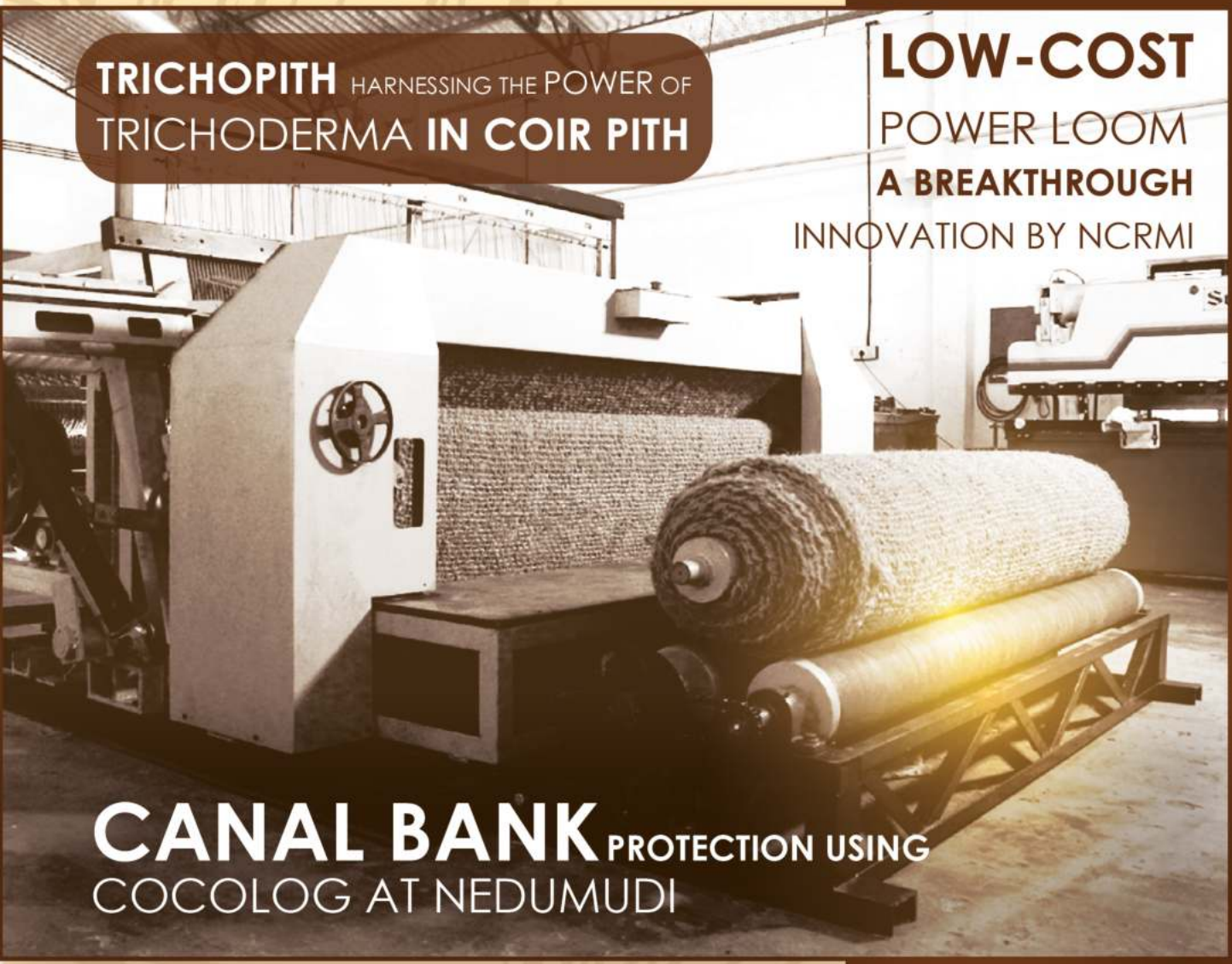
Issue 3

COIR VOX

A Bulletin from NCRMI on Kerala Coir

2023 June



TRICHOPITH HARNESSING THE POWER OF TRICHODERMA IN COIR PITH

LOW-COST POWER LOOM A BREAKTHROUGH INNOVATION BY NCRMI

CANAL BANK PROTECTION USING COCOLOG AT NEDUMUDI

PUBLISHED BY

NATIONAL COIR RESEARCH & MANAGEMENT INSTITUTE (NCRMI), THIRUVANANTHAPURAM

NCRMI
INFRASTRUCTURE

NCRMI Geotechnical Engineering Laboratory

NCRMI spearheads various research and development activities in the coir sector. To test and assess the various physical and engineering properties of soil, yarn, fibre, and geotextile, NCRMI is equipped with a geotechnical laboratory having sophisticated instruments. The laboratory offers the facility for the analysis of a wide range of soil behaviours and properties, ranging from simple moisture content analysis to the most versatile triaxial shear test.

