Coir fibre in Asia

Romulo Arancon, APCC, Jakarta

OUTLINE

I. Unique Properties of Coir
II. Coir Products and Uses
III. Coir Fibre and Coir Pith Resources
IV. World Coir Export and Prices
V. Emerging Applications of Coir Products
VI. Challenges in the Coir Industry Towards Reducing Poverty and Promoting Employment and Income

I. Coir, the product extracted from husk has unique properties compared to other natural fibres in several ways:

- It is the thickest and most resistant of all commercial natural fibres.
- Its cellular structure makes it more elastic than other natural fibres.
- The cell – walls of coir fibre and pith contain more lignin than any other commercially relevant natural fibre.
- Lignin is a natural polymer, which adds strength and elasticity to the cellulose based fibre walls. Since lignin resists bio-degradation, a high lignin content also imparts longevity to outdoor applications.

II. COIR PRODUCTS AND USES

Coir's properties have made it the fibre of choice for several uses:

- General purpose **twine** and **rope** in producing countries, where these products are a common sight in roadside stalls.

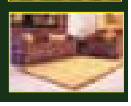
II. COIR PRODUCTS AND USES

- **Brooms** and **Brushes** : from hand brushes to the metal wire twisted tawashi brushes used in the kitchen.

This sector is another area where the stiffness and durability of coir make it a natural choice with limited competition, even by synthetics.

II. COIR PRODUCTS AND USES

- Almost indestructible, scrubby and increasingly stylish **doormats** and a wide range of designs of double **rugs**.
- No other natural fibre makes better doormats yet synthetics always loom as a competitor. Manufactures try to maintain a role for coir by offering softer rugs made from blends of coir and other tropical fibres, such as sisal and jute, in a range of designs.



II. COIR PRODUCTS AND USES

- **Mattresses, upholstery, car seats,** often as **non-woven mats** sprayed with naturel latex (rubberized coir).

In India and China, particularly the demand for more "sleeping comfort" has reignited the market.

II. COIR PRODUCTS AND USES

- **Car seat** covers are still found in several high-end European car models. Rubberized coir is also making inroads as durable flowerpots.

II. COIR PRODUCTS AND USES

Coir Waste and Dust (Pith)

- While extracting coir fibre, the short fibre (2mm or less) and dust (pith) are left behind as a waste product.
- Coir dust or coconut peat is a good planting medium with excellent water holding capacity (up to 8 to 9 times its dry weight).

GEOTEXTILES AND ORGANIC PLANTER POTS

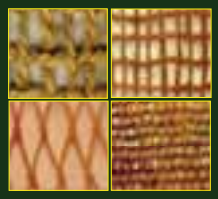
- Technological advances in bioengineering and urgent need to rehabilitate degraded lands, slopes led to development of new applications of coconut coir.
- **Coir nets/geotextiles, coco rolls** or **biologs** are used for environmental protection – erosion control (desertification in China).
- These products are preferred due to strength, ecological qualities and biodegradability.

COIR GEOTEXTILES (COIR BHOOVASTRA)

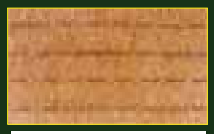
Cocolog

Coir needled felt

COIR GEOTEXTILES (COIR BHOOVASTRA)

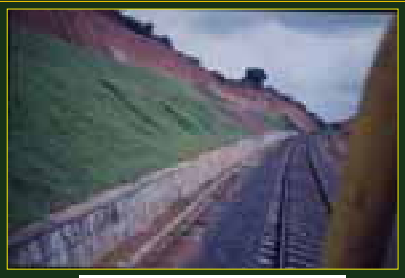


Coir netting



Erosion control blanket

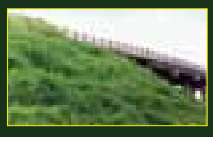
COIR GEOTEXTILES (COIR BHOOVASTRA)



Railway embankment protection

COIR GEOTEXTILES (COIR BHOOVASTRA)

Prevent soil erosion in the slopes / embankments of road.

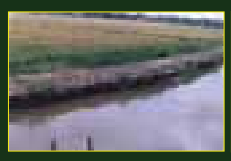


COIR GEOTEXTILES (COIR BHOOVASTRA)

River bank protection

Reservoir bank protection

COIR GEOTEXTILES (COIR BHOOVASTRA)



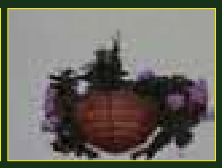
Mud wall reinforcement

Stream bank protection

GARDEN ARTICLES FROM COIR

Coconut planter pots as soil-less potting medium from coir dust which can hold water at least twice its own weight.

