Issue 2

CREATING MASTERPIECES
USING COIR

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COIR VOX

A Bulletin from NCRMI on Kerala Coir

COIR GEOTEXTILES
SOLUTION FOR
SLOPE STABILITY

Geocells For
SLOPE LAND STABILIZATION
AND CULTIVATION

COIR GROW BAGS
A BETTER ALTERNATIVE FOR THE PLANT AND PLANET!

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NATIONAL COIR RESEARCH & MANAGEMENT INSTITUTE (NCRMI), THIRUVANANTHAPURAM

INFRASTRUCTURE **FACILITIES AT** NCRMI

The NCRMI campus is situated at Kudapanakunnu panchayath coming under the Thiruvananthapuram Corporation area. It is spread over 7 acres of lush green land inhabited by different varieties of trees and plants and a well-maintained freshwater pond. The campus has 5 main building complexes namely – The administrative complex, Laboratory, Machine shop, Canteen, and Security office.

The administrative block houses the various divisions office rooms, administrative rooms, a seminar hall, two lecture halls, and a digitized board room with interactive technology. The air-conditioned seminar hall has a seating capacity of 75 persons and is fully furnished using coir and coir products that enable acoustic management and temperature control. The seminar hall is equipped with a high-quality projector, Wi-Fi facility, and classroom teaching amenities such as a whiteboard, cordless / collar / wired microphones. It also has an elevated podium that can accommodate 10-12 guests. The chairs are cushioned and are suitable for long duration sessions/seminars with hand rest for note taking.

The two lecture halls are situated on the third floor of the administrative block. The cushioned chairs with hand rests can be shifted to suit the requirements of training sessions. The lecture halls has a wall-mounted LCD projector with a wired micrphone, latest sound system and a dias. Both the lecture halls are air-conditioned and can accommodate 50 persons each.

Apart from the seminar hall and lecture halls, NCRMI has a well-furnished hostel facility. Accommodation facilities can be provided for 50 people. Apart from ordinary rooms, there are fully furnished faculty rooms too. In addition to the accommodation facilities, there is a recreation room with indoor games, TV, and other amenities.

Seminar Hall

Lecture Hall

Guest hostel facility

Faculty Room

COIR GROW **BAGS**

A better alternative for the Plant and Planet!

Grow bag cultivation is an ideal system to produce healthy food in a limited space. One of the main benefits of grow bag is its versatility and mobility. The best alternative to plastic grow bags is fully biodegradable bags that are safe for soil. Grow bags made from natural coir fibres are eco-friendly and renewable. National Coir Research and Management Institute (NCRMI) has designed and fabricated 100% natural and biodegradable grow bags made of treated coir. These coir bags are flexible, lightweight, and durable. Compared to plastic grow bags, coir grow bags are composed of plant-derived materials and are compostable. Coir grow bags are perfect for urban, rooftop, balcony, and patio gardeners. The coir bags are ideal for growing vegetables, fruits, flowers, herbs, indoor plants etc. Coir has excellent water holding capacity that also encourages proper drainage and aeration. It is biodegradable, porous and hygroscopic. Coir fibre prevents nutrients from leaching away and helps in the diffusion of water and air. The texture of the coir grow bags thus allows the water and air to penetrate quickly. Due to this, the roots can breathe, and there is no concussion of roots. Since these coir bags are porous in nature help extra water drains away, preventing overwatering and water stagnation. The coir grow bags enable root aeration, taking much of the heat away from the roots. An improved yield can also be attained with well-developed roots.

Coir bags prevent plants from becoming root bound. The porousness of the coir bag leads to dryer soil near the edges of the container, where there is more contact with the air. When the plant's roots reach that drier soil and the air, instead of circling the pot and eventually strangling the plant, that root stops growing called "air pruning". As roots are pruned, the region behind the root tip is stimulated to generate branches, resulting in the formation of several more secondary roots. The development of more secondary roots boosts nutrient uptake, allowing the plant to grow more quickly.

The coir grow bag is truly a sustainable product which is environmentally feasible, economically sound, and socially acceptable. The potential of using innovative, sustainable, biodegradable, and 100% natural coir grow bags made of treated coir takes a step closer to a greener and well-balanced ecosystem.

Features

- *Excellent aeration and irrigation facilities for the growth of plants.*
- *Maintain a sturdy structure to maximise the possibility of reuse.*
- *Organic, biodegradable, and environmentally friendly.*
- *Lightweight and portable.*
- *Excellent drainage leads to healthier root systems.*
- *No chemicals or plastic, making it environmentally friendly.*
- *Suitable for 2 to 4 plant cycles.*
- *Easy to dispose of by composting.*

COIR GEOTEXTILES **SOLUTION FOR SLOPE** STABILITY

Coir geotextile controls soil erosion by acting as a ground cover or mulch. As a ground cover, it reduces the flow velocity of run-off water by forming check dams with the help of net structured strands of open weave coir geotextile in firm contact with the soil, which absorb the impact of water flow and keep the soil intact. Coir geotextiles have been found to be ideal for situations where land is sloppy which may lead to riling and gullying. In such slopes, heavy rainfall causes loss of soil.