Key Soil Testing Facilities:

- Moisture content
- Specific gravity
- Atterberg limits
- Sieve analysis
- Hydrometer analysis
- Direct shear test equipment
- Permeability test equipment
- Unconfined compression test equipment
- Field density (Core cutter method)
- Compaction (Light & Heavy compaction)
- California bearing ratio test equipment
- Triaxial test equipment

Key Facilities to Determine The Mechanical and Hydraulic Properties of Geotextiles:

- Thickness gauge
- Apparent opening size
- Puncture resistance by falling cone method
- Permeability test of geotextile
- Gradient ratio test
- Long-term flow permeability

Triaxial Test Equipment

For the analysis of fibre, yarn, and geotextile, highly sophisticated universal testing equipment, Instron 5969, is maintained at the lab. The equipment is loaded with separate load cells to evaluate the tenacity, breaking load, and other fibre, geotextile, and yarn parameters. The various grips for testing are mechanical screw action grip for testing woven, knitted fabrics/geotextiles cord, yarn grip for testing yarn, and pneumatic grip for fibre. The equipment being software driven provides live test results. The testing facilities are availed by various research organizations, educational institutions, and private institutions to aid their research.

CBR Test Apparatus

Unconfined Compression Test Apparatus

Universal Testing Machine Instron 5969

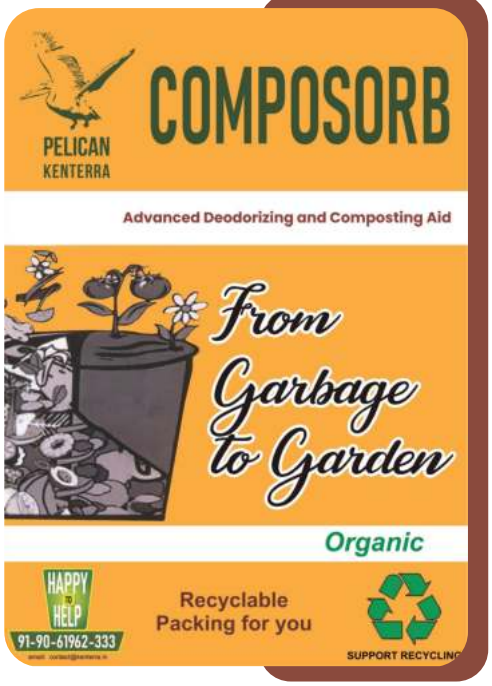
Expert Feature

VALUE ADDED COIR PITH IN WASTE MANAGEMENT AND AGRICULTURE

Dr. C N Manoj,
Director, Pelican Kenterra P Ltd

Coir pith is a well-established soil additive used across the globe in agriculture. India is exporting huge quantities of coir pith, worth many millions, every year. Coir pith is used in the raw and composted forms in these additives. It provides humus, soil conditioning, water retention and microbial medium properties to the soil. Coir pith is being composted using ligno-cellulolytic fungus to generate a less EC (low phenolic) coir pith to further enhance the rooting properties of the planting media.

Coir Pith As A Composting Aid:



COMPOSORB: *compost and absorb - Our proprietary technology- Advanced composting using aerobic assistance – ACUAA.*

Pelican has been pursuing the use of coir pith as a medium for growing lignocellulolytic fungus so that it can be used as a composting aid/ inoculum/accelerator. We have now successfully formulated and developed an inoculum named "COMPOSORB" that has been proved to be a good composting aid/accelerator.

1. **COMPOSORB** is an aerobic composting agent developed from natural materials like coco peat, hay, dry leaves etc.
2. **COMPOSORB** degrade all biodegradable wastes like kitchen waste, food waste, meat, fish, fruit peels, seeds and vegetable waste.
3. **The microbes** in **COMPOSORB** rapidly convert them into a nutrient rich organic planting media and manure.

ADVANCED COMPOSTING USING AEROBIC ASSISTANCE – ACUAA.

