

Science and Technology Scheme

Introduction

The Research and Development activities of the Board are carried out through the twin research institutes; the Central Coir Research Institute, Kalavoor and Central Institute of Coir Technology, Bangalore. The Central Coir Research Institute, Alleppey was established in 1959 and the Central Institute of Coir Technology, Bangalore in 1980. Whereas CCRI, Kalavoor concentrates on research concerning both the white and brown fibre sectors, CICT, Bangalore confines to the brown fibre sector. Identification of new user areas for utilisation of coir and coir waste (coir pith), modernisation of production infrastructure for elimination of drudgery in manual operation thereby attaining higher productivity and improvement in quality are integral parts of the research efforts.

Extension of the fruit of the research at the laboratory level for application at the field level and extension of testing and service facility are two main areas of activity under the head. Collaborative research with research organisations, institutes, universities having proven records on varied applications of coir, development of new products, new machinery, product diversification, development of environment friendly technologies, technology transfer, incubation, testing and service facilities are the areas which are given priority consideration.

The Plan programmes under the Science and Technology in Coir Industry is being undertaken through the following Plan Sub-heads:

- Modernisation of Production Processes
- Development of machinery and equipments
- Product Development and Diversification
- Development of Environment friendly technologies
- Technology transfer, Incubation, Testing and Service Facilities

I. MODERNISATION OF PRODUCTION PROCESSES

Objectives of the Sub-scheme

- ** Modernisation of
 - extraction process of coir fibre by enhancing productivity and upgrading quality without drudgery.
 - production and extraction process through bio-technology
- ** Development of
 - appropriate technologies for improving the productivity and quality in spinning.
 - innovative technologies in weaving of coir products by improvisation of the production processes and equipments.
 - modern technologies for finishing operations of coir products
 - technologies for wet processing of coir using natural dyes.

Background

Most of the technologies used in the coir industry are either very old of yester years. Consequently, the amount of drudgery is more and the industry in some of its production sectors lacks the working environment congenial for retention of a dedicated work force. The productivity and the quality of the products are not up to the mark either. Continued research activities will result in increasing the acceptance of the coir products both by domestic and export markets. To achieve this objective, the following programmes are chalked out:

- Quality improvement of coir fibre by bio-technological intervention.
- Extraction of Lignosulphonates and characterization for end uses.
- Enhancement of longevity of coir by chemical/enzymatic method.
- Coir Pith Organic Manure Production.
- Production of Biogas from Coir Pith
- Enzymatic softening and brightening of brown coir fibres.

Review of the Sub-Scheme

Through the Research efforts of the Board, the technology of making Coir Pith Organic Manure could be improved. The period of composting of coirpith could be reduced from 30 to 21 days. A novel technique for "in situ" composting of coir pith hillocks was also developed and demonstrated in coir producing areas. The Board has been successfully running the Pilot Scale Laboratory for producing "Coirret" and "Pithplus" for the last 12 years and catering to the demands of the coir industry.

The Coirret is being continuously being produced in the Pilot Scale Laboratory and the farmers are making use of it for treatment of green husk fibre for improving the quality to the level of retted fibre.

A collaborative project was initiated with the Indian Association for the Cultivation of Science (IACS), Kolkata for improving the quality of the dry husk brown fibre. The IACS could develop an enzymatic formulation to improve the quality of brown husk fibre so as to make it brighter and softer for carrying out spinning. This is being popularised in the industry.

From 1st May, 2006, the Board has commenced demonstration and production of Coir Pith Organic Manure in its Pilot Scale Laboratory.

Need for continuation

Coir is an age old traditional industry employing outmoded technology of production and processing. Efforts need to be continued towards refinement of the production/ processing technologies through new technology intervention. Situation calls for continuing efforts towards achieving the set goals of elimination of drudgery, improving productivity and quality.

II. DEVELOPMENT OF MACHINERY AND EQUIPMENTS

Objectives of the sub-scheme

- Elimination of drudgery in operations
- Improvement in productivity and quality
- Achieving cost effectiveness

Background

Most of the existing machineries employed for coir production in coir sector are obsolete with low productivity and involves drudgery in operation. Low productivity, lack of influence of new technology, passivity in adopting rapid mechanization, economic backwardness to modernize the sector etc. are some of the limitations affecting growth prospects of coir industry. Modernisation essentially involves mechanization and application of modern processes, which necessitates developing appropriate machinery for processing of coir fibre into yarn and products with enhanced productivity. It is proposed to achieve these through the following programmes:

- Design and fabrication of a spinning machine with better quality and better output.
- Use of wind energy for running the spinning ratts and Anupam Loom
- Development of a chopper-cum-grinder for pulverization of tender coconut husk for effective utilization for various end uses.
- Indigenisation of stitched Erosion Control Blanket Machine.
- Development of Wrapping Machine/ needled felt machine/mobile defibering machine
- Indigenisation of drainage pipe filter making machine.