Coir geotextiles have superior erosion control capability for the protection of embankment slopes in roads, railways, natural hill slopes, riverbanks, and canal banks. These are used for gentle slopes (slope angle less than or equal to 45 degrees) and have a life span of 2-5 years.

Coir geotextile also provides support to the sown seeds and seedlings, which could otherwise be easily washed away by water. The strands of the net reduce the wind velocity at the soil surface thereby trapping soil particles from being blown away. As mulch, coir geotextile provides an ideal environment for the seeds to germinate and healthy growth of seedling by regulating soil humidity, temperature and manure and controlling weeds, by protection from direct sunlight and rain.

In the areas of scanty rainfall where the soil is non-cohesive and subject to wind blowing, coir geotextiles provide protection against erosion like in cut slopes of railways, roads, approaches of bridges, banks of canals, rivers, hill slopes and terraces requiring surface stabilization, and aids reclamation of mine spoil heaps and sand dune stabilization.

Coir geotextiles are good insulators, resistant to dampness and moths, absorb moisture equal to their own weight, and conserve moisture in the soil which is sufficient for the growth of vegetation. When the coir geotextile eventually disintegrates, it leaves only humus. There is no need for post-installation work.

Figure 1. Coir Geotextile

Figure 2. Erosion control measures using coir geotextile on railway embankment, Pali, Rajasthan (a) before construction (b) after construction

Coir Geotextile As A Complementary Engineering Material for Reinforced **Soil Facia Systems**

Soil reinforcement is the technique of improving the strength and/or stiffness of soils and other fills with tensile inclusions. Soils have high compressive strength when confined but have low tensile strength and the shear strength of soils depends on effective confining stresses. Reinforcement with tensile inclusions enables soils to resist tensile stresses and increases the shear strength and stiffness of soils. The use of a facing system prevents localized failures i.e., ravelling of fills between reinforcement layers and erosion control in slopes, allowing very steep slopes to be constructed safely.

When vegetation is used as the facia cover, the face should provide a suitable medium like coir, jute, or a combination of it for the establishment and continued growth of vegetation. This blanket is preassembled at the production unit between the double twisted steel wire mesh and welded mesh panel. For a vegetated face, several interrelated aspects need to be considered, such as the climate, water requirements of plants, water availability, site location aspects, altitude, precipitation, a form of facing, and erosion resistance capability to ensure permanent vegetative covering throughout the design life. If the characteristics of backfill soil are not adequate to support vegetation, suitable topsoil material may be placed at the front face separated from the fill by an appropriate separator or hydro seeding may be adopted.

Figure 3. Vegetated facia unit

For the retention of road at technopark in Trivandrum, Kerala, 27m high reinforced soil structure of vegetated/green fascia with integrated tail was proposed as a part of landslide rehabilitation measure. Coir geotextile is one of the components of vegetated facia units as shown in Figure 3. The site installation photographs during construction are given in Figure 4.

Figure 4. Coir Geotextile as one of the components of vegetated facia units for construction of 27m high reinforced soil structure at Technopark, Trivandrum, Kerala

Mrs. Minimol Korulla
Head- Strategic Projects
Maccaferri Environmental Solutions (Pvt) Ltd

GEOCELLS FOR SLOPE LAND **STABILIZATION AND CULTIVATION**

Coir Geocells are three-dimensional honeycomb structures that feature a unique cellular confinement system formed by a series of self-containing cells. They can physically confine the soil placed inside the cells which avoids mass sliding of top soil while vegetation is being established. Coir geocells are widely used for erosion control, ground and slope stabilization, channel protection, structural reinforcement for load support, and earth retention.

Steep slopes must have global stability or be internally reinforced before the application of the geocell system. The soil making up a slope often has a predominantly arid nature due to the lack of organic materials. Under these conditions, it is necessary to ensure that an adequate thickness of topsoil is provided to allow for the growth of vegetation. Topsoil has poor mechanical properties, and it can easily slide down the slope. It could also get washed away by heavy rainfall prior to the onset of vegetative growth. It becomes necessary to build a secure system capable of preventing the detachment of heavier and larger-sized material and simultaneously retaining any growing medium. Geocells are particularly useful in this situation due to the high tensile strength of coir and the dense mesh structure that can hold itself to the foundation profile. This provides an effective containment system for the grassed areas, protecting the latter from erosive phenomena associated with precipitation or with non-channelled flowing waters.

