APRIL 2023

COIR VOX

A Bulletin from NCRMI on Kerala Coir

REJUVENATION OF
EXPOSED ROCK
PATCHES & EROSION
CONTROL USING COIR
GEOSYNTHETICS

NCRMI OVERVIEW
Mobile Tender
COCONUT
CRUSHER

COIR GEOSYNTHETICS

ENRICHED ORGANIC
COMPOST FROM
HOUSEHOLD WASTE
USING **COIR PITH**

ISSUE
1

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REIMAGINING THE FUTURE WITH COIR

Coir is the wonder fibre that stitches together the history of Kerala and binds it with world history. Coir industry started developing in Alappuzha in Kerala around 1859 from where it spread to different parts of India.

Marco Polo, the renowned explorer, had recorded in his journals the method of fibre extraction from coconut husks. Coconut fibre is an eco-friendly product and is one of the hardest natural fibres. The fibre has traditionally been used as rope and floor coverings like for making mats, carpets etc. However, over the years its uses have diversified, thanks to NCRMI for significant role played through its R & D intervention.

A pioneering research and development organisation, under Coir Development NCRMI was registered in the name C-DOCT to cater to the varied needs of the coir industry in Kerala in 1994. Later in 2003, C-DOCT was elevated to the standard of a Global Institute. The scope of activities of NCRMI and its role in the Kerala coir sector was dramatically elevated by this step. NCRMI has explored and improved the multiple applications of coir like soil erosion control and reinforcement and stabilisation of soil. Besides emerging as an eco-friendly substitute in various applications, coir has also penetrated into the fashion and accessories world since discerning customers, driven by eco-sensitivity are looking for sustainable products.NCRMI envisions a sustainable future for mankind where development is not at the expense of the environment.NCRMI has been an innovative force in giving a new touch and feel to the coir industry and the varied products it churns out. NCRMI is designed to facilitate comprehensive research on coconut fibre and other allied products. It has been spearheading various developmental activi ties and making meaningful policy interventions since its inception. NCRMI has helped boost the coir industry in Kerala and increase its product portfolio considerably in the last many years. NCRMI's relentless efforts and innovative ideas have facilitated innovation in the coir industry which has been steadily expanding its market both within the country and abroad. NCRMI has been highly successful in developing a variety of products, most of which have become huge hits in the market.

Apart from technological innovations, NCRMI conducts training programmes with a focus on training women workers across Kerala. A pipeline of innovative research programmes, skill development programmes, and collaborations with reputed research organizations are in order to impart technical and management skills to students, self-help groups, and entrepreneurs. NCRMI aims to support sustainable development and to create a robust ecosystem and knowledge platform for Kerala's coir sector.

CHAIRMAN'S MESSAGE

NCRMI was created with the vision to act as the nodal agency for coordinating all the technical and academic developments related to the Coir Sector in Kerala.Since it's inception days, it has lived up to its founding goal. It has become the nodal point for Research, Development, Training and overall knowledge management of the sector. It gives me great pleasure to learn that NCRMI is bringing out such a Bulletin to share its knowledge with all the sector stakeholders.

Coir Vox aims to inform the readers about the latest trends and developments in the Coir Sector, the various activities of NCRMI and Coir Ecosystem in the State. Coir Vox will also have technical articles and short summary of recent research in allied subjects. I congratulate NCRMI on this much needed initiative and wish the endeavour all success.

SHRI. P RAJEEVE

Minister for Industries, Law, and Coir &
Chairman NCRMI

PRINCIPAL SECRETARY'S MESSAGE

Realising the great financial potential and ever-growing global demand for Coir products, NCRMI with the support of both Central and State Governments has implemented a number of innovative solutions. Coir, as a versatile renewable resource, is helping to enhance our commitment to quality and sustainability. Our initiatives not only provide an advantage in the domestic sector, but also contribute significantly to India's economy through exports.

Furthermore, we have been keen on promoting the welfare of coir workers, including various training programs and skill development initiatives. To boost the production and exports of coir products, we have put emphasis on implementing the most sophisticated technological and innovative research measures.

