COLLABORATIVE PROJECTS –PAST/PRESENT/FUTURE

Sl no	Name of the Project	Collaborative Agency	Boar-d's Share (Rs.)	Dur-ation	Objectives	Result	Remarks
1	To study the physical characteris-tics of coir fibre	Technological Laboratory of the Indian Central Cotton Committee, Bombay		1955 to 1957	To study the characteristics of coir.	Assessed the proportions of different length fibres in coir fibre, torsional rigidity and comparative study of tensile strength of coir, sisal and aloe fibres and formulated standard specification for 4 different grades of coir fibre	
2	To study the chemical aspects of coir and find new user areas	Department of Chemical Technology, University of Bombay		1957 to 1961	To explore the technology of dyeing and chemical analysis of coir	The study involved morphology of the fibre, variation in linear density, extraction of lignin in coir waste, coconut pith and coir fibres, systematic investigation on application of various classes of dyes, utilisation of coir waste / coconut pith as fillers in production of moulding composition using phenol formaldehyde in the production of 'COIROLITE'	Developed "COIROLITE" from coir pith and PF resin.
3	Application of Bituminised matting	Vaiga canal Authority, Madurai		1960 .	To find out the diversified use of matting.	Bituminised coir matting by treatment with bitumen and its application as canal lining with Vaiga canal Authority, Madurai.	
4	Design and develop a prototype pedal operated coir spinning machine	Small Industries service Institute, Ollur.		1961	To design and fabricate a prototype improved coir spinning machine.	Studied the pedal operated coir spinning machine with CCRI and designed and fabricated a prototype incorporating some improvements in the design which increased the output and lessened the strain on the spinner operating pedal but produced a somewhat coarser yarn.	

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5	Application of coir mat tings for sand stowing purposes.	Collieries of Tata Iron and Steel Works		1961	To use coir matting in sand stowing operation.	The coir nettings was used for sand stowing purposes in Coal mines of Tata Iron and Steel Works and the preliminary experiments showed encouraging results. Extensive trials were conducted to study the economics of the process and reported that coir matting could be reused for sand stowing operations for about 40 times.	
6	Use of coir beltings as conveyors	Tata Iron and Steel Company		1962	To explore the possibilities of using coir beltings as conveyors	The Tata Iron & Steel Company used coir beltings as conveyors for fine ores and they reported that the experimental investigations in the use of coir belting as conveyors of "Fines" in Iron Mines did not suit their purpose.	Coir belting is not suitable to use as conveyors for iron ores.
7	Utilisation of mats as dumping mats	Defence Research Laboratory		1962	To study the use of mats as dumping mats	Sample mats were supplied to Defence Research Laboratory who studied its use as dumping mats as shock absorbing per cushion heads	
8	Utilisation of coir fibre in Axle box packing			1962	To Investigate the possibilities of utilising coir fibres in axle box packing	Investigated the possibilities of utilising retted fibre mattress fibre and decorticated fibre with cotton waste in axle box packing.	
9	To fabricate treadle operated spinning machine	Govt. of India Production Centre, Ettumanoor		1963	To fabricate a motorised treadle operated spinning machine of better output	Fabricated two modified treadle operated spinning machines and put into intensive performance run at CCRI. The machine gave an average output of 9.0 lb per day with a maximum output of 13.0 lb of coir yarn from 8 hour day.	

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10	To design and fabricated an improved coir spinning machine	Alleppey cycle Assembly Workers Industrial Co-operative Society		1964	To fabricate an improved coir spinning machine	An improved coir spinning machine was fabricated by incorporating a friction gear wheel device and the trials proved to be unsatisfactory.	
11	To Design and fabricate a fibre extraction machine	Small Industries Service Institute, Alleppey		1965	To design and fabricate a new prototype fibre extraction machine	Studied the models of coir fibre extraction machines available in the industry and fabricated a prototype.	
12	To design and fabricate equipments for testing rubberised coir	Extension centre for General Engineering, Alleppey		1967	To design and fabricate instruments for testing rubberised coir.	The physical characteristics of rubberised coir such as hardness, resistance to flexing and load was assessed by instruments designed and fabricated in association with Extension Centre for General Engineering. Indentation hardness index, flex testing machine and compression sets were fabricated	
13	To design and fabricate a prototype slivering machine	Govt. of India production centre, Ettumanoor.		1968	To design and fabricate a slivery machine of improved performance.	With the new slivering machine, produced 48 kg of silvers of per hour and nearly obtained slivers uniform density of 25 to 30 g per metre	

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17	To design and fabricate an automatic coir spinning machine	Govt. of India Production Centre, Ettumanoor.		1971	To design and fabricate an automatic spinning machine	Designed and fabricated an automatic coir spinning machine with arrangements for winding the yarn separately from the twisting and doubling mechanism which improved the performance of the machine for production of yarns of different twist.	
18	Theoretical aspects of Retting	Indian Institute of Science, Bangalore		3 years 1971	1) Determine the period required for retting of green husks before and after crushing. 2) To explore the possibility of aerating the retting environment with a new to facilitate the process. 3) To study the effect of periodic flushing of the ret liquor on the quality of the fibre and the time taken for completion of the process.	1) The studies revealed that crushing of green coconut husks prior to steeping considerably reduced the time taken for completion of the retting process compared to the uncrushed husks. The degradation of poly phenols and pectin was much faster when the husks were crushed and uncrushed. 2) Aeration of the retting environment did not hasten the retting process. However the colour of the fibre was superior when aerated. 3) Weekly or fortnightly flushing resulted in shortening the time taken for completion of retting of uncrushed husks. Flushing did not help in reducing the time further for crushed husks. The colour of the fibre derived from periodically flushed husks was superior and comparable to the best shades of commercial fibres whereas the fibre from the stagnant vats was far inferior in colour.	

