, Delhi (fig 93) and Agro-Biotech and Dairy Technologies, Pune. More than 70 dairy farmers/sweet makers/representatives of dairy units and experts from various R&D institutes participated in the programme.



Fig 93: Dairy Conference in Progress

Coir Cluster

Processing of Coir to produce several products is an important activity in the southern states namely, Kerala, Karnataka, Tamilnadu and Andhra Pradesh. The coir cluster is an important sector in these regions but unfortunately the clusters are still

practicing traditional technologies and old looms for processing of fibre. The machines and technologies used by these clusters are traditional and old. These clusters are required to be equipped with new technologies and machines so as to improve the productivity and reduce pollution.

The Corporation provided financial support for distribution and installations of four Anupam Looms through Central Coir Research Institute, Alleppey. These looms have a basic advantage of high productivity and higher efficacy as compared to the traditional looms. During the period under report, the Corporation provided 'Anupam Looms' to Coir Clusters in Kerala, Karnataka and other southern states. This is likely to result not only in enhanced productivity and quality but will also lead to the economic development of the region.

Sericulture Cluster:

- 100 sericulture farmers from Kanakpura taluk were trained at CSR&TI, Mysore on advanced methods of silkworm rearing including use of disinfectants, biofertilisers and hygienic practices.
- The Corporation continued to provide support to the Commercial Chawki Rearing Centre and NRDC Farm Field School in the Sericulture Cluster Region of Kanakapura Taluk for the supply of quality silkworm chawki to the sericulture farmers and facilitation of farmer-to-farmer training and demonstration of improved technologies.

3.7 Exhibitions and Publicity

Changes on the marketing scene and fierce global competition are demand upward thrust on sales promotion and publicity.

Trade fairs and exhibitions have some unique advantages over traditional sales promotion techniques. Through display mechanisms, the Corporation creates awareness among visitors, co-participants about various NRDC technologies.

During the year, Corporation participated in 23 exhibitions organised in India and abroad. Some of them are as below:

- Achema-2009, Frankfurt, Germany

- Potential of Rural Technologies, Bhopal
- Dairy-2009, New Delhi
- 13th National Science Expo, Kolkata

3.8 Publications

The Corporation brings out various publications for disseminating information on new technologies. The Corporation publishes various catalogues/ brochures of new technological opportunities, NRDC process lists, and brochure of technologies available for commercialisation.

3.9 Market Surveys

Market survey is a key factor to acquire advantage over competitors in the market. The survey provides important information to identify and analyze the market need, market size and competition. Industry analysis and business research is helpful in decision making for launching new products in the market.

The Corporation carried out market surveys for 3 technologies as follows:

- IBD Kit
- Autograft tissues for burn patients
- DNA Rabies Vaccine

The Corporation is in process of conducting 13 more market surveys.

3.10 Technology and Project Export

The Corporation has been emphasising its endeavour to export Indian technologies and machines to the other countries for the past several years. The Corporation has also initiated steps for widening the network for technical co-operation and export of technologies and in the process; it has tied up with following organisation:

- MoU with Cameroon National Employment Fund, Cameroon
- MoU with Ministry of Trade and Industry, Govt. of the Republic of Sierra Leone
- Council of Scientific and Industrial Research, Ghana
- MoU with M/s Eisenlohr Industries Consulting (EIC), Germany

- MoU signed with Argentina Govt. for mutual cooperation

3.11 Demonstration Centre of Small and Micro Machineries in Ivory Coast

The Corporation has set up a Centre for Demonstration and Promotion of Technologies (CDT) at Abidjan, capital of Ivory Coast, in association with Ivorian De Technologies Tropicale (I2T) with an objective to promote Indian technologies/machineries suitable for small and micro entrepreneurs in West African countries.

Subsequent to official inauguration of CDT on 14th January, 2009, an open day was organised, wherein various organisations were invited to witness the demonstration of machines at the Centre. More than 400 enquiries were received from the entrepreneurs for various machines.

The technologies and machines installed are suitable for small entrepreneurs and are affordable by the common people. It is expected that the sharing of Indian expertise and technologies exhibited at CDT (fig 94) shall benefit the people of Africa.

