

COIR VOX

A Bulletin from NCRMI on Kerala Coir

REFURBISHMENT

of coir fiber extraction machine with process change

RUT BEHAVIOUR OF coir geotextile

reinforced subgrade

PEATKOL DOTS

Revolutionizing cooking and incense with peatkol dots: a sustainable alternative to woody charcoal

THE NCRMI STATE OF THE ART LIBRARY

NCRMI Library has a key role in supporting the research and development activities of the Institute. Since its inception, the library has been functioning as a knowledge - disseminating centre of the institute. Literature collection is essential for any research, and NCRMI library offers an outstanding collection of Indian and foreign books, reports, thesis, etc, for study and research in coir and other natural fibre products. Apart from books, the library is subscribing to 25 national and international journals from various subject fields such as civil engineering, geotechnical engineering, textile engineering, microbiology, etc. and online restricted access to some of these journals are provided. The library's collection can be browsed through the online public access catalogue available internally, and the patrons are alerted with email alerts for the newly added publications in their area of interest.

As part of modernisation, NCRMI Library has implemented **RFID (Radio Frequency Identification System)** technology. This enables the library for faster, easier and more efficient way to track, locate and manage library materials. With the help of an RFID handheld reader, patrons can find a particular book within a minute by themselves, and the self-service kiosk of the RFID system provides self-issue and return of books.

RUT BEHAVIOUR OF COIR GEOTEXTILE REINFORCED SUBGRADE

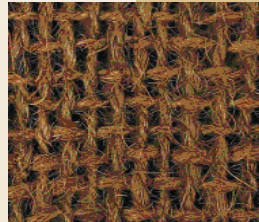
DR. BEENA K. S.
PROFESSOR (RTD.) CUSAT



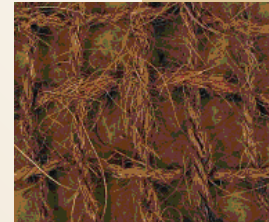
Increased traffic loading, along with adverse environmental factors, contribute to the deterioration of road surface. Various types of failures occur on road surfaces due to defects in construction methods, quality of materials used, inadequate surface or subsurface drainage, number of load repetitions and several environmental factors. Excessive deformation in the subgrade soil causes its failure, and undulations or waves and corrugations (ruts) are formed on the pavement surface. Acute shortage of good quality construction materials and the resulting failures have led researchers to take up experimentations related to reinforcing available materials suitably and thereby using available subgrade materials for the construction.

A case study done at Thanneermukkam panchayat in Alleppey illustrates the use of coir-woven geotextiles for reinforcing the unpaved road. The geotextile reinforcement placed at the surface course/base course interface effectively increased the service life of the pavement. The road is still in good condition without any maintenance requirements, even after a decade. Here, different types of coir geotextiles (both woven and non-woven (with and without a lining of a thin layer of polypropylene)) are investigated

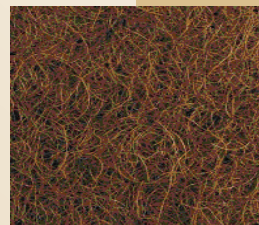
Fig 1. Types of coir geotextiles used



(a) H2M8



(b) H2M6



(c) Non-woven

as reinforcement in unpaved roads using laboratory models.

The rutting resistance of geosynthetic reinforced pavement is analysed using the California Bearing Ratio (CBR) test and Wheel load test, and results are evaluated. The soil for the investigation was collected from Alappuzha.

The CBR test results in unsoaked conditions indicated that the presence of coir geotextile influences the CBR value. The improvement of soil strength due to the presence of coir geotextile is a function of the interaction of geotextile with soil at the OMC condition. Under un-soaked conditions, the clayey soil reinforced with woven/non-woven geotextiles shows higher CBR values than one without geotextiles. The test values indicate that the percentage increase in CBR value was high when the geotextile was placed at $1/3 H$ from the bottom of the mould surface ($1/3H$ below the loading surface) and minimum when it was set at $2/3H$. Maximum CBR value was obtained for non-woven geotextile. The CBR values were plotted to study its effect on the position of reinforcement and placement depth.