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14	To Investigate the fundamental aspects of dyeing of coir fibre	Department of Chemical Technology, University Department of Chemical Technology, Bombay		1969 3 Years	To study the fundamental aspects of dyeing including the mechanism of fixation of dyestuffs on coir fibre.	Conducted studies in the kinetics of dyeing coir fibre with two selected dyes belonging to acid, basic and direct classes. A study of the cross section of coir fibre dyed with typical dyes from acid, basic and direct classes showed that penetration of dye into the coir fibre was unsatisfactory and dye was present more or less in outer region only.	
15	To design and fabricate a cops and cone winding machine	Govt. of India Production Centre, Ettumanoor		1969	To prepare machine drawings of the imported cops winding machine and cone winding machine	Fabricated prototypes.	
16	Use of coir matting for sand stowing in coal mines	Central Mining Research Station, Dhanbad.		1969 3 years	To assess the advantages of coir matting for sand stowing material in coal mines.	Investigated the application of coir matting for sand stowing in coal mines and on comparison with the strength to rupture of the different barricading materials showed that coir matting was 3.2 times stronger than brattice cloth, 3.6 times stronger than double layer hessian cloth, 5 times stronger than single layer hessian cloth and 8 times stronger than bamboo mattings and strength to rupture of coir matting was least affected by water. The field test revealed that coir mattings had definite advantages over the conventional barricading materials for stowing operation and over all saving of 64% in the cost of the coir matting barricading material in relation to bamboo mats.	

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19	Utilisation of coir mattings / pads in road construction and erosion control on hill slides and railway embankments.	Central Road Research Institute, New Delhi.		1971 3 Years	Utilisation of coir matting/nettings in areas. 1) As an underlay for asphaltic concrete. 2) As an underlay for asphalt surfacing. 3) As an reinforcing layer for flexible overlays on cracked coconut concrete slabs and	1) It was reported that coir nettings are a very effective means of checking erosion and establishing vegetation on denuded slopes. Field demonstration were conducted in 1972 at hill slide slopes of Hindustan – Tibet National Highway – down hill near Idgah grounds in Simla covering an area of 278.7 sq. metre and Railway embankment slopes of near Bridge No. 154 Pathankot to Jammu Railway Link 70 km from Pathankot covering an area of 1200 Sq.mtrs using ½ inch mesh coir nettings.	
20	Use of coir nettings as container of stones	Department of Civil Engineering, Punjab University .		1972	Protection of soil slopes against scour using stones enclosed in coir nets.	Use of coir nettings of 1 cm^2 mesh indicated that coir is tough and hard to avoid the cuttings on contact with the sharp edges of stones. The coir nets have extreme flexibility to allow the settlements of the coir-stone bed assume the profile of the protected bed with the advantage of causing the stones to act in unison, thereby preclude the possibility of the stones being washed away even at high velocity flows and can be used for River training works such as groins and spurs with earthen embankment and covered with coir stone bed.	

Sl no	Name of the Project	Collaborative Agency	Boar-d's Share (Rs.)	Dur-ation	Objectives	Result	Remarks
21	Developme nt of roofing / panelling boards from coir pith	CBRI	1973	1 Year	To use coir as a reinforcing material to develop composite boards from coir fibre and allied materials for roofing / panelling	Coir fibre / coconut pith was used as a reinforcing material and developed composite boards from coir fibre / rice straw and cement, from coir fibre/coconut pith/ cement and corrugated sheets from coir file and cement. The panels were found suitable for partitions and walling in building constructions. The physical properties such as bulk density, texture, moisture absorption , bending strength, thermal insulations, thermal performance index, fire resistance, drying shrinkage, sound transmission loss and absorption co-efficient were measured.	
22	Coconut pith concrete for Thermal Insulation	Central Building Research Institute, Roorkee.	To produc e light weight cocon ut pith concre te for therma l insulat ion	1974	Samples of pith concrete were made by mixing it with dry cement and water and the mix is poured on the roof to be insulated and air dried for 20 days to 30 days. The thermal conductivity was measured.	It gives better thermal insulation and easy to mix and lay in situ. Cost also worked out which is only one half to two third depending on transport cost of the pith.	

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23	Single strand from coir/Jute	Jute Institute Research Association		1975	Admixing of coir and Jute to spin single strand yarn.	Studies were conducted in evolving single strand from coir fibre and softened coir fibre was made available to Jute Industries Association by CCRI. Admixture of jute to the extent of 20% improved the uniformity of single strand yarn due to more efficient movements to the coir fibre softened coir fibre/jute using Jute spinning systems with improved settings Yarn was spun from blend of 80% softened coir and 20% jute fibre and blends of 50% each softened coir fibre and ordinary jute fibre on the jute	
24	Use of Coir pith in gaskets	National Chemical Laboratory, Pune.	To diversify the use of coir pith in gaskets	1978	Coir pith at a loading of 100 phr and 150 phr was used as filler in natural rubber and synthetic rubbers such as SBR, Neoprene, Nitrile, Butyl and EPR and gaskets were moulded at a vulcanisation temp of 120^0C for 10 to 60 minutes.	It was revealed that the coir pith -rubber gaskets were more resistant to ageing and to compression set and other effects of fatigue than rubber gaskets. A paper was also published and pith can replace the imported cork sheets in the manufacture of gaskets in automobile oil engines and similar equipment. Project profiles were made based on the study at National Chemical Laboratory, Pune in which samples of gaskets of size 18" X 18"X1/8" were prepared and the technology ready for transfer through NRDC.	