COIR VOX is a newsletter that covers all the essential updates on NCRMI's activities and the Coir industry. Through this venture, I hope you will acquire a better understanding of NCRMI and the wonder fibre that is Coir.

SHRI. MOHAMMED HANISH IAS
Secretary, Coir

DIRECTOR'S MESSAGE

Kerala is a veritable treasure trove of traditional coconut fibre. NCRMI's persistent work has resulted in making this valuable material one of the most sought-after products in the world. Our attempts to expand its availability to a global market have been applauded by all. Aside from traditional products, NCRMI's modern techniques have made way for new and inventive coir items. Geo-textiles have been readily welcomed due to their environmentally friendly nature. The world has been gradually shifting towards more eco-friendly products, and Kerala has seen an increasing demand for its coir products on the International market. Our new initiative, COIR VOX, was created to spread awareness on latest development in the sector and a more sophisticated and sustainable lifestyle for the future.

SHRI. V R VINOD IAS
Director, NCRMI &
Director, Coir Development Department

COIR GEOSYNTHETICS

Dr. K. Balan

Coir Geosynthetics are used for non-critical civil engineering applications such as erosion control, silt fence, separation layer or basal reinforcement, protection of canal or river sides, to mitigate meandering in river and in rural roads, etc. In the geosynthetic market, geosynthetics made of natural fibers such as coir, jute, sisal, hemp and straw are occupying less than 5% of the total quantity of geosynthetics used in civil engineering projects all over the world. Coir fibers can be converted into fabric both by woven and non-woven (stitched, needle punched, adhesive bonded) process. It can be easily blended with manmade fibers too. From among the natural fiber geosynthetics, coir has long life owing to the presence of more lignin content. However, the biodegradation behaviour of coir geosynthetics can be advantageously used to solve civil engineering problems. It can be effectively used where the function of the geosynthetics is needed for a limited time period and by that time either the soil attains sufficient strength or vegetation is established fully to take care of the erosion.

Coir Geosynthetics Products

Three different varieties of woven (mesh mats) coir geotextiles are widely used for erosion control purpose. They are classified based on their mesh size or mass per unit area as 400 gm per square meter (gsm) (about 25 mm opening size), 700 gsm (about 12.7 mm) and 900 gsm (about 6.35 mm). Bureau of Indian Standards, Indian Road Congress and Railway Design and Specification Organization (RDSO)have approved woven coir geotextiles as erosion control material. Non-woven coir geosynthetics are made either by needle punching, coir fibers are bonded together with adhesives or latex, coir fiber sandwiched between thin PP net and stitched with PP filaments. They are also known as erosion control blankets(ECBs). Bureau of Indian Standard's Textile Division is about to publish the standards for coir ECBs.These coir non-wovens are successfully used in Major District Roads in Alleppey district and in National Highways in Ponnani region as capillary breaks and working effectively. Coir nonwoven had been successfully used as a drainage media in NH Bypass embankment above stone columns, starting from Ramanattukara to Chaliyar River. So many case histories of use of coir geo synthetics in highway/ railway embankment, mine waste dumps, river or canal side protection etc., has been reported in literature. Major trials of use of coir geosynthetics in rural roads have been undertaken by Coir Board in association with NIT Calicut, NIT Trichy and College of Engineering Trivandrum. From the results, obtained from these studies in

Kerala and Tamilnadu, specification for the use of coir geotextiles in low volume rural roads has been published by IRC recently. This specification will pave the way for wide usage of coir geosynthetics in village road applications.

Cocologs, coir fibre densely packed in a net having cylindrical form, is another product in the coir geosynthetic family, which can be used for the protection of river or canal sides and also to mitigate river meandering by replacing conventional dry rubble or random

rubble masonry. A field trial has been done in this case at Konni by Kerala Agricultural University. Intensive research is going on in this aspect at College of Engineering Trivandrum sponsored by KSCSTE. Cocobed, coir fibre filled in closely woven mesh mats, can be used as apron in beds of river and canals for deposition of soil and thereby prevent the toe erosion in canal or river. Not much research has been taken place in utilizing this product. Coir fibre treated with latex is another product which can be used as a separator in village roads where the strength of soil is weak. Coir geocell similar to that of its synthetic counterpart can be used to improve the bearing capacity of soft soil. Research conducted in College of Engineering Trivandrum has shown that coir geocell improves the bearing capacity of base soil by two times. Research conducted at IIT Delhi has proved that Prefabricated Vertical Drain (PVDs) made of needle punched nonwoven coir geotextile (Core) wrapped with jute geotextile (Burlap) performs far better than the natural PVD used (jute burlap with coir rope as core) for the development of runway from sea at Changi Airport in Singapore.