Review of the Sub-Scheme

Under the programme, a Mobile Fibre Extraction Unit was fabricated and a loomless weaving technique was developed. Another achievement was the development of a fine coir yarn spinning machine by blending with sisal, jute, banana fibre and screw pine upto 1300m/Kg runnage. A mild steel metallic handloom named as "Anugraha" for weaving coir geotextiles was designed, fabricated and put to trial. The technology has been conferred NRDC Award as a meritorious Invention for the year. Another milestone in the R & D efforts of the Board was the designing and fabrication of a versatile loom named as "Anupam" for weaving coir products. This is a pneumatic loom and a variety of coir products can be manufactured on the loom.

A small willowing machine attached with the traditional motorized ratt was developed and both machines can be operated with a single motor of quarter HP with a single belt.

Need for Continuation

The development of more sophisticated machineries and perfecting the existing ones will result in enhanced productivity and better returns. Consequent elimination of physical strain and better incomes would attract younger generation to coir activities. Improvement of the existing equipments and technology would result in improving the product appeal.

III. PRODUCT DEVELOPMENT AND DIVERSIFICATION

Objectives of the Sub-Scheme

** To develop

- Innovative products out of coir fibre/ coir fibre blended with other natural fibres.
- Standards for coir geo-textiles for various end use application
- New areas of application for coir products like coir geo-textiles
- New technologies for utilisation of coir pith
- Technology for use of coir in the automobile industry
- Innovative designs suitable for mats, matting and carpets

** To establish Design Clinics in the major coir clusters.

Background

Future of coir industry depends on product development and diversification, especially in the non-traditional areas. Development of substitutes for wood, synthetic products, geo-synthetics, products of coir fibre blended with other natural fibres etc. would open up new vistas for the coir industry. Development of new application areas and new products are of vital importance for full utilization of the potential of the industry. The programmes envisaged are: -

** Development of

- Blended coir yarn and blended coir products.
- Kaleens by softening of coir fibre.
- Coir nettings and other products for vanilla cultivation.
- Rubberized coir mattresses covers with modified PVC sheet
- Coated coir fibre for fire retardancy, water-oil repellency and longevity.
- Coir polymer composite board for specific end use for kitchen, drawing room and bathroom etc.
- High tech coir fibres by nanotechnology.
- Establishment of a Pilot Plant for extraction of Natural Dyes.
- Finalisation of specifications for coir geo-textiles/coir pith.
- Finalisation of specifications for coir polymer composite boards.
- Production of coir needled felt for experiments and for the industry on service charge basis.
- Geo drainage filters for areas lying below sea level.
- Paper for coir bit fibres.
- Binderless Coir polymer Composite Boards.

Review of the Sub-Scheme

Development of fine coir yarn by blending with sisal, jute, banana fibre and screw pine, coir camouflage material for defence purposes, "Cocolawn", a readymade lawn, various products from coir polymer composite boards were a few achievements under this head.

Need for Continuation

Diversified use of coir would increase the utilization of coconut husk for fibre extraction in all coir producing States providing employment to rural youths which would prevent migration from rural areas to urban areas. The use of coir products for environment friendly activities will result in environment protection. Development of new products and identification of new areas for application of coir will result in the generation of more income from a waste material i.e. coconut husk.

IV. DEVELOPMENT OF ENVIRONMENT FRIENDLY TECHNOLOGIES

Objectives of the Sub-Scheme

** To develop

- Appropriate technologies in the abatement of pollution in the production processes.
- A cost effective eco-friendly effluent treatment technology for treating the effluents arising out of wet processing in coir industry.
- Technology for disposal of sludge in the ETPs.
- New products like wood substitutes out of coir alone or by blending with other natural fibres.

** To standardise the coir composite products for different applications.

** To undertake studies in estimation of carbon trade by using coir products like composites, geo-textiles etc.

Background

The world is becoming more and more environment conscious and the need for protection of water, air and other natural resources for the posterity is being realized by the manufacturers' community as a whole. Even though coir and its products are eco-friendly being bio-degradable, research/ studies have to be carried out to minimize the environmental hazards caused by retting and wet processing. The following programmes are envisaged.