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25	To study the inter biological aspects of retting	Indian Institute of Science, Bangalore.		1979	To explore the micro flora present in important retting sites of Kerala.	Collected ret liquors from five important retting centres – Chavara, South Paravoor, Muthukulam, Pachaloor and Muthakunnam and were analysed for micro flora (bacteria, fungi and yeasts) and revealed that retting of coconut husk is of aerobic nature. The pH, colour, distribution of bacterial genera and fungal flora, its counts / ml in the ret liquor, the anaerobic species and yeast flora associated with the five natural rets were also analysed. Most of the organisms play a vital part in the decomposition of pectic substances and poly phenols.	
26	To fabricate model testing machine for coir in PVC base. Developme nt of equipment for tufting coir in PVC. 1st phase Design IInd phase Fabrication	MERADO, CSIR, Madras / Durgapur.	 1.25 4.75	 1978 1986	To design and fabricate a model prototype machine for tufting Coir in PVC base	In the phase 1 of the project on development of equipment for tufting coir in PVC base and completed the design of a model plant by MERADO. In phase II fabrication of a model machine for tufting of coir in PVC as designed in phase 1. consisting of the sub assemblies such as creel stand, yarn feeding unit, coir cutting mechanism, drier / curing chamber and carpet rolling / winding units were completed and fabricated individual sub-assemblies were tested for their performance. Initially cut bits of coir yarn were hand tufted in PVC base in a tray. Complication and difficulties faced for feeding unit, cutter assembly and drier units which required refinements and perfection.	

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27	Use of Coir matting as foundation for sea wall	Kerala Engineering Research Institute, Peechi		1979 1 Mon th	Use of coir matting as filter material below the sea wall	Model studies with coir matting indicated that the rate of development of scour and the rate at which the sea wall is damaged is slower when coir matting was used as filter material in place of fascine mattress. The extent of damages to sea wall and scour below and immediately in front of the wall do not differ to any considerable degree by changing the foundation / filter materials to coir mattress. Sand filled rubber backed coir mattings of size 1.80 mX 1.20 m (in the empty state) was used for maintenance of A.S.E works in place of armour stones at north of Alleppey between RLS 87 and 91 for a length of 50 m.	
28	Utilisation of coir pith as manure in agricultural farms.	Tamil Nadu Agricultural University, Coimbatore.		1980 -91	To investigate the coir pith as manure in agricultural farms for different crops in the field level and on continued application for different seasons.	The study reported that coir pith can be successfully utilised in agricultural farms for higher yield with lesser application of fertiliser, improving the yield in alkaline soils as well and coir pith application increase the hydraulic conductivity of the soil. As the dose of coir pith increases, organic carbon content of the soil also increased.	The findings of the research project on utilisation of coir pith were highlighted in a seminar conducted at TNAU, Coimbatore in November 1991

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						to farmers, students, unemployed graduates and visitors during exhibition and training programmes.	
29	Improvements in Coir Cargo for export.	Indian Institute of Packaging, Mumbai.		1983	To improve packaging of coir products in areas of alternative wrapping materials for export cargo, development of unit packages and protection of corners of mat bundles.	Packing materials for coir mats, coir yarn materials with edge protectors, plastic wrappings and containerisation with different plastic materials for exports were made and demonstrated. The possibility of effecting improvements in packing to prevent damages of mats at the edges / corners by positioning of corner strips made out of solid fibre board and corrugated board were examined and found that corner strips made out of corrugated board withstood the pressure of wrapping strips at the edges without damage to the mats. Of the different wrapping materials tried, hessian/ poly laminate for packaging of coir, HDPE packs with suitable openings for escape of moisture and arrangement for heat sealing the packing stage gave best result. Studies in containerisation revealed that 5.5 to 6 tonnes of coir mats and 5.8 tonnes of coir mattings could be stuffed in a 20 feet container.	Disseminated the findings in a workshop held on 24.02.1989 at CCRI
30	To develop a treadle ratt of enhanced output	MERADO, Kochi.		1984	Design and to develop a prototype treadle ratt of better output	The possibilities of effecting improvements to the treadle ratt for enhancing the output and reducing the operational strain led to the fabrication of a new treadle ratt.	