A typical Agri coir cell

Brinjal plant in geocell

Cowpea in geocell

Harvest of brinjal in geocell

NCRMI conducted trials with different crops such as brinjal, tomato, chilli, and cowpea. These crops were cultivated in succession by filling potting mixture along with soil in the coir geocells. NCRMI trials proved the geocell's capability for successive cultivation of two different crops. Even after the second cultivation, the coir geocells were observed to be in good condition. The efficacy of the coir geocell system in reducing soil erosion along with cultivation was observed to be much higher.

Advantages of Coir Geocells

- Stabilization of steep stream banks and embankments.
- Confining topsoil on steep barren slopes.
- Sustaining vegetation and controlling soil erosion on steep slopes.
- Enabling cultivation on steep barren slope lands.

HERITAGE **COIR PRODUCTS**

Frame Mats

Frame mats are those mats manufactured without the aid of a loom. They are manufactured using frames, hence called frame mats. It is manufactured using base wooden/ metal structure having levelled a plane top upon which cast iron/steel rods are fixed in different arrangements and orientations. Typically, four workers are employed in single frame mat unit.

Sinnet or Chain Mat

A mat made of plaited (braided) coir yarn guiding it in an even zigzag manner with inter spaces giving patterns by stitching with the help of specially designed wooden boards. Sinnet mat is a reversible non-brush mat.

Corridor Mat
(Hollander or Dutch Mat)

This mat is produced with the help of a designed frame and a pressing device. It is a mat in which both warp and weft strands are continuous without tucking in or binding. It is a non-brush type and the weaving is of carpet weaving in which the weft is predominant and warp is concealed.

Mesh Mat - Non-brush mat

Non-brush mat having a regular mesh effect achieved by laying coir yarn in cris cross manner between a number of nails fixed on a frame and knotting the intersecting points with coir yarn.

Rope Mat or Lovers Knot Mat

A mat made with a coir rope guided through a number of upright nails fixed on a flat surface. It is available in oval, spare, rectangular and round shapes.

THE KERALA **STATE COIR CORPORATION LTD.**

The Kerala State Coir Corporation Ltd. is a public limited company, fully owned by Government of Kerala established in 1969 for the systematic development of the coir industry in Kerala. KSCC is the first company in the public sector to introduce quality circles successfully among the workers and staff, proving its commitment to quality. The company achieved an ISO 9001 certification in the year of 2001.

K.S.C.C is the nodal agency in implementing various schemes in the coir sector, announced by the Government of Kerala. KSCC also outsources a large portfolio of coir and non-coir products, including different types of mats, matting, mattresses, rugs, etc from village artisans and other small-scale manufacturers at fair price and bring it to the end customers, majorly exporters. KSCC export products to various countries including Australia, South America, USA, Europe, and the Middle East. KSCC runs 8 showrooms in Kerala and 3 outside Kerala.

KSCC operates four manufacturing facilities at Alappuzha, Kozhikode, Cherthala & Pathanamthitta for engaging manufacturing geotextiles, fibre mats, PVC tufted coir doormats. It also facilitates modern dye house, rubber moulding unit, a state-of-the-art display centre, defibering units, Coir spinning units, Curled coir manufacturing units and coir pith briquet-ting units.

Head Office Division at Alappuzha

Malabar Coir complex at Beypore, Kozhikkodu

Coir Park Division at Kanichukulangara, Cherthala, Alappuzha

Travancore Coir Complex at Adoor, Pathanamthitta district

Latest News

Coir Vox Issue 1 Launched by
Shri. P. Rajeeve, Hon'ble Minister for Industries, Law & Coir

CHINGOLI WEST **COIR INDUSTRY CO-OPERATIVE SOCIETY LTD. NO. A, 625**

The Chingoli West Coir Industry Co-operative Society Ltd. has been functional since 1980. There are 780 members in the group. The society has its office, workshed, and two go-downs on its own land of 183 cents.

The society operates 212 E-Ratt Spinning units and 10 automatic spinning machines producing Vaikom rope in runnages of 160, 180, 220, and 240. The marketing is through Coirfed. In addition, the unit has been running a defibring unit of 90 hp since 2008. The coconut husk (chakiri) threshing group produces their own husk to make rope, which is later exported.

The society is running profitably and is a role model in creating sustainable local livelihood for its members. The society has members from the Chingoli, Mahadevikad,and Kartikappalli Panchayats. Mr. D. Anirudhan is the President, Smt. P. Manjith is the Secretary, and Mr. M. Syamlal is the Group Business Manager of the society. The society has received state awards for highest fibre and coir production in previous years.