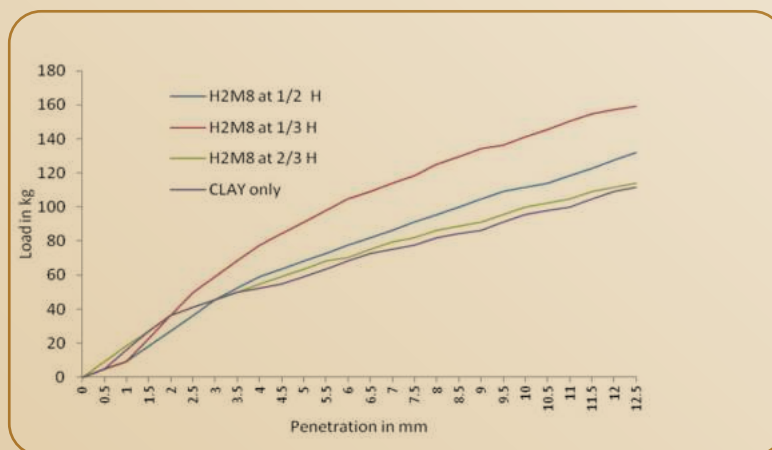


Fig 2. Effect of position of H2M8 geotextile

The rutting behaviour of subgrade reinforced with geotextile was studied by conducting a laboratory wheel load test using a wheel tracking machine. The test was conducted on a prototype road bed by using clayey soil. The test measures the surface rut depth and base deformation of pavement when loaded by a moving wheel simulated using wheel load. Rut depth was measured as a function of the number of loading cycles. The ability of geotextile reinforcement to distribute the load over a wide area was monitored and analysed.

Results

Higher CBR was obtained with non-woven coir geotextiles in un-soaked conditions, and the optimal location of reinforcement was nearer to the surface. The results showed that coir geotextiles could fulfil the functions of reinforcement and as a separator, both under static and repetitive loads. The type of reinforcement also affects the performance of the CBR value of the reinforced subgrade. The properties of geotextile, like mesh size opening, mass per unit area and secant modulus, have an influence on the obtained CBR value of reinforced soil.

The increase in soil strength due to the presence of geotextile is a function of the interaction of geotextile with soil at OMC condition. It was observed that there is no significant improvement in the CBR value when the geotextile is placed quite below the soil specimen.

Calculated Aggregate thickness and % savings in aggregate

Specimen	Aggregate thickness (mm)	Savings in aggregate (mm)	% Savings in aggregate
Clay only	17.59	-	-
H2M8	8.80	8.79	49.97
H2M6	11.17	6.42	36.50
NW	8.37	9.22	52.42
NWL	10.12	7.47	42.47

The experimental studies revealed that NW geotextile showed maximum penetration resistance with a higher CBR value and hence recommended as reinforcement for unpaved roads. The optimum location of geotextile reinforcement is 1/3rd height from the bottom of the mould, and NW geotextile performed better when compared to other types. Analysing the results, it can be stated that depending upon the type of coir geotextile, type of soil, position of geotextile and soaking conditions, the percentage increase in CBR varies.

The test results showed that rut depth can be reduced, and subgrade strength can be increased by the introduction of coir geotextile as reinforcement. H2M8 and NWL are best suited for reinforcement purposes of unpaved and earthen roads, allowing more vehicle passes with less rut depth, where the percentage reduction in rut depth amounts to 32% to 40% with the introduction of H2M8 as reinforcement. Properly selected, designed, and installed coir geotextiles offer valuable operational and economic benefits in constructing and maintaining unpaved granular roadways.

TECHNOLOGY TRANSFER OF VARIOUS PRODUCTS DEVELOPED BY NCRMI

The technology transfer of the different products developed by NCRMI shall be offered at transfer fee cost to stakeholders as shown below. This action is initiated as part of commercialization of research findings of NCRMI among new entrepreneurs and stake holders of Coir Industry.

Sl. No.	Name of Product	MSME's/ Private organization/ individual (transfer fee cost per firm/ individual)
1.	Pith Activator	Rs.10,000
2.	Trichopith	Rs.10,000
3.	E-coir Bag	Rs.10,000
4.	Peatkol Dots	Rs. 25,000

PEATKOL DOTS

REVOLUTIONIZING COOKING AND INCENSE WITH PEATKOL DOTS: A SUSTAINABLE ALTERNATIVE TO WOODY CHARCOAL

In a world constantly grappling with environmental challenges and the depletion of natural resources, innovation becomes the driving force for sustainable development. NCRM has taken a remarkable step in this direction with the development of a groundbreaking product called Peatkol dots. These innovative, eco-friendly biobriquettes are designed to replace traditional woody charcoal for

cooking and incense purposes. Peatkol Dots are derived from coir pith, a readily available natural resource, undergoes a specialised process that makes them not only an efficient fuel source but also a safe and sustainable alternative to woody charcoal. The manufacturing process of Peatkol Dots involves several essential steps such as sterilization, carbonization and mixing of organic binders and densification.