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						Studied the utility of coir pith as additive to soil for increasing the yield in agricultural crops such as ground nut, Sorghum, Sugar cane and coir pith samples were analysed for micro nutrient content (Zn,Cu,Fe,Mn). Composting of coir pith using the fungus pleurotus of coir pith using the fungus Pleurotus Sajor Caju (mushroom) in combination with urea was confirmed in the field level study for crops like ground nut, paddy, sapota etc. and the effect of continuous application of coir pith on the growth and yield of groundnut for a period of five seasons showed steady increase in the yield and nutrient uptake by groundnut pod. Iron enriched compost coir pith along with zinc salt recorded high yield of maize over the control with NPK (28.5%). Studies in rain fed and irrigated farms with tapioca as the test crop showed that the yield increased significantly on application of coir pith with a saving of potash fertiliser to the extent of 50% Pot experiments with coir based poultry litter along with NPK indicated significantly higher yield for sodium cowpea crop system. The methodology and training in composting of coir pith was demonstrated	

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						The machine was put to intensive performance runs and found more modification and refinement to make it acceptable to the trade.	
31	Training programmes	European Economic, Community		1984	A short-term training programme in Product Development, Dyeing and Shade Matching, Testing and Quality Control.	R & D personnel were deputed to training programmes in product development at Dansk Textile Institute, Tastrup, Denmark, Dyeing and shade matching at Tropical Products Research and Development Institute, London and Testing and Quality control at T.F.I, Aachen, West Germany, through India Trade Centre, Brussels and EEC.	
32	Treatment and disposal of spent liquors from the bleaching/dyeing operations	National Environmental Engineering Research Institute, Kochi.		1984	To treat the spent liquors of bleaching / dyeing operations meeting with the norms of pollution control board.	Effluents from dye house was collected at periodic intervals and tested for BOD/pH/Colour and other parameters in the NERRI lab and suggested remedial measures which were strictly followed and norm and standards were arrived for installation of an Effluent Treatment Plant for dye house at CCRI.	
33	Use of coir needled felt in packing of electronic items	BPL India Ltd. Bangalore.		1984	To study the usefulness of coir needled felt in packaging.	The study showed that coir needled felt sandwiched with rubberised coir and rubberised coir needled felt is a best packaging materials for hospital equipments like cathode ray, oscilloscope, cardiac monitor etc. in transit.	

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34	Use of Coir needled felt in packing of electronic items	Bharat Electronics Ltd., Bangalore.		1984	To investigate the possibilities of using coir needled felt in packing of electronic items.	It was reported that rubberised coir needled felt used for packing fragile items such as valves and T.V tubes withstanding the rigours on handling and transport of the items.	
35	To study the quality of fibre from husks of wilt infected coconut trees.	Central Plantation Crops Research Institute, Kayamkulam		1984	To investigate the effect of wilt infection on quality of coconut husk	A field study was conducted on the quality of fibre extracted from coconut husks of wilt infected coconut husks. The husks of coconut collected from healthy coconut trees, coconut trees early stage of wilt infection and coconut trees in advanced stage of wilt infection were crushed and steeped for retting in both of 300 each in areas susceptible to good tidal action. Samples of husk before steeping and three months after steeping were examined for microbial load revealed that increased microbial activity in husks from nuts of healthy trees compared to husks from nuts of root wilt affected trees, with the infection being either in the early or later stage. The physical characteristics such as tensile strength, initial modulus and elongation showed no substantial difference at all among the three types of fibre.	

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36	Use of sand filled coir bags as armour units for sea wall in coastal protection works.	Central Water and Power Research Station, Khadakwasla, Pune		1985	The prospects of using sand filled rubber backed coir bags as armour units for sea wall.	Rubber backed Coir matting bags filled with sand(8 kg) were laid in 1:5 slope vertically (normal to the waves) and horizontally (parallel to the waves) as single layer and vertically in double layer and studied the effect of wave actions on placement of the bags and reported that the single layer sand filled bags can withstand wave height of 0.8m to 0.95m and double layer sand filled bags laid vertically 0.95m to 1.0m for no damage condition and showed no deterioration in the marine environment. If the sand filled bags has been tied with each other for interlocking, the weight of the individual sand filled bag is stable and will not be dislocated due to wave action.	
37	To study on the use of coir pith as a medium of conservatio n of soil moisture.	University of Agricultural Sciences, Bangalore.		1985 3 Year s.	To study the effect of coir pith. 1)As a medium for conservation of soil moisture. 2)As a mulch in the farms 3) The effect of adding coir pith in specific proportions to farm soil on the physico-chemical of the soil with particular reference to selective crops such as Cashew, Coconut and Paddy.	Analysed the chemical composition of coir pith available in Karnataka and mineral contents, cellulose, lignin and degradation of coir pith. The study revealed that the yield of crops such as cashew and coconut increased by the application of coir pith. The application of coir pith in agriculture farms suppresses the weed growth and conserves moisture in coconut and cashew plantations. Use of coir pith to the farm soil with ragi, groundnut and maize as the test crop showed increased yield.	

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38	To study the suitability of Janatha Mattress	UPASI		1986	To study the usefulness of mattress from coir needled felt	Coir needled felt layers were laminated by hot pressing after spraying with compounded rubber latex. It was than covered with cheap cotton tapestry and marketted as Janatha Mattress. UPASI was tied up for the effectiveness of the Janatha mattress and ascertained their views on the suitability of the Janatha mattress from coir needled felt for use by workers of Tea Estates who reported that the performance was satisfactory.	
39	Application of coir netting for erosion control of soil slopes of highways.	Central Road Research Institute, New Delhi.		1986	To apply coir netting for erosion control of slopes	Field demonstration were conducted using coir netting of mesh size 1" at Nilgiri Hills (3300 m^2) Coonoor – Kundha Road and Nagapattanam-Gudalore-Mysore Road(630 m^2) in 1986 in association with Highway Research Station, Madras and Mirapur-Davel Road(750 m^2), Lambidhar Mines(1500 m^2) and Dolmar, Nainital-Almora Road(500 m^2) in U.P in 1986 and 1987 have established the technique that it can successfully control surficial landslides in the Nilgiris and in the Himalayan regions and also in the treatment of highway slopes against erosion and the technique is cost effective.	
40	Developme nt of a device for husk beater.	National Research Development Corporation, New Delhi.	25000	1986	To develop a prototype husk beater to reduce the labour drudgery	Designed and developed prototype but not found acceptance in the trade.	Not successful as the prototype did not find acceptance in the trade.