The Corporation has also propagated the concept of setting up of Demonstration Centres in different African countries and has signed MOAs for setting up Demonstration Centres in the various Ministries/ organisations of countries like Benin, Senegal, Sierra Leone, Nigeria, Egypt, Rwanda, etc for similar projects.



Fig 94: Providing Demonstration at CDT -Vermicelli Machine



3.12 Knowledge Management System (KMS) for Technology Promotion

Knowledge Management System is a self-propelled mechanism for systematic evaluation of technologies, by a team of experts for value addition, to the extent possible, to generate a complete technology package for setting up a commercial plant. Three expert Panels in the area of Biotechnology, Agriculture and Ayurveda and Herbal Technology have been formed. During the period under report, 19 new technologies were discussed in 4 meetings. A one day seminar on Agro-Biotech and Dairy Technologies; and a one to one industry meet on 27th November, 2009, was conducted. Another similar seminar on Agro-Biotech and one to one Meeting with Industries was organised on 22nd December, 2009 in Kolkata.

3.13 Basic Engineering Design Package (BEDP)

The major objective of the activity is to provide value-addition to promising technologies for quick and effective utilisation of the technology. BEDP provides deeper insight and clarity regarding the workability of the technology and also instills confidence amongst the entrepreneurs. The package developed contains design basis, block flow diagram, process description, equipment list, instrument list, PDS and P&ID's. The Corporation has selected 12 technologies for carrying out BEDP during the financial year.

3.14 Technology Development Programme for Priority Projects

Under this programme, the Corporation has been financing R&D institutes/universities for development of important technologies in collaboration with industry. The technology development projects undertaken by the Corporation for further development are either for setting up pilot plant, semi-commercial or demonstration plants, carrying out field trails, toxicological data generation, etc. The progress in respect of major technology development projects is given below:

- **Bio-assay Efficacy Test for the Process 'Plant Based Larvicide'** - The

Corporation obtained the technology for 'Plant Based Larvicide' from Indian Agriculture Research Institute (IARI), New Delhi. The product appears to have market both in India and abroad. One private company in UK has carried out the evaluation of the product at London School of Hygiene and Tropical Medicine, UK which has rated the product as excellent. NRDC has assigned a project for evaluating the efficacy of the product to National Institute of Communicable Diseases, Delhi. The project is under progress.

- **Multi Location Field Efficacy of Biopesticidal Pusa Nemagel against insect pests and its effect on crop health and nematode fauna** - Nemagel is a composite formulation of heat tolerant entamopathogenic nematodes (EPN) and super-absorbent hydrogel developed by IARI, New Delhi. Nemagel is used as a biopesticide and covers a wide range of pests including termite. The process for multiplication of nematodes developed at IARI is not suitable for commercial scale production. Moreover, multicentric field efficacy trials for nemagel have not been carried out for evaluating the efficacy of the product. The Corporation is supporting IARI for developing an in-vitro production technique and for carrying out field trials in different locations. The work is in progress.
- **Field Trial Evaluation of Bio-release Micro-Nutrient Zinc Fertilizer** - The technology for the production of bio-release micro-nutrient zinc fertilizer has been developed by Raman Centre for Applied and Interdisciplinary Sciences, Kolkata and the technology has been licensed to M/s Showbhagya Amino Inputs Pvt. Ltd., Hyderabad. Since the data on multi-centric field efficacy of this product is not available, the licensee requested the Corporation for sponsoring a project for generation of multi-centric field efficacy data so that they could include the product under Fertilizer Control Order (FCO) and market the product. The work is in progress.

- **Generating Field Efficacy Data on Super Absorbent Hydrogel** – A new absorbent hydrogel that has been developed, remains stable under high temperature conditions (50-60°C) and possesses water absorption potential upto 350 times. It also remains stable in soil for long period. It is prepared through cross-linking of monomer and has huge potential for use in agriculture as water economy aid in dry-land agriculture. Since the technology has a huge potential, the Corporation has partially supported the project and has requested IARI for generating the field efficacy data. The project is in progress.

3.15 Program for North-Eastern States

In order to accelerate the growth of industrialization in North-Eastern States and develop entrepreneurship in the region, the Corporation has carried out the following programs:

- Organised a 6 weeks EDP program in Roing, Arunachal Pradesh in food processing. The training was attended by 25 participants out of whom 24 were women. One more such program is likely to be taken up in Mizoram.
- A 6 week EDP in Banana fibre production and processing is in progress at Jorhat, Assam.