- Setting up of an Eco Lab to analyse the effluents of bleaching/dyeing/ retting etc. and to develop appropriate techniques to combat the pollution.
- Adoption of Ecomark for coir /coir composite products
- Development of corrugated roofing sheets from coir non-woven felt/woven mat in association with IPIRTI
- Inclusion of coir villages in the itinerary of domestic and foreign tourists
- Strengthening of the CICT as a Centre of Excellence and development of environment friendly coir based/composite products and machinery.
- Exploration of the possibilities of varied applications of coir geo-textiles, coir composite boards, coir pith, organic compounds extracted from coir etc. in association with various R & D Institutes, Universities etc.
- Exploration of the possibilities of Carbon Trade by using eco-friendly coir/pith/composite products as wood-substitutes in the back-ground of Kyoto Protocol.

Review of the Sub-Scheme

Even though this sub-scheme is proposed newly for implementation during the XIth Plan, the Board had been carrying out research and development programmes for development of technologies for minimization of environmental hazards caused by coir industry.

Development of a technology for conversion of coir pith, the problematic waste material which was generated in the defibering process to organic manure was a major achievement of the Board towards environment protection through proper management and economic utilisation of waste material. Similarly, the development of "coirret" for speedier retting outside backwaters and the invention of techniques for neutralization of ret-liquor, generated in the retting process, were widely acknowledged achievements. Recently, the Board has been able to develop a cost effective emulsion for treatment of coir fibre before spinning which makes the job easier for the workers and eliminate the pollution caused by the production process.

The Board has also been instrumental in the development of "coirply", a wood substitute, coir geo-textiles, the material used for protection of embankments and soil erosion control. These two products have immense potential for preservation of soil and natural resources, especially in hilly areas.

Need for Continuation

Development of a nature friendly technology will enhance the acceptability of the product before the discerning customers both in the domestic and external market who are concerned about protecting the environment. Development of environment friendly technologies will better the marketing prospects of coir and in turn will improve the working and living conditions of the workers.

V. TECHNOLOGY TRANSFER, INCUBATION, TESTING AND SERVICE FACILITIES

Objectives of the Sub-scheme

- To transfer the technologies developed by the research institutes to the trade against specific requests and under agreement of technology transfer by realising appropriate fees.
- To establish technology incubation centers in one or many places for training the entrepreneurs in the new technologies developed and transferred.
- To create a tool room for maintenance of and repair of the looms and equipments established in different coir production centers.
- To establish a laboratory for testing of coir composite materials and to extend service facilities to the trade.

- To demonstrate the user friendly technologies developed by CCRI/CICT in the major coir yarn production centers for the benefit of the workers/entrepreneurs.
- To extend technical assistance for interventions in clusters identified by the Board in different coir producing States.
- To undertake testing of coir and coir products, dyed samples, coir pith etc. at the laboratories of CCRI, CICT and Regional Officers and issue test certificates.
- To extend service facilities to the trade in dyeing of coir yarn/fibre at the dye house established at the CCRI.

Background

The result of the research activities has to be disseminated to the industry and trade and diversified uses of coir and coir products have to be popularized through demonstration in the field for increasing the demand of coir. There is also a need of services like testing and certification facilities required by the industry. It is proposed to achieve the objectives through the programmes detailed below:

- Digitalisation of National Coir Information Centre and the information centre at the CICT to create and operate a digital library capable of providing digital information from text, images, electronics media etc.
- Procurement of NABL accreditation to the physical and pith testing laboratory of CICT.
- Transfer of Technology developed by Coir Board to the industry and extension service.
- Establishment of Technology Incubation Centers.
- Establishment of tool rooms in different localities
- Establishment of laboratories for testing of coir composite materials, geo-textiles and coir pith.
- To extend the facilities available in the Institute to the trade on realization of service charges in the areas listed below:
 - Bleaching, dyeing and drying of coir yarn/fibre and shade matching by extending the facilities available in the modern dye house of CCRI.
 - Testing of coir and coir products
 - Testing of NPK content of composted coir pith, lignin content, salinity and electrical conductivity and phytosanitary tests.
 - Evaluation of dye-stuffs suitable for coir.
 - Evolving novel designs and sale of copies of design cards using CAD system.
 - Evolving standard specifications for different coir products.
 - Upgradation of quality of coir products through field extension programmes an improvement of the skills of artisans.
 - Field demonstration of PITHPLUS in composting of coir pith for elimination of coir pith hill locks in the fibre extraction centers in all coir producing States.
 - Field demonstration of COIRRET in retting of husks and converting mechanically extracted fibre into the quality of retted fibre.
 - Field demonstration of Coir Bhoovastra in soil bio-engineering applications in collaboration with various institutions.
 - Technical guidance in setting up coir based industrial units.
 - Extension of facilities for conversion of coir fibre into coir needled felt.
 - Organization of Seminars/Workshops for popularization of various technologies and products developed by Coir Board.
 - Providing certification facility under ASTM/Australian Quarantine and Inspection Services etc.
 - Technology transfer for setting up Effluent Treatment Plants and Pollution abatement.