Peatkol Dots exemplifies how innovation can transform waste into a valuable resource, benefiting both people and the planet.



The Unique Advantages of Peatkol Dots

- ✦ Made from natural materials and does not contain any harmful chemicals. This makes them safe to use for cooking and incense purposes.
- ✦ Made from a by-product of the coconut industry, which helps to reduce pollution and conserve resources.
- ✦ Burns longer than traditional charcoal, which makes them more economical.
- ✦ Produce very little smoke, which makes them ideal for indoor use.
- ✦ Odorless, which means that they will not affect the taste of food or the fragrance of incense.

REFURBISHMENT OF COIR FIBER EXTRACTION MACHINE WITH PROCESS CHANGE FOR ENHANCED PRODUCTIVITY

The devastating floods of the century during August 2018 inflicted immense damage to the lives of people and property in Kerala. Mala DFWICS Ltd R 614, an SC/ST coir co-operative society under the Project Office – Thrissur, Kerala, India engaged in the fiber extraction process, was severely affected during the floods. All society buildings and machineries were submerged in the flood water for six days. All the machineries got damaged as a result, rendering the unit non-operational.

The Department of Coir Development, Kerala, along with the support of CMD-PMU, initiated a feasibility study to make the Fiber Extraction Unit operational with an enhanced production capacity of 15000 husks per 8-hour shift by refurbishing the existing machinery.

Site visits at the Mala DF unit were conducted. The exact condition of the fiber extraction unit was checked, and the possibility of restoring them to working condition was evaluated. The machines were found to be rusted and silt-covered conditions. Electrical lines and installations are also found to be severely damaged. A project was designed to refurbish the machines. In addition to this refurbishment, a new fiber extraction process was developed to improve fiber quality.



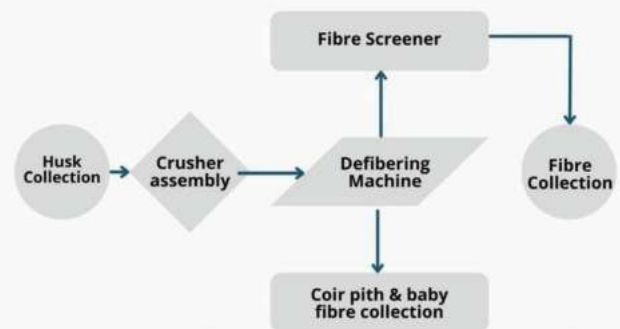
Fiber Extraction Unit



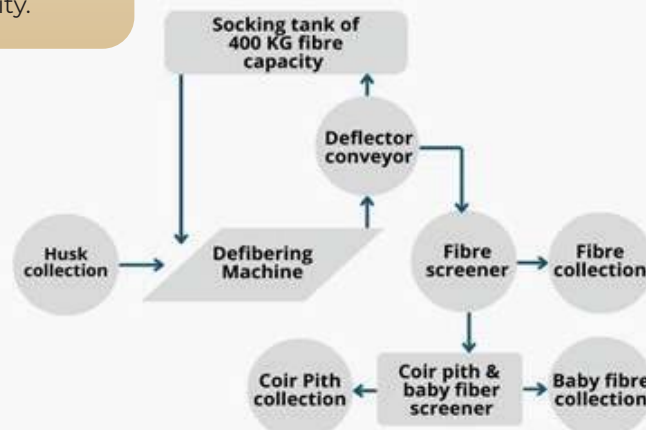
Conveyors and Motors



Electrical Panel



Existing Defibering process layout



Proposed Defibering Process layout

The existing fiber extraction process included a 15 HP crusher assembly for pre-crushing the husks before fiber extraction, a 20 HP defibering machine for extracting fiber from crushed husks, and a 1 HP fiber screener. There were no mechanisms in place to separate coir pith and baby fiber. Because of the mixture of baby fiber and coir pith, the value addition of coir pith was complex. The total daily production capacity was 10,000 husks.