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41	Design Developme nt.	Indo-International Trade Centre, UNDP, New Delhi/Geneva and the Swedish International Development Authority, Stockholm		1987	Trade promotion program of evolving modern designs colour matching and styles of coir products for European markets and train the designers in the industry.	New designs in novel themes in attractive colour combination involving the development of the design concept, translation of the design concept in to the design card, manufacture of selected designs of consumer appeal (46 patterns) and popularisation of the design by display at Trade Fairs / Exhibitions with in India and abroad were carried out availing the services and support of the ITC/SIDA as part of trade promotion programme.	
42	To design and develop standard semi-automatic loom for weaving coir matting	MERADO, Madras.		1988	To fabricate a prototype standard semi automatic loom for weaving coir matting.	Drawings of the components of semi automatic loom was made, standardised the dimensions of each part and model loom was fabricated and put in to intensive performance run.	
43	Developme nt of a machinery for the manufacture of circular coir mats	MERADO, Kochi.	1.95	1988 15 months	To design and develop a prototype loom for the manufacture of Hollander mats..	Designed and fabricated a prototype but not found to be successful in weaving quality Hollander mats.	

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44	Developmental studies on Coir/Polymer composites as building materials such as panelling, roofing etc.	Regional Research Laboratory, Trivandrum	998250	1988-89 1 Year	Design and fabrication of a continuous polymer impregnating unit for making prepreg using needled felts, studies on processing coir/PF composite sheets (plain and corrugated) for various applications, setting up a laboratory scale demonstration plant Technology Transfer.	Samples of coir polymer composite using phenol formaldehyde were evolved. A lab level plant was installed and doors and ceiling and panelling were made and demonstrations was made by panelling in Hotels like Sakthi Hotels, Pollachi. Technology was transferred to M/s Duroflex Pvt.Ltd., Bangalore.	A seminar was conducted to disseminate the findings on 28th February 1992.
45	Use of coir needled felt as filter for underground drain	WALI ,Baroda		1989	To study the usefulness of coir needled felt as filter for drains	Samples of coir needled felt were made available to the Executive Engineer, WALI who reported that the material was suitable as filter for underground drains and conducted performance of the felt for a period of about one year on service of the material under field conditions as filter for underground drain for lagging perforated underground drain pipes.	
46	Pilot plant for making coconut fibre reinforced gypsum board for building Industry.	Regional Research Laboratory, Jammu Tawi	8.50	1989 1 Year	To set up a demonstration plant for the production of coconut fibre reinforced gypsum Boards for Building Industry.	Gypsum reinforced coir needled felt boards useful for false ceiling, panelling and cabin were made by sandwiching layers of coir needled felt with layers of gypsum which possessed properties like low thermal and sound conductivity, smooth finish and easy machinability.	A seminar was conducted at Hotel Holiday Inn on 28th Feb,1992 to disseminate the findings.

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47	Utilisation of coir matting for roof surface evaporative cooling	Central Building Research Institute, Roorkee, U.P	126000 & 3000m^{2}S2BM7 coir matting.	1989	Develop a suitable technology to exploit coir matting in roof cooling.	Field demonstrations were conducted and found that S2BM7 is the best coir matting and durable in cooling buildings of various types in hot places as evidenced in the field trials at Tata Energy Research Institute, IIT, New Delhi, CBRI Roorkee, Central Institute of Medicine and Aromatic plants, Lucknow, Tyre plant factory, Meerat, Mughal Sheraton, Agra, Standard Radiators, Vadodara and Narmada Plastics, Rajegaon.	The findings was disseminated in the seminar in coir polymer composites and coir gypsum held on 28th Feb 1992
48	Design and development of fully automatic 4 mtr. wide power loom.	MERADO, CSIR, Madras.	12.00	1990	To design and fabricate a prototype 4 mtr. Power loom.	Prepared the drawings but not able to complete the assembly and hence wound up the project.	
49	Develop colour fastness to coir.	Department of Chemical Technology, University of Bombay.	2.09	1991 1 Year	To develop colour fastness to light for coir.	1) Conducted an appraisal of the problems relating to bleaching and dyeing 2) Studied and developed techniques to colour fastness to coir fibre/yarn	The findings was disseminated in a seminar held in 1992.

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50	Coir Retting-Process up gradation and pollution abatement through environmental biotechnology	CUSAT, Kochi	4.57	1993 3 Years.	Develop technique for upgrading the process of retting to yield good quality fibre and contain the pollution along the coast of Kerala.	Surveyed the retting sites of Ernakulam, Alleppy and Kollam Districts and the hydrological parameters such as pH ,salinity, colour and tidal amolitude, mode of retting, quality of fibres produced and chemical characterisation of ret liquor and husk infurion were studied.	
51	Application of coir geo-textiles for stabilisation of bunds.	Rice Research Station, Monkombu, KAU.		1996	To reinforce the mud wall of bunds	Conducted a field study in application of coir geo-textiles in soil stabilisation of bunds for control of irrigation of paddy fields at Monkombu in Kuttandu by laying coir geo-textiles of basket weave for reinforcing the mud wall. The matting was fixed to the bamboo and coconut poles at a distance of ½ meter to give it a stable structure.	
52	Application of coir geo-textiles for arresting soil erosion in reservoir	KSEB Kerala and Charankattu Coir Mfg (Co) PVT Ltd. Cherthala.		1998	To apply coir geo-textiles against soil erosion in the reservoir	Applied H_2M_5 coir geo-textiles covering an area of 3000m^2 to control soil erosion in the reservoir of the Hydro-electric project, Kakkayam.	