Though full-scale field and academic research on coir geotextiles have started in the early 1990's, it gained momentum during 2010 and currently research is going on, in the various aspects of coir geosynthetics, in all coir producing nations. The first book on coir geotextiles was published by Kerala State Coir Corporation Ltd., Alappuzha in 2000 as part of the Coir Geotextile Development Programme of Govt.of Kerala.

Central Board of Irrigation and Power in association with International Geosynthetics Society Indian Chapter has published a book on Coir Geotextiles in 2016, which cover all aspects and applications of coir geosynthetics. The summary of field and research trials has established coir geosynthetics as a better alternative material for civil engineering applications which require limited time period.

*Author is the Former Director, NCRMI, Vice Principal, Rajadhani Institute of Engg. & Tech., Nagaroor. Geotechnical Consultant to M- TIPB, Govt. of Tamilnadu and KRail, KIIFB, KLDC, IDRB, Govt. of Kerala.

SPECIAL FEATURE

REJUVENATION OF EXPOSED ROCK PATCHES & EROSION CONTROL USING COIR GEOSYNTHETICS

Exposed rocky surface before conducting the study

Kerala has a varying topography, with hilly areas, valleys, and meadows. The vegetation over rocky surfaces helps to rejuvenate the area as well as to form soil. Soil formation is brought about by weathering action of various abiotic or biotic factors or in combination of both on rocky strata. Soil forming process is slow and takes thousand years of weathering. Similarly, soil erosion is a process which refers to detachment and displacement of soil particle by various means as running water, wind, glaciers etc. With the unscientific human interventions, the process of soil erosion has reached at a rate that it exceeds the rate of soil formation, tampering the natural equilibrium. The most common means of arresting soil loss from exposed surfaces are by establishment of vegetation. The roots bind together the soil particles against the erosive media thus precluding the soil loss. In such regions where the soil is required to be bound together till vegetative growth is established, coir geotextiles is a feasible solution. Apart from acting as check on splash during downpour, the coir geotextiles also act as a binding material over the soil. For rocky regions, coir geotextile alone could not perpetuate vegetation. Proper rooting medium should also be incorporated for initiating and sustaining vegetation over rocks.

Laying of coir pith over rocky Surface

Keeping in view of the above, a study at NCRMI campus was conducted employing a combination of coir geotextile, cocolog and coir pith for a sustainable measure of erosion control. For the establishment of vegetation over the rocky strata, coir geotextile in combination with coir pith and cocologs were employed as a medium for the growth of seeds.

> *"The combination of ecofriendly and biodegradable solution using coir geotextile, coir pith and cocolog is very effective in the rejuvenation of rock patches and establishment of vegetation especially in hilly terrain.*

For establishment of any vegetation the rooting of seedlings is of paramount importance, which in this case was served by the utilization of coir pith bounded by coir geotextile. Above the rocky area, coir pith for a uniform thickness over which pith was another layer of coir pith in combination with seed was spread.

A combination of coir pith and Congo signal grass seeds was spread over the coir pith layer. Coir geotextile, which were laid along the slope over the layer to prevent dislocation of seeds due to wind, was anchored at top and bottom and fixed to rock. The water holding capacity of coir pith and coir geotextile created an agro-climatic condition suitable for establishment of vegetation. Between the narrow cracks in the rocky format there is always higher humidity so even if it is only a little, the roots do find some water. Consequently the root system develops a symbiosis with fungi and bacteria. Contour bunds constructed using cocologs, acted as barrier to flow of water reducing run off and minimizing soil erosion.