The proposed layout was designed to increase processing capacity with superior fiber quality. Process modifications were made by removing the crushing operation from the line and introducing a soaking mechanism. Initially beaten fiber was traversed to a soaking tank and immersed for 1 hr. The power rating of the defibering (DF) machines was enhanced to 30 HP for increased productivity. The soaking tank could accommodate 400 kg of fiber obtained after the initial beating operation. After an hour of soaking, the fibers were again fed to the DF machine for a second beating process. Deflecting change-over mechanism is incorporated into the system to operate the first and second DF operations easily. The fiber quality was enhanced with minimal breakage and impurities with the newly implemented process line. As a result, superior-quality fiber was produced. A 2 HP fiber screener was recommended to remove excess pith attached to the fiber. A separate screener of 2 HP was also proposed to separate baby fiber from the coir pith.

REFURBISHMENT

The refurbishment process was estimated to involve 60 days of activities. The refurbishment of the DF unit started in Jan 2020 and was completed by June 2020. The whole bearings of the crusher machine, screener and conveyors, Pulleys, Motors, Belts (Fenner), Beating Blade (10mm MS plate), and Beating Arm (10mm MS plate) were replaced. A new screener to separate pith and fiber was fabricated. A new conveyor was added to the screener. All nuts and bolts were replaced with locknuts (TVS). A relief valve was added to the hydraulic press bailing unit. All sealants in the hydraulic press unit were replaced, and the Gearbox was overhauled. The whole electrical wiring was completed. 3 x 2HP motors (Crompton) was replaced. A motor upgrade of 20HP to 30HP was conducted to increase the efficiency and enhance the productivity from 10000 husks to 15000 husks in 8hrs shift. A new panel board was installed. All refurbishment was done by re-welding with EA7018 electrode. A dust protection cover was installed. Sandblasting of the crusher, screener, and roller parts was completed. Plywood was added to prevent the overflow of fiber from the conveyor. The husk feeder was also modified.

The functionality of the system was tested and verified. A test run of 15000 husks was performed for verification purposes. The refurbishment of the DF unit was completed within budget and schedule. The refurbished system was capable of fiber extraction of 1000 husks in 35 minutes.



Fig 4. Refurbished Fibre Extraction Unit



Fig 5. Screener



Fig 6. New Screener and Willowing Unit



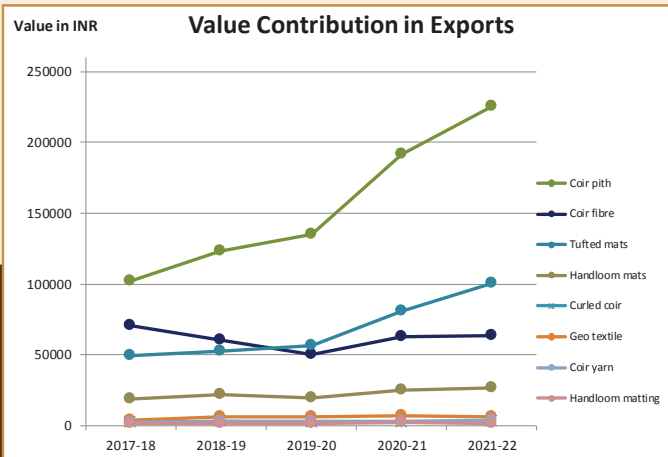
Fig 7. Panel Box

COIR PITH

Coir pith is a non-fibrous, fluffy, light weight corky material which is tightly packed along with coconut fibre in the coconut husk. Coir pith constitutes of mainly Cellulose, hemi-cellulose and lignin. Coir pith is obtained during the extraction of coconut fibre from the husk. The coir pith constitutes to 50-70% of the coconut husk and its size varies from 100-300 microns.

It is an excellent soil conditioner and is being extensively used as a soil-less medium for agri-horticultural purposes. Considered once a waste material left over after fibre extraction, it has revolutionised the export market of the Coir industry. Coir pith is the highest revenue grosser by exceeding the traditional markets of centuries-old coir & coir products.