Review of the Scheme

Laboratories have been established at the Central Coir Research Institute for testing coir pith as per the specifications of AQUIS, RHP etc. and testing coir geo-textiles as per ASTM Standards. It has been able to develop a water repellent finish for coir matting and impart fire retardant finish to the coir products. Natural dyes were extracted from fruit, leaves, stems of plants etc. for application on coir products.

Need for Continuation

Proper incubation/extension of the results of the research efforts to the field level would generate enthusiasm among entrepreneurs on the new processes and prompt them to adopt the technologies. The industry will be equipped with all infrastructure and technological development to face any threat or competition. The testing requirements of customers of various coir products can be met efficiently by establishing sufficiently equipped laboratories.

Financial Outlay (Rs. in crores)

Sub-head	Year					Total
	2007-08	2008-09	2009-10	2010-11	2011-12	
Modernisation of Production Processes	1.50	2.50	2.00	2.00	2.00	10.00
Development of machinery and equipments	1.00	2.00	2.00	2.00	2.00	9.00
Product Development and Diversification	2.00	2.50	2.00	2.00	2.00	10.50
Development of Environment friendly technologies	2.00	3.00	2.50	2.50	2.50	12.50
Technology transfer, Incubation, Testing and Service Facilities	1.50	2.00	1.50	1.50	1.50	8.00
Total	8.00	12.00	10.00	10.00	10.00	50.00

Evaluation of Science & Technology Schemes of the Coir Board

As desired by the Ministry of Micro, Small and Medium Enterprises, Coir Board has constituted a team of experts consisting of the following for undertaking an evaluation of the Science & Technology programmes undertaken during the Xth Five Year Plan.

1. Prof. G V Rao, Chairman (formerly Professor & Head, Department of Civil Engineering, Indian Institute of Technology, Delhi (IIT, Delhi), Chief Consultant, Sai Master Geo-environmental Services Pvt. Ltd., Hyderabad)
2. Dr. C Kondaiah, Principal Director, National Institute of Small and Medium Enterprises, Hyderabad
3. Dr. S Ghosal, Dean and Head, National Institute of Design, Bangalore
4. Prof. R Gnanamoorthy, Professor, Department of Mechanical Engineering, IIT, Chennai
5. Dr. K Rajagopal, Professor & Head, Dept. of Civil Engineering, IIT, Chennai
6. Prof. I S Bright Singh, Director, School of Environmental Studies, Cochin University of Science and Technology, Kochi

The study team undertook an evaluation of the S&T programme on the basis of a prescribed Terms of Reference. In the evaluation report the team of experts have identified the major achievements and remarked that they were very significant and highly commendable. The research findings of the projects and most of the technologies developed by the Institutes have been transferred to the trade. It is further revealed that the research findings under Product Development and Diversification were the outcome of an appropriate blend of basic and applied research with the clear understanding of the requirements in real life situation both at environmental and industrial fronts. The institutes the report credits were successful in developing machineries for spinning and weaving all of which have been conceptualised taking into consideration the drudgery of the coir workers. All these modernisation efforts have made life of the working class easier thereby attracting more women to the coir sector. The team further remarked that testing and service facility established stands out as a role model of its kind. The team of experts further observed that the laboratory facilities developed by the research institutes were excellent with some of them having approval/ accreditation by the well known organisations such as ASTM, Australian Quarantine Inspection Service (AQIS) and BIS. The two research organisations of the Coir Board, had been undertaking industry/ trade specific research programmes and the research outcomes are beneficial to the coir industry and trade in India and thus accomplishing the objectives for which the research institutes have been established. The study team recommended setting up of an Eco Laboratory and National Coir Information Centre during the XIth Five Year Plan. The inadequacy of the qualified research personnel to cope up with the increasing responsibilities in the twin Research Institutes of the Coir Board is an important observation of the study team in the report. There are about seven scientific personnel currently working in both the Institutes. Considering the future plans and diversification of activities there is an urgent need to increase qualified scientific staff in both the Institutes to effectively utilise the infrastructure available there.

Expenditure during Xth Plan

During the Xth plan period an amount of Rs.24.53 crores was incurred towards implementation of various programmes under this scheme. The year wise break up of expenditure is indicated below.

Year	Expenditure in Rs. crores
2002-2003	2.37
2003-2004	5.53
2004-2005	5.62
2005-2006	5.50
2006-2007	5.51
Total	24.53

Approval required

Approval of SFC/EFC is solicited for continuing the S&T Programmes with the sub-schemes I to V enlisted herein during the XIth Five Year Plan period at an overall outlay of Rs.50 crores.