1. ACUAA provides the solution for aerobic composting challenges.
2. During conventional aerobic composting the major challenge is to maintain the aerobic nature of composting which gets progressively difficult due to leaching liquid and size reduction in the composting material, hindering free passage of air.
3. ACUAA provides in COMPOSORB, a two-prong solution for the same.
4. First the solid and liquid waste is sandwiched between spongy matrixes (PCS) that can absorb moisture.

The matrix comprising of coir pith based lignocellulolytic materials also adsorbs stench and obnoxious gases and provides for the aerobic condition when waste disintegrates into uniform particles along with the matrix into healthy nutrient rich organic manure. Additives in the formulation help to maintain pH and low EC value by which the compost rapidly changes into a soil-less planting media. The compost can be simply filled in a planter and left behind for around 15 days, after which a plant can be simply inserted into that.

Soil less planting media: We also have developed a soil less planting media branded from coir pith and other ingredients. Composted coir pith is formulated with organic sustained

release nutrients so that the plants can survive for a long time without additional nutrients. Unlike a soil conditioner, soil less planting media need to qualify many parameters like pH, nutrient load, water holding capacity and most importantly, Electrical conductivity (EC) value. We have developed such a product which is currently used by nurseries for seed germination.

Primarily soil less planting media is an urban boon. With the quality of the soil available for urban gardening raising many questions, it is a great advantage to have a guaranteed planting medium. Secondly, it is lightweight, providing multiple advances like easy to handle, extended planter life, and reduced watering cycle. Due to the high content of humus, planting media provides high rooting volume and hence requires lesser surface area.

Based on our coir pith-based planting media, we also have designed a zero carbon vertical garden module. Conventional vertical gardens with plastic pots, iron scaffoldings and soil, creates more carbon footprint than what the plants growing in that can compensate. Our zero carbon vertical garden made of coir pith based planting media, coir ply and coir fibre gives a carbon neutral solution. This provides carbon reduction possibility in urban establishments.

Mycochitin: we are in the process of formulation chitinaceous exo-skeleton, coir pith and chitinase generating fungus to develop a broad based organic contact pesticide. Coir pith is a material or the next generation that can rule from engineering to Biotechnology.

LOW-COST POWER LOOM:
A BREAKTHROUGH INNOVATION BY NCRMI

NCRMI has made significant strides in the development of innovative technologies to enhance the coir industry's productivity and efficiency. One such breakthrough is the development of a low-cost power loom specifically designed for weaving coir geotextiles and coir mattings. This pioneering technology promises to revolutionize the coir weaving sector, offering improved weaving speed, cost-effectiveness and quality output.

The low-cost power loom developed by NCRMI incorporates cutting-edge technology and innovative design features to streamline the weaving process while maintaining the quality and integrity of the coir products. This power loom is engineered to handle the unique characteristics of coir yarns, ensuring smooth weaving operations, minimal yarn breakage and consistent product dimensions.

The key advantages of the low-cost power loom include increased production efficiency, reduced labour requirements, and improved product quality. The power loom significantly enhances productivity by automating the weaving process, allowing weavers to produce larger quantities of coir geotextiles and mattings within shorter timeframes. This increased efficiency translates into cost savings for manufacturers and a competitive edge in the market.

Furthermore, the power loom's user-friendly design and simplified operation make it accessible to small-scale weavers who may have limited technical expertise. NCRMI has also provided comprehensive training programs to ensure that weavers can effectively operate and maintain the power loom, maximizing its performance and longevity. In addition, by enabling increased production capacity, the power loom supports the growth of the coir sector while minimizing the environmental impact.

Key Features:

1. Automated Weaving Mechanism reduces manual labour requirements and ensures consistent and precise weaving, resulting in high-quality coir products.
2. Easy-to-Use Interface enables operators with minimal technical expertise to operate it effortlessly.
3. Compact design to optimize space utilization. Footprint: 8 m x 4 m x 2.2 m
4. Motorized take-up mechanism to wind the woven coir matting onto a roll.
5. Electronic shedding control system for automated shedding.
6. Sturdy warp beam to hold the warp yarns during weaving.
7. Shuttle-based weft insertion mechanism for efficient weaving. Auto-stop mechanism to detect yarn breakage or other weaving faults. Weaving speed: 1.2 sec/weft
8. Rigid beat-up mechanism to securely place each weft thread against the fell of the mattings.
9. Variable speed control to adjust the weaving speed based on the operator's requirement. Coir Geo Textiles: 260 running meters. Coir mattings (SK1): 96 running meters. Width: 0.7 m - 2.1 m
10. Power Requirements: 5 HP for main motor, 0.5 Hp for take up mechanism. Power required- 440V 3 Phase AC.