Despite the rocky terrain of the region, the growth of seedling was observed to be flourishing. In addition to arresting erosion from the region, the vegetative establishment augmenting the aesthetic quality is an added advantage. Also with the establishment of the roots, the vegetation also accelerates the process of soil formation by roots penetrating into rocks. With the passage of time, the area became established with respective vegetation which further deployed successive generation of vegetation. In the longer period of time, the rocky patches,which were left barren, could be rejuvenated augmenting the aesthetics and accelerating the soil forming process.

Laying of cocolog

Four months after sowing

SPECIAL FEATURE

MOBILE TENDER COCONUT CRUSHER

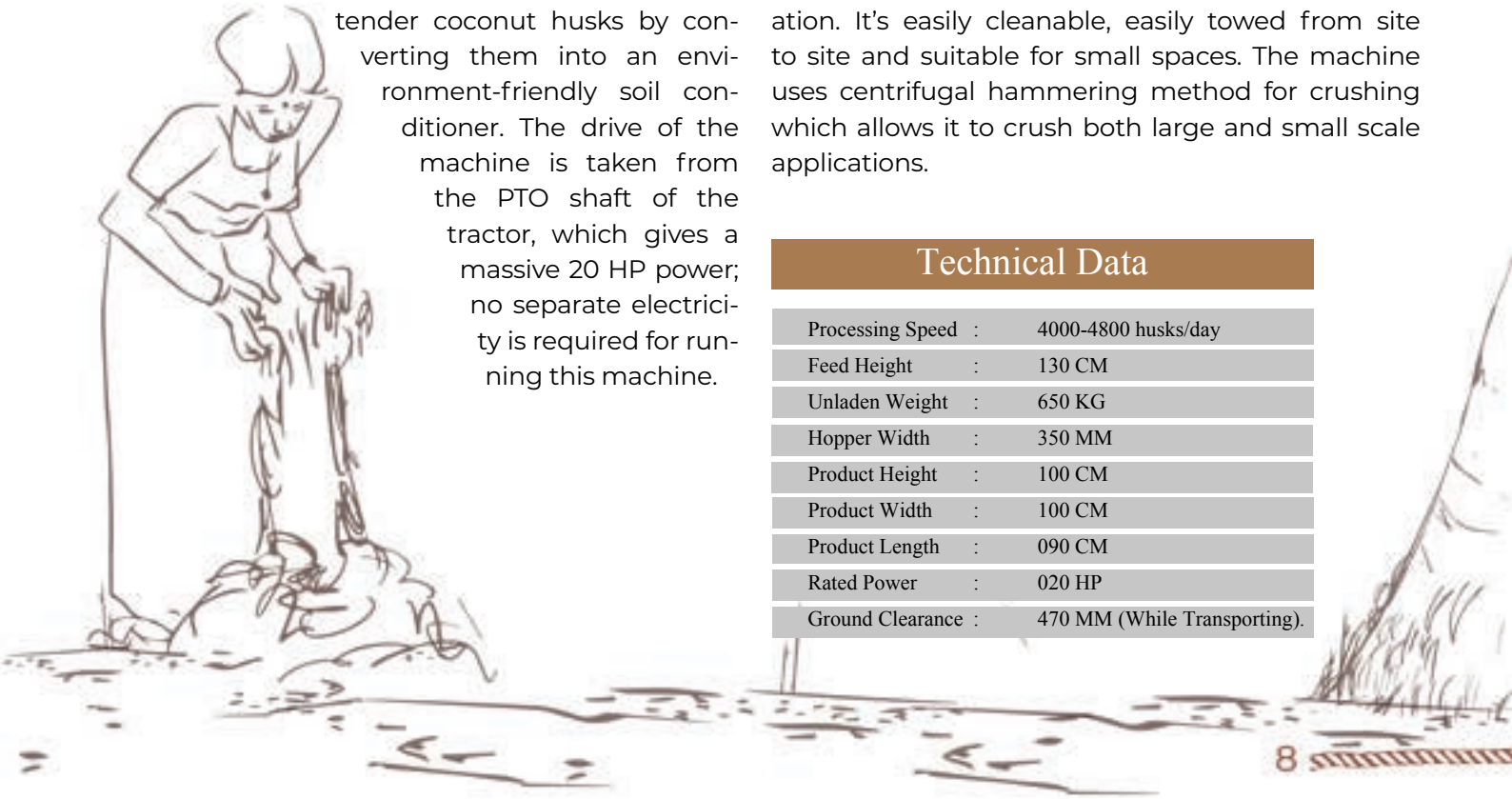
WHAT'S NEW?