Sl no	Name of the Project	Collaborative Agency	Boar-d's Share (Rs.)	Dur-ation	Objectives	Result	Remarks
53	Application of coir geo-textiles for river bank protection and assessing the biodegradability of coir geo-textiles	Kerala Agricultural University	7.13	2000 3 Year.	To assess the biodegradability of coir geo-textiles under varying conditions and to evaluate the performance of the coir geo-textiles as a protective material against stream bank erosion.	The bio degradation of coir geo-textiles laid on varying slopes, on exposed rocky patches for template planting of various crops and for stream bank erosion control were assessed. The tensile strength of geo-textiles reduced considerably over the period with complete degradation after 180 days. The extent of preventing gully erosion and to encourage siltation along the stream bank was studied 500m^2 area was covered. Several microbes belonging to bacterial and fungal population were found associated with degraded geo-textiles.	
54	Application of coir geo-textiles for soil and water conservation at varying slopes	Kerala Agricultural University	9.86	2000	To evaluate the effect of different types of coir geo-textiles on preventing soil loss and in helping soil and water conservation under various slopes.	7000 m^2 was covered with coir geo-textiles at 20%, 30% and 50% slopes and the result indicated that coir geo-textiles could considerably reduce soil and water loss of sloppy land.	
55	Application of coir geo-textiles for regenerations of exposed rock patches	Kerala Agricultural University.	9.83	2000	Do develop suitable technologies for rejuvenating the eroded / degraded lands and rehabilitating the rocky patches using coir geo-textiles.	Field demonstration conducted by covering rocky patches without soil by a layer of turf and over this with coir geo-textiles of 200 m^2 and another layer of soil was spread and a control without coir geo-textiles. Rocky patches could be regenerated using coir pith and geo-textiles in combination with turfing. Establishment of grass cover on geo-textile mulched rocks was good.	

Sl no	Name of the Project	Collaborative Agency	Boar-d's Share (Rs.)	Dur-ation	Objectives	Result	Remarks
56	Application of coir geo-textiles for template planting and as a soil mulch	Kerala Agricultural University.	6.97	2000	To assess the impact of coir geo-textiles as a soil mulch	Studied the effect of coir geo-textiles for template planting of intercrops in coconut gardens and effect of coir geo-textiles as a soil mulch to prevent weed growth. The effect of different mulching agents in growth of bindhi, pineapple and brinjal was studied. Among the treatments tried transparent polythene was better than geo-textiles.	
57	To develop moulded coir polymer products	Indian plywood Industries Research Institute, Bangalore		2001		Developed polymer composite boards of improved appearance and finish by vapour cure coating. The wood veneered particle boards were tested at IPIRI. The moulded materials were tested which satisfied the requirements for commercial use.	
58	Application of coir geo-textiles for protection of Road Embankments	Indian Institute of Management, Kozhikode.	9.75	2001 1 Year	To use coir geo-textiles in the road embankments in the IIMK Campus.	The coir geo-textiles was made available to IIMK and laid coir geo-textiles on the road embankments of 5 Km stretch inside the campus of Indian Institute of Management Kozhikode. The treated area was properly vegetated and the degradation of geo-textiles and growth of vegetation monitored regularly by the officers of CCRI.	
59	Testing of ligno sulphonate extracted from coir pith as an expander in lead acid batteries	Central Electro Chemical Research Institute, (CECRI), Karikudi		2001	To find out an area of use for ligno sulphonate extracted from coir pith and assess its quality.	The CECRI has recommended the use of sodium ligno sulphonate as an expender in lead acid batteries by successfully experimented it and proposed to enhance the purity of the material so as to increase charge discharge cycles as per international standards.	

Sl no	Name of the Project	Collaborative Agency	Boar-d's Share (Rs.)	Dur-ation	Objectives	Result	Remarks
60	Design Intervention	NID, Ahmedabad			1) Operation Desert Green. 2) NID cell at CCRI 3) Coir cell at NID	The coir materials to be promoted as camouflage materials of 2 inch mesh for the defence establishments and prepared different samples and given to the Army establishment for testing. An NID cell was created at CCRI which provided design support to the trade. A full time design expert was placed at CCRI and coir fibre was bleached with other natural coir fibre like sisal, banana etc. for making fine count yarn. A coir cell was created at NID, Ahmadabad where the products made out of design intervention were displayed and details disseminated to the trade. 36 different sample products were manufactured from blended yarn of fine quality such as carry bags, shopping bags, boxes and corridor mats.	Organised two dissemination workshops at CCRI on blending and make value added products out of it to the industry.
61	To develop technology for dyeing and printing of coir with Natural Dyes.	IIT, New Delhi.	8.125 lakhs	2001 2 Year	Techniques of applying natural dyes to coir	12 Shades were evolved from vegetable dyes on coir with the help of mordents and its light fastness were assessed. The quantity of the vegetable dyes required varied from 5 to 10% on the weight of the material. Samples of products were also made from yarn dyed with natural dyes	A Workshop-cum-Demonstration was held to disseminate the findings of the project in 2003 and samples of shade and dyes kit with brochure on methodology of application of the vegetable dyes used by the IIT, New Delhi were distributed to the trade