EXPORT STATISTICS

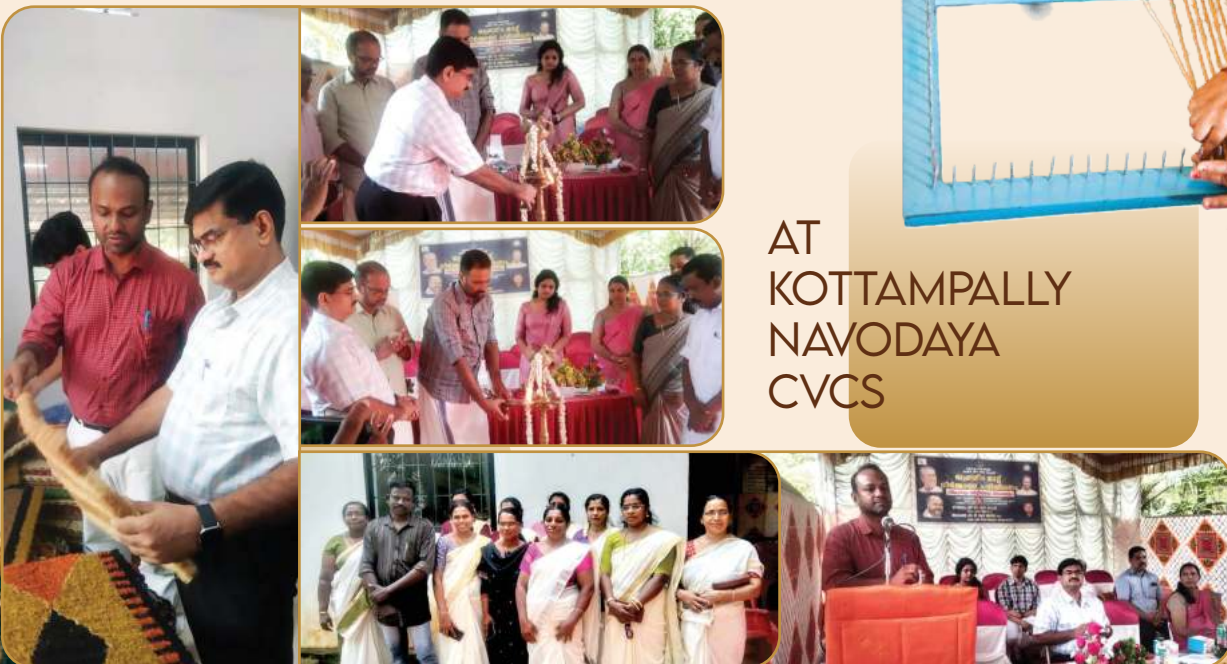


COIR PITH SPECIFICATIONS

Specifications	Raw Coir Pith	Low EC Coir Pith Blocks - Washed & Sundried	High EC Coir Pith Blocks - Sundried	Processed Low EC Coir Pith - Washed & Sundried	Processed High EC Coir Pith - Sundried
Electrical Conductivity	2.68 to 3.32 Millisiemens	400 Microsiemens or 0.4 Millisiemens	NA, but shall be less than 3 Millisiemens	0.4 Millisiemens	NA, but shall be less than 3 Millisiemens
PH	6.25 - 7.2	5.5 - 7.0	5.5 - 7.0	5.5 - 7.0	5.5 - 7.0
Impurities	less than 5%	less than 5%	less than 5%	less than 5%	less than 5%
Moisture	35% to 60% (Mostly 57%)	less than 15%	less than 15%	less than 15%	less than 15%

LATEST NEWS

CLOSING CEREMONY OF FRAME MATS TRAINING PROGRAM



AT
KOTTAMPALLY
NAVODAYA
CVCS

DIRECTORATE OF COIR DEVELOPMENT

Directorate of Coir Development (DCD) is the agency for implementing all policy decisions of the Government of Kerala regarding the coir industry. The Directorate is the controlling authority of the ten coir project offices at Chirayinkeezhu, Kollam, Kayamkulam, Alappuzha, Vaikom, North Paravur, Thrissur, Ponnani, Kozhikode and Kannur in the state. "Coir Bhavan" - the head office is located at Palayam, Thiruvananthapuram.

The State Government has envisaged a planned and innovative development strategy in the sector. It aims at promoting progressive development of the sector and generating more sustained employment therein. The programme of action of the Directorate is anchored on the concept of functioning as a facilitator for the promotion and sustainability of the coir sector in Kerala's economy. DCD has 42 coir inspector offices across the state.