The new coconut crusher developed by NCRMI uses a unique technology for the conversion of coconut husks into crushed forms that can be used in soil conditioning. The machine, called the Mobile Tender Coconut Crusher, is connected with a tractor for easy transportation from one place to another. This has become a solution for environmental problems due to the piles of used tender coconut husks by converting them into an environment-friendly soil conditioner. The drive of the machine is taken from the PTO shaft of the tractor, which gives a massive 20 HP power; no separate electricity is required for running this machine.

The tender coconut crushed products has many applications, including soil conditioner, seedling filler material, agricultural mulching, biochar manufacturing and charcoal block manufacturing. It has many benefits including minimal running costs and simplicity in operation. It can eliminate setup time practically. The coconut crusher is made with 52 jaw blade crusher, robust frame, feed hopper, PTO direct drive and a hydraulic lift for easy operation. It's easily cleanable, easily towed from site to site and suitable for small spaces. The machine uses centrifugal hammering method for crushing which allows it to crush both large and small scale applications.

Technical Data

Processing Speed	:	4000-4800 husks/day
Feed Height	:	130 CM
Unladen Weight	:	650 KG
Hopper Width	:	350 MM
Product Height	:	100 CM
Product Width	:	100 CM
Product Length	:	090 CM
Rated Power	:	020 HP
Ground Clearance	:	470 MM (While Transporting).



ENRICHED ORGANIC COMPOST FROM HOUSEHOLD WASTE USING COIRPITH

Zero Waste is a goal that is economical, efficient, ethical and visionary. This is achieved by changing our lifestyles and practices to emulate sustainable natural cycles. Composting of wet waste involves undesirable by products such as foul smell, obnoxious leaching, and the release of toxic gases. There is a need for a simple, efficient and cost effective composting media for composting both dry and wet organic waste that can produce high quality compost to be utilized as a soil improving agent.

Advantages

- Highly cost effective and requires no large capital investment
- High quality organic manure in a very short time
- No foul smell or production of harmful pollutants such as Carbon Monoxide, Hydrogen Sulphide
- No need of frequent turning of composting material

Pith Activator is an effective micro organism (EM) developed by NCRMI that accelerates the bio-degradation mechanism of household organic wastes. The present technology provides an activated aerobic composting media containing coir pith impregnated with nutrients and consortium of microorganism used therein for bio-degradation of wet and dry organic waste into excellent high-quality, easy to handle, organic manure. This consortium approach ensures total breakdown of all types of complex organic molecules in the biodegradable residue available for composting thereby accelerating the composting process.

The coir-pith with its very high porosity and water holding capacity provides the best environment for aerobic micro organisms. This not only allows for the growth of aerobic microbes but also absorbsliquid materials from the medium, preventing leaching. Effective micro organisms (EM) include common and food grade aerobic and anaerobic microbes that enhance the conversion of organics. Kitchen waste provides a better environment for the effective microorganisms (EM) to grow and produces a higher quality of household waste compost. Thus household waste is effectively converted to organic gold that enables soil management for sustainable cultivation of any crop.

CHERUVARANAM COIR MATS & MATTINGS CO-OPERATIVE SOCIETY

SOCIETY TALKS

Cheruvaranam Coir Mats & Mattings Co-operative Society was founded on 2nd May 1997 in Cherthala, Alappuzha district. Sri. S Chellappan and Sri. Dileep C P serves as the President and Secretary respectively and there are 154 members in the society. By understanding the social value and financial benefits, this society is formed to cater the demand for coir products like, mattings & Geotextiles in the domestic and international markets. The looms which are currently under operation are of three types. They are Handlooms (37 Nos), Power Looms (5 Nos) and Semi-Automatic (4 Nos).The society is situated in a 55,000 Sq ft. building on 1.83 acres of land. The annual turnover is estimated at approximately 7 crores. The society has acquired an export license and planned to start export business this year itself.