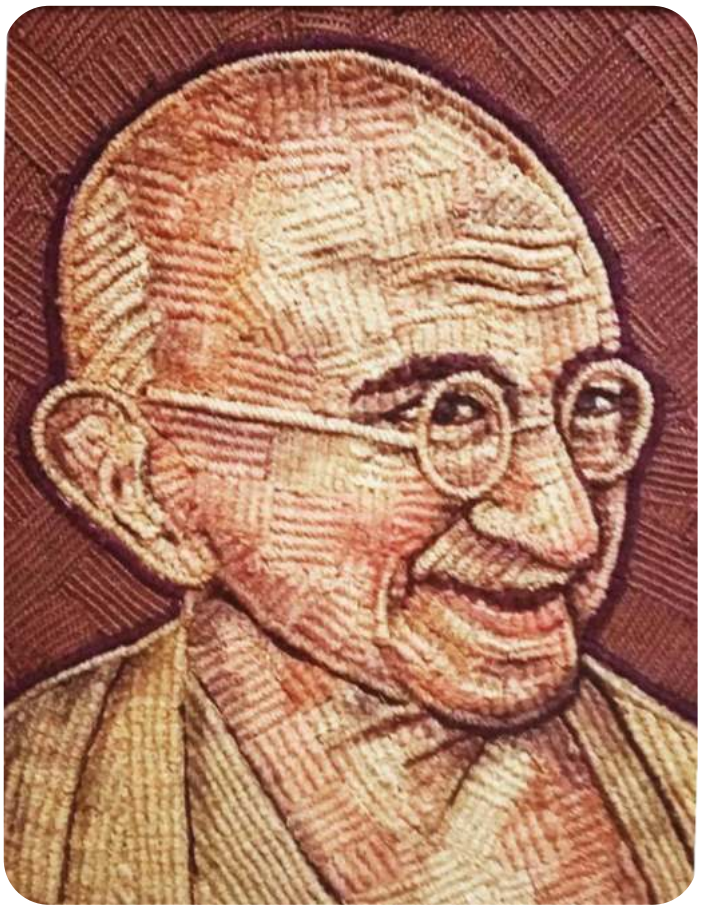
NC JOHN **AND SONS**

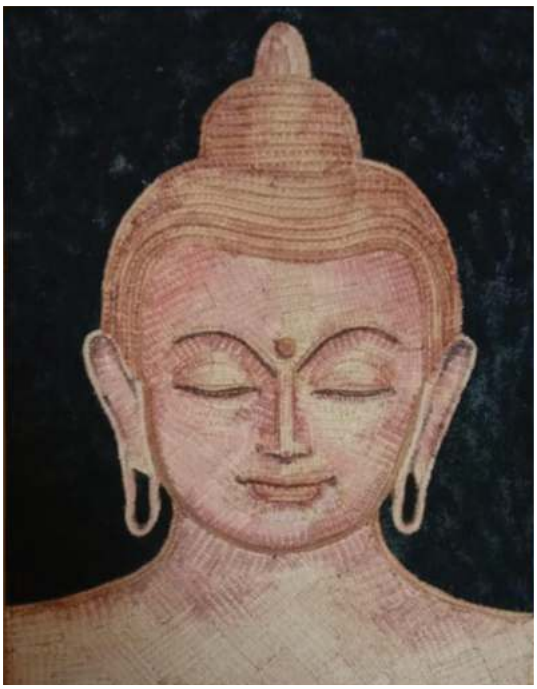
NC John and Sons (NCJ) started in the 1920s as the Indian Coir Manufacturing Company by the late Mr NC John. NCJ evolved into a corporate entity in 1943 and was christened NC John & Sons. The company has now expanded to have a variety of natural and manmade fibres for floor coverings with customers in more than 35 countries. The fifteen factories that are spread over one million square feet in the Southern states of India have varied capacities engaged in spinning, dyeing weaving, printing, and final finishing facilities. NCJ prides itself on a skilled team who are empowered to work and understand the importance of customer-centric work culture. The consistent product quality and timely delivery of orders have helped NC John build long-lasting trade relationships.

The 100-year heritage of NCJ has been made possible by the core philosophy of embracing change and seeing the potential to grow. NCJ continues to successfully emerge as a leader in the floor-covering industry and is an impressive contributor to the Indian export market.

CREATING MASTERPIECES USING COIR

K R Raghu is a rare artist who uses coir to create his masterpieces. Raghu comes from a family of artists and creative minds. He worked as an illustrator and artist using mostly oil paint till his 30s. It was then that his artistic mind discovered the magical medium of coir fibre. Over the last three decades Raghu has perfected the medium through diligent innovation and practice. This coir wizard starts with sketches on a plywood base on which the fibre is glued to. The colour schemes are identified, and different varieties of coir are sourced for generating the desired effect. Every step of the work is done manually over many days. Raghu has clients from across the globe and a growing fan base for his art in Kerala. Raghu's works vary from traditional dance forms and historic monuments to celebrities, politicians, and wildlife. Coir Vox is delighted to share some of his masterpieces with its readers.





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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