Coco pots



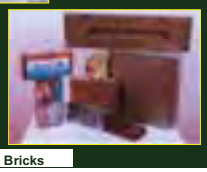
Coir Hanging Basket

GARDEN ARTICLES FROM COIR

Creeper poles

Coir Basket

GARDEN ARTICLES FROM COIR



Coir Pith Bricks

C O C O L A W N TM

Cocolawn, a ready to use lush green natural lawn made from coir geo textiles, coir non woven felt, coir pith and composted coir pith on which the lawn grasses could be planted.

SOFTENED COIR PRODUCTS

Cushions / pillows / mats were developed from softened coir fibre which has supple feel. The softened fibre do not induce skin sensitisation in guinea pigs and it is non-irritant to the mucous membrane in rabbits.

Cushion

Seat cushions for school children

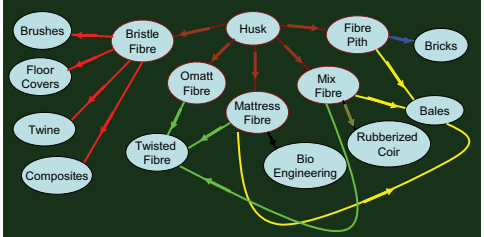
Softened coir pillow

BINDER – LESS FIBER BOARD FROM COCONUT HUSK (ECOCOBOARD)

- PCA – ATO – DLO – CFC – FPRDI developed the production process of fiberboard using natural lignin content of coconut husk.

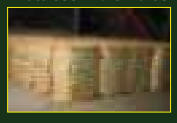
- Can be used as construction materials, molded 3D furniture parts & accessories & as packaging material for machineries.

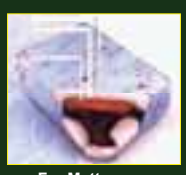
PRODUCT DIVERSIFICATION



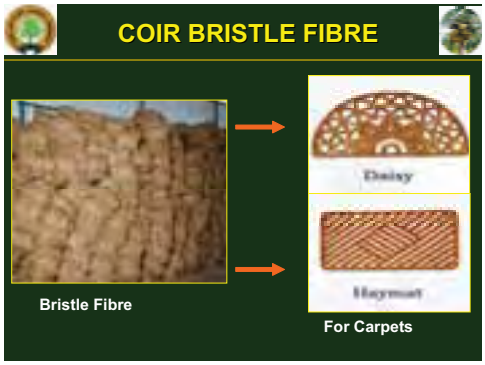
COIR MATTRESS FIBRE

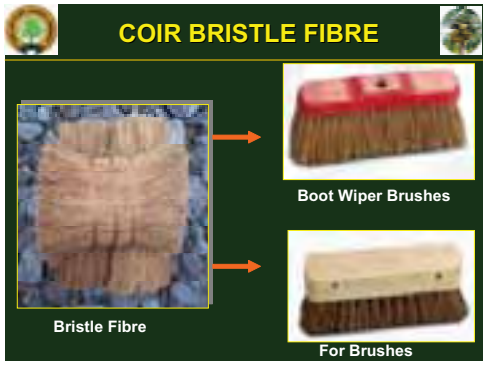
Mattress Fibre Bales



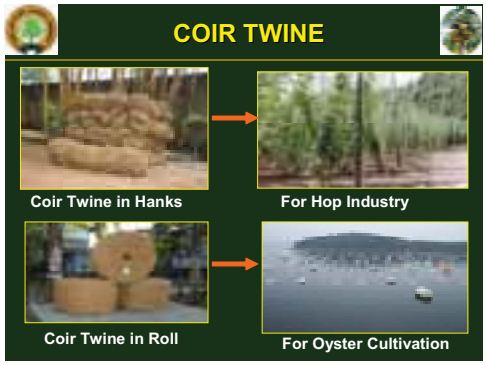


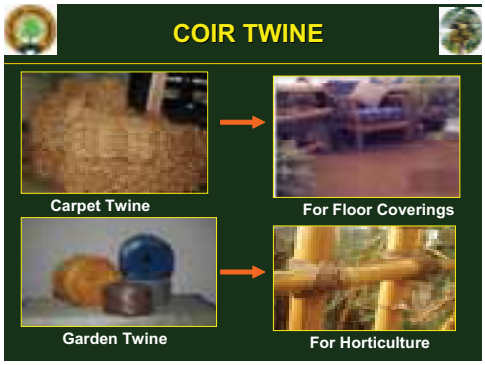
For Mattresses


COIR BRISTLE FIBRE
Bristle Fibre
Daisy
Haymat
For Carpets


COIR BRISTLE FIBRE
Bristle Fibre
Boot Wiper Brushes
For Brushes


COIR TWISTED FIBRE
Black Dyed Coils
Twisted Fibre Natural Coils
For Car Seat


COIR TWINE
Coir Twine in Hanks
For Hop Industry
Coir Twine in Roll
For Oyster Cultivation