CANAL BANK PROTECTION USING COCOLOG AT **NEDUMUDI**

Fixing of cocolog

Kuttanad region of Kerala is well known for its vast paddy fields and geographical peculiarities. The region is one of the few places in the world where farming is carried on around 1.2 to 3.0 metres (4 to 10 ft) below sea level. Picturesque streams and canals are the lifelines of the region. The region is likely to be flooded yearly in the monsoon season. As floods are being faced at intermittent intervals, second crop cultivation of paddy in the region is difficult. As a result, these cultivation practices were abandoned by farmers for several years.

Nedumudi is one of the panchayats in the lower Kuttanad region on the banks of the river Pamba. Due to the impact of climate change and heavy rainfall occurring in the recent period, Nedumudi has become one of the major vulnerable locations to floods. As paddy cultivation is the major economic activity of the region, the stability and strength of canal/paddy bunds are crucial.

Silt deposition reduces the water carrying capacity of canals, so the drainage is affected, leading to the flooding of the surrounding region and the destruction of the bund. When bunds are damaged, the water flows to the paddy fields damaging thousands of acres of crop cultivation.

Cocologs were envisioned as a solution to this problem. A log-like structure of coconut fibre covered with coir netting is called a cocolog. Cocologs were placed as an intermediate between the canal bank and water by means of coconut logs piled to the canal bottom in order to strengthen the canal bank. Over a distance of 600 metres, the cocologs were placed, stacked one on top of the other and fastened with ropes. The cocolog aids in dissipating the energy imparted by the flowing water on the canal bank. It also aids in retaining the soil along the canal bank. To instil strength in the cocolog fortified canal bank, vegetative establishment was also done. As the roots of vegetation develop, it binds together the entire structure preventing damage.

During the rainy season, the structure was observed to fortify the canal bank and safeguard the settlement and paddy field. The reinforcement has made it feasible to cultivate paddy in the area for the second time in a year. Thus, the cocologs aid in achieving a sustainable method of canal bank protection in the Kuttanad region.

Canal bank protected by cocolog

TRICHOPITH: HARNESSING THE POWER OF TRICHODERMA IN COIR PITH

Coir pith has gained popularity as a versatile and sustainable alternative to conventional soil amendments. Coir pith possesses excellent water-holding capacity, aeration properties, and a neutral pH, making it suitable for various agricultural applications. However, despite its numerous benefits, coir pith, a lignocellulosic product, has a relatively slow decomposition rate. This poses a challenge when it comes to incorporating it into the soil and making its nutrients readily available to plants. Hence it is necessary to find out effective and innovative solutions for the better and faster decomposition of coir pith.

Trichoderma is a group of naturally occurring fungi that accelerates the degradation process by breaking down the complex organic compounds in coir pith. NCRMI has developed Trichopith, a specially formulated substrate-based bio inoculum using *Trichoderma* sp. for rapid and efficient composting of coir pith. Coirpith enriched with Trichopith can be applied to a variety of agricultural practices, including organic farming, horticulture, and hydroponics.

To implement this approach effectively, it is essential to ensure the quality and viability of the inoculum. The commercial spawn production unit in NCRMI caters to the full need of spawns to produce Trichopith. This powerful inoculum, developed by NCRMI, is designed to accelerate the decomposition of coir pith, converting it into a nutrient-rich compost which works faster and convert coir pith to a soil conditioner with effective biocontrol property. As a result, an increasing number of clients from diverse sectors have embraced NCRMI's coir pith composting inoculum, recognizing its potential to enhance soil fertility and promote sustainable agricultural practices. NCRMI's coir pith composting inoculum has garnered recognition and adoption among following diverse clientele who have successfully integrated this technology into their operations.

OTHER BENEFITS OF TRICHOPITH

- *Trichoderma*'s enzymatic activity aids in the breakdown of complex organic matter that plants can readily absorb. This increases nutrient availability and improves overall plant health and productivity.
- *Trichoderma* exhibits antagonistic properties against various plant pathogens, including fungi, bacteria, and nematodes. When incorporated into coir pith, it helps suppress harmful organisms and reduce the risk of disease and improves plant resilience.
- Coir pith enriched with trichopith enhances soil structure by promoting the formation of stable aggregates. This improves water infiltration, root penetration and air circulation.