ASPINWALL CO.

EXPORT PROFILE

Aspinwall and Company Ltd., one of the earliest commercial enterprises founded during the British era in South India. Established in 1867 by the legendary English trader and visionary John H. Aspinwall, who offered a range of shipping services and traded in timber, spices and agro-products. In 1956, the Royal Family of Travancore, the erstwhile rulers of Kerala, South India acquired a small interest in Aspinwall, when the company became a public limited company. In the early 1970's when the English owners decided to divest their ownership in Aspinwall, the controlling interest was taken over by the Royal Family. Aspinwall entered the natural fibre processing industry more than hundred and fifty years ago with the manufacturing of hand loom and power loom matting products made from coir. With coir handloom mats as the traditional base, Aspinwall has diversified into developing and producing rubber-backed and PVC tufted coir mats, natural rubber mats as well as floorcoverings made from other natural fibres such as jute, sisal and sea grass. The natural fibre mats are made-to order and exported to buyers in all parts of the United States, Europe and Australia.

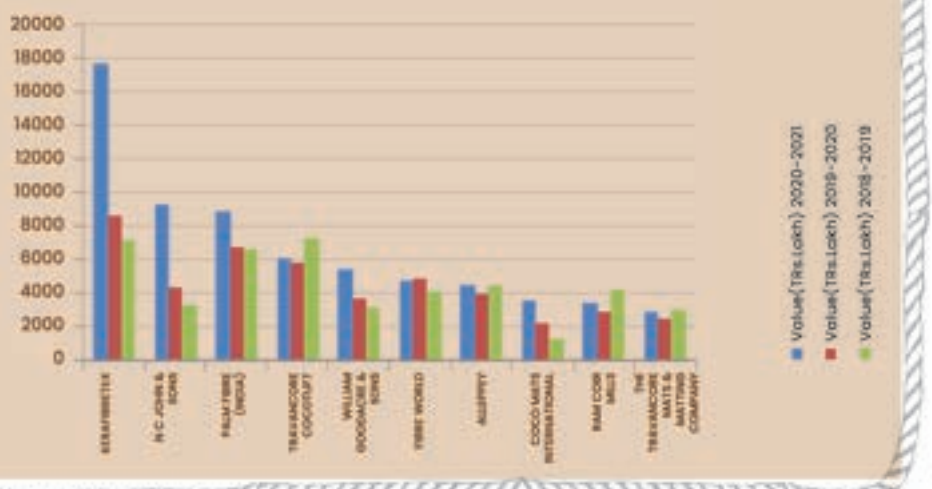
In addition to (door) mats, now they offer coir geotextiles, which are used in environment engineering to prevent soil erosion, as well as coir pith (a natural and eco-friendly replacement for peat moss), which is applied in horticulture as a water-retaining agent and growth medium.

Aspinwall have a fully integrated factory at Pollachi right from Production to Shipment. It also has Certification of SA-8000:2014, ISO 9001:2015 and Sedex. With a branch office in the Netherlands, Aspinwall aims to effectively promote Coir products.

PRICE OF HUSK AND FIBRE

Region	Average Price of Husk in Rs		Average Price of Fibre (in Rs)	
	Green	Brown	White	Brown
Southern	0.70-1.40	0.40-0.75	16.50	14.50
Central	0.80-1.65	0.20-0.80		
Northern	0.40-1.10	0.20-0.60		

COIR EXPORT STATISTICS



SOURCE : COIR BOARD

COIR YARN DETAILS FOR THE YEAR 2022-23

YARN	SELLING PRICE (Rs/Kg)
Vycome(140-240)	44.00 - 59.00
ASM Training Yarn(140-220)	25.00 - 51.50
Anjengo(180-300)	83.00 - 103.0
Aratory(240-300)	63.00 - 78.00
C1330	73.00 - 77.00
Mangadan(90-110)	46.00 - 53.00
Vettoor(180-200)	77.00 - 86.00
Paravur Spl	32.00 - 53.00
Quilandy	71.00
Beypore	62.00

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