RECENTLY JOINED AS DIRECTOR
OF COIR DEVELOPMENT

Smt. Anie Jula Thomas IAS



TRAINING ON COIR PITH COMPOSTING

NCRMI's specially formulated substrate-based bio inoculum, known as TRICOPITH, has emerged as a game-changer for coir pith composting. This groundbreaking bio inoculum enables rapid and efficient composting, resulting in stable and mature compost with the ideal Carbon-to-Nitrogen (C:N) ratio for soil microbes. Moreover, NCRMI is taking strides to spread this knowledge by providing in-house training to fiber extraction units in Kerala, equipping them with the skills and expertise required for successful coir pith composting using TRICOPITH.

The key advantages of TRICOPITH

- ✦ Ideal C:N Ratio is essential for the growth and activity of soil microbes. This makes the compost an excellent soil conditioner, enhancing its ability to support plant growth.
- ✦ Microbial activity plays a vital role in reconditioning the soil, improving its structure, and enhancing its fertility.



KADALUNDI COIR CO-OPERATIVE SOCIETY

Kadalundi Coir Co-operative Society Limited No. 223 is a coir co-operative society registered on 22-01-1958 at Kadalundi village in Kozhikode district and started functioning on 15-02-1958.

The group owns 30 cents of land and three buildings and has 389 workers and 27 supporters. Currently Beypur handspun, KMRY, and Vaikom varieties of yarn are produced. The association has a President Sri. Devan M, Secretary Smt. Anitha C K and an elected governing body. The coir co-operative society has share capital of Rs. 18,11,405.97 of which Rs.1,67,275.97 is from workers and Rs.16,44,130 is from the Government.

The group employed 80 persons and produced 599.3 quintal of yarn and 683.81 quintal of fiber in the last financial year. The mini de-fibering (DF) machine provided by the Kerala State Coir Machinery Manufacturing Company and the integrated DF machine are used to process the green husk and produce fiber. The team also has mechanised ratts for yarn production and



frame mats for mat and mattings production.

NCRMI has provided training in making various types of Coir and Coir products to the workers of the society. The income assurance scheme in the society has benefited workers and increased employment opportunities. Increased electrification and modernisation of machinery can drastically improve production, productivity, and employment for the society.

Year	Workers (Nos)	Yarn (Quintals)	Fiber (Quintals)
2020-21	121	704.00	503.32
2021-22	92	726.00	720.55
2022-23	86	599.3	683.81

COCOMATS INTERNATIONAL

Cocomats International is a proprietorship firm founded in 2003 by Mr. Hashim. Cocomats International is one of the leading Manufacturers and Exporters of Coco Products such as Coir Pith, Coir Fibre, Coir Geo Textiles, Coir Rope, Coir Geo Textiles, Coir Log, Coir Yarn, Coir Mats and Rubber Mats. It is an ISO 9001 Certified firm and OMRI Certified from the USA. The firm received the National Award for Largest Exporter of the Year in 2008, 2017-2018, and 2018-2019 from the Coir Board of India.

of Fertilizers using their innovative ideas and technologies with Coir Blending. Cocomats International is guided by its values of innovation, constant improvement, continuous growth, and sustainability focus.

Cocomats products are exported worldwide to countries and regions including the USA, Canada, European countries, Middle East, African and Asian Countries. Agri Middle East LLC is Cocomats International's branch in Dubai for Landscaping and gardening. They also collaborate with Spanish company Coco Espana for operations in Spain. Cocomats also make value-added products in different types



MONARCK ENGINEERS MECHANICAL ENGINEERS AND GEAR MANUFACTURERS

Started in 1973 in a humble way with the facility to fabricate simple tools, dies, moulds, and spare parts of different machines to cater to the needs of industrial units in and around Ernakulam Monarck Engineers has gradually grown to the present stage of a full-fledged machine manufacturer by concerted effort and hard work maintaining the high quality and precision in workmanship. During the past 39 years Monarck has supplied numerous numbers of Machines to the cosmetic industry, Industry, Refineries, Fertilizer Plants, and food processing industries.

Monarck has emerged simultaneously as one of the important manufacturers of wide range of machines to cater to the various needs of Coir Industry. Monarck's machines are known for quality and high standard of performance. The machines fabricated for Coir Industry include fully automatic power loom, semi-automatic loom, PVC tufting machine, latex backing machine, spool winding machine, cop winding machine, dyeing machine, passing/inspection machine, yarn clipping machine, brush mat trimming machine, spray bleaching machine and trolley feeding type dryers for coir door mats, etc.





Department of Coir Development
Government of Kerala, India



National Coir Research
& Management Institute



National Coir Research & Management Institute (NCRMI)

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