HAPPY CUSTOMERS

PUBLIC SECTOR UNITS	COIR COOPERATIVE SOCIETIES	PRIVATE ENTREPRENEURS
Kerala State Coir Corporation (KSCC)	Vazhamuttam CVCS	M/s.Cocofab Pvt Ltd, Palakad
Coirfed	Kairali CVCS	Cladis Pvt Ltd, Kozhikode
Kerala Clays and Ceramics Pvt Ltd (KCCPL)	Chirayinkeezhu-Anjengo Coir Mats & Mattings cooperative Society Ltd.	Leo exports, Palakkad
	Iringallur CVCS	Durga compost unit,Thrissur
	Akkarappadam CVCS	Takson Agro industries
	Ferook CVCS	

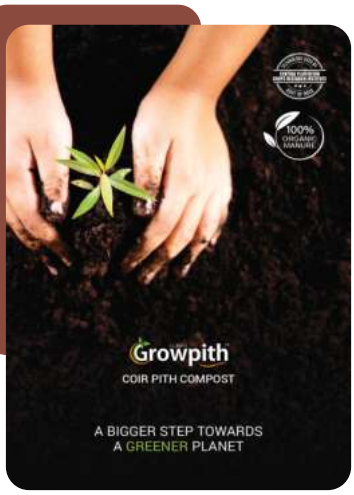
TUFTED MATS

Tufted coir mats are produced by inserting Coir yarn as a pile over a PVC base to form a brushing effect on the surface. The tufting process involves cutting of yarn to the required size and embedding it into the PVC/Natural Latex compound spread over the surface of a heat resistant Teflon belt conveyor, which leads itself to a heating zone, the temperature of which ranges from 140 to 180 ° C with yarn projected over its surface. After travelling over the heating zone for about 25 meters, it reaches the cooling zone, where the temperature is maintained at 10° C to cool down the mat formed. This enables the base compound to firmly hold the yarns erected on the base structure and form the mat with PVC/Latex base and yarns embedded in it. After cooling down, the mat is released from the conveyor belt and rolled or cut to the required size by longitudinal or crosscutting.

Special feature

CLADIS : ENTREPRENEURIAL SPIRIT IN THE KERALA COIR INDUSTRY

The **Kerala coir sector** was built on the handwork and perseverance of able leaders and dedicated workers over the past many decades. The Kerala Coir sector has many young people with an entrepreneurial spirit setting up base in Kerala. Cladis Private Limited is one such venture of dynamic young entrepreneurs of Kerala that manufacture Coir and Agro related Coir products. Cladis Private Limited was incorporated in 2018 and is headquartered in Kozhikode.



Their manufacturing unit is spread across 4 acres of land, with a capacity to process 50000 Husk a day. CLADIS aims to improve the traditional coir industry into a more product efficient and cost-competitive sector, thereby facilitating the industry's sustainable development. Given its strategic location, CLADIS can play a key role in linking the coir value chains of north and south Kerala.

CLADIS has formulated a effective method for collecting coconut husks. It has dedicated wings of professionals, to facilitate coconut husk collection and for marketing final products. CLADIS products go through a 3 level quality check before they are sent to customers. Strict adherence to quality parameters has increased the market demand for their products.

CLADIS products

- Coir Fibre
- Coir Pith
- Coir Pith Compost
- Coir Pith Briquette
- Coir Yarn
- Coir Geotextile
- Coir Mats

CLADIS Facilities

- Defibering unit
- Godown
- Bailing unit
- Two ply yarn Unit
- Geotextile Unit
- Drying and stocking Yard

TECHNOLOGY TRANSFER OF VARIOUS PRODUCTS DEVELOPED BY NCRMI

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

PSU IN FOCUS

FOMIL

FOAM Mattings (India) Limited (FOMIL) is a Public Sector Undertaking established in 1972 under the Government of Kerala. It manufactures various products made of Coir, Jute, Sisal, and Rubber under the brand FOMIL, which are marketed domestically and internationally. In terms of coir textile marketing, FOMIL has achieved significant growth with sales reaching Rs 5.26 crores in FY 2022-23, and it aims to achieve a turnover of Rs 7 crores in FY 2023-24. Efforts are being made to expand the domestic market by engaging with more buyers, resulting in increased machinery utilization and employment opportunities.

FOMIL's mattress marketing division has shown potential, with sales increasing from Rs 1.57 crore in FY 2021-22 to Rs 2.43 crore in FY 2022-23. FOMIL aims to expand its mattress market to other districts and increase sales to over 5 crores in 2023-24. Foreign marketing has been a significant focus for FOMIL, and efforts are being made to strengthen it by collaborating with buyers and supplying a wide range of products required in foreign markets.