3.16 Women Entrepreneurship Development Program (WEDP)

- Created awareness on technologies appropriate for women to start entrepreneurship during a meeting with students at Maharani Lakshmi Ammani College for Women and Apparel Training and Designing Center, Bengaluru.
- Dry Fish Complex - The Corporation has also taken-up a consultancy project for setting-up a dry fish complex of capacity 500 Kg/batch using solar energy. The project is intended to provide infrastructure facilities and machinery support to self-help

groups of fisherwomen in Sakthikulangara, Kerala.

3.17. Initiatives by NRDC in Madhya Pradesh

Some initiatives as mentioned below, have been taken up in association with Department of Women and Child Development, Madhya Pradesh to suggest activities taken up for improving the economic condition of BPL families through Anganwadi Centres:

- Digital Tracking System: A new monitoring mechanism system called Digital Tracking System & Audit Trail Based Management System (DAT) is being developed to monitor the number of children and women receiving supplementary nutrition, pre-school education and immunization as well as information relating to the nutritional status of children. Development work is in progress.
- Production of Educational Toys and Kits: Training and capacity building of women members, as per International Toy Safety standards. This activity is to be undertaken in different pockets of MP including tribal belts. The project involves Training, Upgradation of technology and Capacity building in terms of toy safety standards, good manufacturing practices etc. Mahila Vitta Evam Vikas Nigam (MVVN), Madhya Pradesh is funding the project for training of 300 tribal women in District Dhar. The project is under implementation.
- Constructing Model Anganwadi Centres: The Corporation has also signed a tripartite agreement with Department of Women and Child Welfare, M.P. and UNICEF for constructing two model Anganwadi Centres in M.P. The Project is in Progress.
- Besides, the Corporation is an advanced stage of negotiation for undertaking various other projects in M.P. like:
- Nutritional Programmes in collaboration with DBT for tackling the problem of malnutrition in M.P.



- Productivity employment in BPL families in M.P. through funding from Ministry of Rural Development, Govt. of India.

3.18 Human Resources

The real asset of any company is its human resource. The total manpower of the Corporation as on 30th November, 2009 was 87 (Group A-27, Group B-34, Group C-20 and Group D-6). The employee-management relationship has been cordial. During the period under report, there were no employees receiving remuneration of or in excess of Rs. 24 lakhs per annum or Rs. 2,00,000 per month, requiring disclosure as per the Provisions of Section 217(2A) read with the Companies (Particulars of Employees) Rules 1975.

3.19 Human Resource Development

Employees training and development at all levels was given due priority by the Corporation to increase effectiveness. Special emphasis was given to organisation building and shaping of right attitudes, team building and work culture, besides preparing employees to understand trends in fast-changing technology and switching over to latest technology for achieving higher results in productivity and profitability. During the year 20 executives of the Corporation were deputed to various training programmes to further develop their skills in various areas of management, communication, vigilance and advancement of technology.

3.20 Technology Absorption, Adaptation and Innovation

While a major objective of the Corporation is the development and commercialisation of indigenous technology, the Corporation itself does not carry out any R&D. However, it promotes and finances R&D on a selective basis in both laboratories and industry. Hence the requirement to furnish information in respect of Technology Absorption, Adaptation and Innovation under Rule 2(B) of Companies (Disclosure of Particulars in the Report of Board of Directors) Rules, 1988, is not applicable to the Corporation.

3.21 Implementation of Official Language

The Corporation continued to make efforts to fulfill the targets prescribed by Govt. of India in the Official Language Act and Rules framed therein with regard to increase the use of Hindi Rajbhasha in office during the year. Employees were motivated to use their working knowledge of Hindi in day-to-day official work. All the Standard Forms, Files, etc are bilingual. Significant progress has been made in the field of correspondence, noting and drafting in Hindi. All Hindi letters are being replied in Hindi only. The Annual Report of the Corporation is being published in diglot form in both Hindi and English since 1986-87. The Corporation also publishes a popular Science and Technology monthly magazine in Hindi, entitled 'Awishkar'. To enrich the Hindi vocabulary of the employees of the Corporation as well as visitors, an English word with its Hindi meaning is written daily on a writing board as 'Today's word' at the reception of the Corporation.