COLLABORATIVE PROJECTS – PRESENT

Sl.No.	Name of the Project	Collaborative Agency	Board's Share Rs.in Lakhs	Duration	Objectives	Result	Remarks
1.	Bio-softening and bio-bleaching of Dry Husk fibres.	Dept. of Biological Chemistry, Indian Association for the Cultivation of Science, Kolkata.	9.956	1 Year	To produce soft fibres from dry husk for easier spinning and making innovative products	Laboratory trials are successful	One year's extension required for up scaling the technology
2.	Development of coir composite sandwich materials and products for industrial and socio-economic applications.	RV-TIFAC (A Collaborative venture of RV College of Engineering and Technology Information Forecasting and Assessment Council) Composite Design Centre, Bangalore.	200.00	18 Months	To produce coir glass fibre hybrids for manufacturing economic doors and other materials of various end uses	The products developed successfully.	A workshop will be held in 2005, for dissemination of results
3.	Development of coir composite board for sheathing of wooden crates for heavy equipments and machine tools.	Indian Institute of Packaging, Mumbai.	9.375	6 Months	To prepare economic packing material out of coir polymer composite boards for replacement of plywood.	Patent filed. The products developed successfully.	A workshop is to be organised for dissemination of technology

Sl.No.	Name of the Project	Collaborative Agency	Board's Share Rs.in Lakhs	Duration	Objectives	Result	Remarks
4.	Development of coir composite boards for pallet docks.	Indian Institute of Packaging, Mumbai	9.375	6 Months	To develop pallet docks by replacing commercial plywood.	The products have been successfully developed..	The information to be disseminated through a workshop
5.	Development of coir composite boards for top and bottom closures for fibre board drums.	Indian Institute of Packaging, Mumbai.	9.375	6 Months	To replace commercial plywood with coir polymer composite boards.	The product has been successfully developed.	Technology will be disseminated through a workshop
6.	Development of cushioning media and semi hard media from coconut husk/pith.	Indian Institute of Packaging, Mumbai.	9.375	6 Months	Cushioning media for safe packaging of fragile materials.	Laboratory trials resulted product which found application but needs refinement are going on.	The final instalment to be released on submission of the project report.

Sl.No.	Name of the Project	Collaborative Agency	Board's Share Rs.in Lakhs	Duration	Objectives	Result	Remarks
7.	Development of Technology for production of particle boards from tender coconut fibres.	P.S.G. Polytechnic College, Coimbatore.	82.00	9 Months	To utilise the waste tender coconut husk for making innovative particle boards for various end uses.	The experimental trial produced particle boards which require modification for getting boards without warping.	The final instalment to be released after successful demonstration of the technology.
8.	Development of eco-friendly production of export oriented vanilla using coir geo-textiles and other products, like coir pith, coir needled felt, coconut husk etc. as a shading material for vanilla nursery and also coir and coir wastes for augmenting growth of seedlings.	Spices Board, Kochi.	9.75	3 Years.	Replacement of normally used nylon nets for green houses with coir and use of coir pith and coir garden articles for growth of vanilla plant.	Prepared green houses with coir geo-textiles and vanilla plant was grown on coir poles using composted coir pith as manure.	Report awaited.
9.	Development of a spinning system for blends with jute and sisal fibres.	South India Textile Research Association, Coimbatore.	9.50	12 Months	To develop a machine for spinning of coir on jute machine with suitable modifications including exploring the possibility of elongating the coir fibres to make that uniform in thickness.	Experimental trials are going on after softening the coir fibres with strong alkali.	Report awaited.

Sl.No.	Name of the Project	Collaborative Agency	Board's Share Rs.in Lakhs	Duration	Objectives	Result	Remarks
10	Modification of rubberised coir mattress for hospital beds enhancing patient comfort, increasing longevity and making it impermeable there by decreasing hospital required infection through mattresses.	Indian Institute of Medical Science, Banaras Hindu University.	10.00	2 Years	To develop rubberised coir products by applying a layer of reinforced Poly Vinyl Chloride(PVC) on its surface.	Initial trials have been found to be successful with the PVC alone. Experiments will be conducted by using reinforced PVC.	Report awaited.
11.	Development and application of coir pith based Cyan bacterial bio-fertiliser for field cultivation.	Dept. of Biotechnology, Bharathidasan University.	4.97		Composting of coir pith using algae, supplying oxygen in the heap and degrading it simultaneously.	Lab scale trials are successful. The time period of composting is to be established after field trials.	2nd phase to be initiated.
12	Bio-efficiency of Coir Pith Organic Manure for 12 crops	Kerala Agricultural University.	3.6	2 Years	Testing the efficiency of C-POM on 12 crops.	Required quantity of C-POM provided to different research stations of KAU.	Report awaited.
13.	Project SEWAK for the use of coir geo-textiles at a road embankment site in Dimapur-Kohima road.	Border Roads Organisation.	4.00	4 Months	Application of coir geo-textiles on erosion control of road embankment.	Site was selected geo-textiles was sent to the site laying of geo-textiles will be carried out on procurement of fixing materials by BRO.	