FOMIL aims to capitalize on marketing opportunities by launching innovative products. Coir Grow bags, as an eco-friendly alternative to plastic grow bags, has significant marketing potential. Additionally, eco-friendly Coir Car mats are being developed. FOMIL has also established a Coir Composite Board Factory, producing boards from Coir Fibres that offer superior features compared to other Plywoods. Sales worth around 50 lakhs have been achieved, and there is high market potential for these board products.

ASM TRAINING: ENSURING PROFICIENCY AND **SAFETY**

Automatic Spinning Machine (ASM) based yarn manufacturing is a mechanised process. Yarn production via spinning machines require acquiring high proficiency for optimal production while ensuring the safety of the operator. An intense level of on-the-job training is essential to acquire the desired production. Proficiency in operating skills will ensure that women workers adapt to the spinning technology. Apart from operating the spinning machine, on-the-job training also ensures skill upgradation in allied processes of spinning like willowing, spooling and winding operations.

NCRMI, the nodal agency for conducting training programs under Coir Development Department of Kerala, conducts skill training programs for women workers of Coir Cooperative Societies. The training programs are conducted for a period of 30 working days at coir cooperative societies. NCRMI has been diligently imparting on-the-job training to women coir workers along with other stakeholders like KSCC and Coirfed to ensure yarn quality and worker safety. NCRMI has already conducted 167 batches of training. A total of 1640 women workers are trained by NCRMI in Automatic spinning machines.

Exporter in Focus

TRAVANCORE MATS AND MATTING PRIVATE LIMITED

Travancore Mats and Matting Private Limited (TMMPL), established in 1917, is one of the few companies in this sector constantly innovating new products, designs and techniques in the production line and competing in the international market. The company has been investing in automation and technology for a very long time to increase its competitiveness. The company has obtained AEO T1 and AEO T2 certifications in supply chain security from the customs department.

IKEA Supply AG, Switzerland, the world's largest home furnishing retailer, is TMMPL's major buyer. TMMPL is the only potentially prioritised supplier of natural rugs and carpets in Southeast Asia for IKEA and has been doing business with them for more than 50 years. The company has been honoured with numerous export awards based on its sales with IKEA.

TMMC had been the winner of "Export performance in Coir" and "Largest exporter of Coir and Coir products" awards from the Ministry of MSME, Govt. of India for a continuous period of four years from 2012-13. In 2020, the company received an MSME award from the Hon. Prime Minister of India.

The company's average annual export Turn Over in the last three financial years was Rs.125 Crores, and it is confident of achieving 25% growth every year. TMMPL has five units, of which one is in Tamilnadu, and four are in Cherthala Alappuzha. TMMC employs more than 800 workers and 125 staff in these units. The company takes pride in its blemish-less track record in protecting the interests of people and the planet and has made a name for itself as a fair employer meeting all statutory norms and has won many awards from the Pollution control board for its sustainable and eco-friendly operations.

Coir Co-operative Society in Focus

ALAPPUZHA NEW MODEL COIR SOCIETY

The **Alappuzha** New Model Coir Mats and Mattings Co-operative Society has a fascinating history - it was started in 1971 by the grit, passion and perseverance of 34 coir workers who were dismissed from the European Piers Leslie company. The society has grown steadily under stalwart leaders over the years, completing 52 years of successful operation. The society currently has 111 members. Imbibing the values of employee rights and work satisfaction, the society provides job security and social security to workers such as PF, ESI, Leave with Wages, Holiday Wages, Gratuity, Bonuses etc.

The society operates on land acquired under the leadership of the industrial architect of Kerala and the Minister of Industries at the time, Mr T.V. Thomas. The 2.5-acre establishment is in the heart of Alappuzha town on the north bank of the Commercial Canal with 18 buildings. The society has 31 looms of sizes varying from one meter to four meters. It runs a profitable business and produces 1,50,000 sq.m. of coir geotextile mattings annually, worth one crore rupees.

In 2017 under the leadership of the Coir and Finance Minister Dr T.M.Thomas Isaac, the Society was declared a Live Coir Museum and was included in the heritage city plan of Alappuzha.

Department of Coir Development
Government of Kerala, India

National Coir Research
& Management Institute

Kerala COIR
Golden Yarn of God's Own Country

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