Sl.No.	Name of the Project	Collaborative Agency	Board's Share Rs.in Lakhs	Duration	Objectives	Result	Remarks
14.	Project PUSHPAK, on the use of coir geo-textiles at Silchar-Agartala road.	Border Roads Organisation	9.50	6 Months	Application of coir geo-textiles on soil erosion control of slops of road embankments.	Coir geo-textiles coco logs were sent and completed laying of coir geo-textiles	
15.	Project SETUK, on the use of coir geo-textiles in area of 4000 sq.m. at Karimganj bypass in Assam	Border Roads Organisation	4.00	7 Months			
16.	Project 'DEEPAK', on the use of coir geo-textiles at an area of 400 mtrs. X 6.`0 mtrs. On a marshy land at 80.000 kms on Manali-Sarchu road in Himachal Pradesh.	Border Roads Organisation	3.00	2 Months			
17.	Project 'UDAYAK' on the use of coir geo-textiles at Mon-Naginimari road in Nagaland and Hunli-Amini road in Arunachal Pradesh	Border Roads Organisation	6.00	6 Months.			
18.	Project 'CHETAK' on the use of coir geo-textiles for sand dune stabilisation at	Border Roads Organisation	4.00	5 Months.			

	Jaissalmer.						
Sl.No.	Name of the Project	Collaborative Agency	Board's Share Rs.in Lakhs	Duration	Objectives	Result	Remarks
19.	Development of Effective production of fuel from Waste fibre for the use on fire places	Tata Energy Research Institute, Delhi.	6.00	6 Months	To find out use of coir pith/bit fibres as fuel.	Trials were conducted on briquettes made of coir pith. The calorific value of coir pith has been found to be near to coal, but initial drying cost is prohibitive.	Final report submitted.
20.	Development of a platform mounted compact portable coir fibre extraction unit	PSG College of Technology, Coimbatore.	8.96	5 Months	To develop a mobile defibering with higher productivity	Trials are being conducted for proper gripping of the husk on release from the first defibering operation.	
21.	Preparation of Code of Practice for the application of geo-textiles for the effective marketing of coir geo-textiles within India for erosion control purposes.	Indian Institute of Technology, New Delhi.	2.5	4 Months	Code of Practice for coir geo-textiles to be used in highways and roads.	It is under preparation.	
22.	Protection of road embankment on the IIM-K campus using coir geo-textiles as part of 2nd phase.	Indian Institute of Management, Kozhikode.	4.60875				

Sl.No.	Name of the Project	Collaborative Agency	Board's Share Rs.in Lakhs	Duration	Objectives	Result	Remarks
23.	Development of coir composite boards for walkway on either side of foot over bridge.	Konkan Railway Corporation Ltd.	9.66		A Proposal has been submitted initially for two foot over bridges for approval of board		
24.	Use of coir pith as a bio absorbent for removal and recovery of uranium from solutions at lower pH	Bhabha Atomic Research Centre, Mumbai.	2		To use coir pith as an absorbent for nuclear waste	Lab level trials have been successful	
25.	Possibilities of coir on the consolidation of soil	Cochin University of Science and Technology, Kochi.	6.75	2 Years			
26.	Use of coir bhoovastra in pavements	Cochin University of Science and Technology, Kochi.	7.60	2 Years			

COLLABORATIVE PROJECTS - PROPOSED FOR FUTURE

Sl.No.	Name of the Project	Collaborative Agency	Board's Share Rs.in Lakhs	Duration	Objectives	Result	Remarks
1.	Increase the longevity of coir.	Indian Institute of Chemical Biology, Jadavpur, Kolkata.	29.47	3 Years	To enhance the longevity of coir for its use in long term applications by chemical / biological modification.		
2.	Application of Natural dyes on Coir, Phase II	Dept. of Textile Technology, IIT, New Delhi.	55.44	2 Years	To establish a pilot plant at CCRI to extract Natural dyes in bulk scale for application on coir		
3.	Development of a versatile spinning machine for coir	Dept. of Textile Technology, IIT, New Delhi.					
4.	Production of vanillin from coir pith.	Central Pulp and Paper Research Institute, Saharanpur, U.P.			Extraction of sodium Lignosulfonate and its conversion into vanillin form coir pith.		
5.	Application of coir geo-textiles for road construction / embankment protection.	Public Works Department, U.P.			To carry out experiment-cum-demonstration in the State of Uttar Pradesh for road construction and road embankment protection.		

Sl.No.	Name of the Project	Collaborative Agency	Board's Share Rs.in Lakhs	Duration	Objectives	Result	Remarks
6.	To use coir polymer composite in railway.	Research Design and Standards Organisation, Lucknow.			To develop substitute of asbestos roof sheets with coir polymer composite boards in railway compartments.		
7.	To evolve Kaleens from coir.	Indian Institute of Carpet Technology, Bhadohi, U. P.	7.98		To develop Kaleens by the use of softened coir in combination with wool and animal hairs.	MOU to be signed.	
8.	Application of coir composite for foot overbridges.	Konkan Railway Corporation Ltd			Demonstration of Coir Composite Board for pathways on ramps for foot over bridges	MOU to be signed.	
9.	Popularisation of coir composite in school.	Technology Information Forecasting and Assessment Council.	147.00		Manufacturing and supply of 3000 sets of desks and benches for schools		
10.	Application of geo-textiles for road embankment protection.	Central Road Research Institute, New Delhi.			Application of coir geo-textiles for road embankments protection not exceeding 10Km		