COIR TWINE
Carpet Twine
For Floor Coverings
Garden Twine
For Horticulture

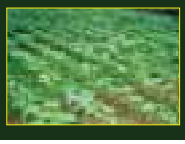

RUBBERIZED COIR/COIR POTS
Rubberized Coir
Coco Pots for Commercial Gardening
Liners for Hanging Baskets


WOVEN GEOTEXTILES
Geotextile Roll
For Erosion Control


STITCHED BLANKETS
Stitched Blanket Roll
For Soil Erosion Control
For River Bank Protection

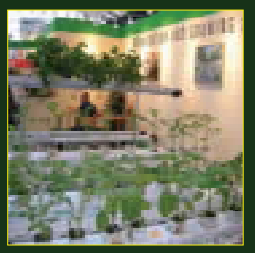
COIR FIBRE PITH

As a Growing Media



USES OF COCOPEAT & HUSK SUBSTRATE

- Growing media in the Green House Industry
- Sold in the Garden Centers as potting soil
- Alternative to Peat moss in Soil less cultivation
- Used in landscapes



III. GLOBAL COCONUT PRODUCTION AND POTENTIAL AVAILABILITY OF COIR FIBRE AND COIR PITH

- Coconuts is grown in more than 93 countries in the world, in an area of about 12.05 million ha and produce 61,165 million nuts.
- The Asia and Pacific countries alone produce 52,936 million nuts.

Table 1. Global Coconut Production and Potential Availability of Coir Fibre and Coir Pith at 50% Available Husks

	Total Nut Production (million)	At 50% availability of husks	
		Fibre	Coir pith
		(million tonnes)	
World	61,165	3.67	8.5
Asia – Pacific	52,936	3.17	7.4
APCC Countries	50,577	3.03	7.1
Africa	2,187	0.13	0.30
American	6,047	0.36	0.84
Assumption Husk	: 400 gram		
Fibre	: 120 gram (30%)		
Coir dusk & shorts	: 280 gram (70%)		

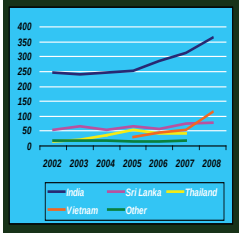
- While 93 countries are growing coconuts, India and Sri Lanka are the major producers of coir and coir products.
- The production of coconut in major Asian countries and the potential availability of coir fibre and pith are given in table 2.

Table 2. Coconut Production in Asian and Pacific Countries, Potential Availability of Fiber (at 50% of Available Husk)

Country	Production of Nuts (Million)	At 50% Available Nuts for Husking	
		Fiber (Thousand Ton)	Coir Pith (Thousand Ton)
1. F.S. Micronesia	40	2.4	5.6
2. Fiji	150	9.0	21.0
3. India	12,160	729.6	1,702.4
4. Indonesia	19,537	1,172.2	2,735.2
5. Kiribati	53	3.2	7.4
6. Malaysia	400	24.0	56.0
7. Marshall Islands	41	2.5	5.7
8. Papua New Guinea	712	42.7	99.7
9. Philippines	12,456	747.4	1,743.8
10. Samoa	190	11.4	26.6
11. Solomon Islands	110	6.6	15.4
12. Sri Lanka	2,591	155.5	362.7
13. Thailand	1,199	71.9	167.9
14. Vanuatu	258	15.5	36.1
15. Vietnam	680	40.8	95.2
Total	50,577	3,034.7	7,070.8

Table 3. Production of Coir Fiber (thousand Tones)

Brown Fibers



White Fibers

IV. WORLD COIR EXPORT AND PRICES

Figure 1. World Coir Export (MT)

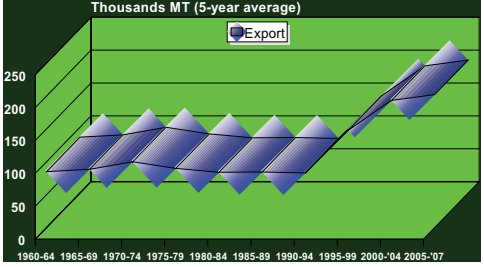


Figure 2. India Export of Coir Products, 2003 – 2007

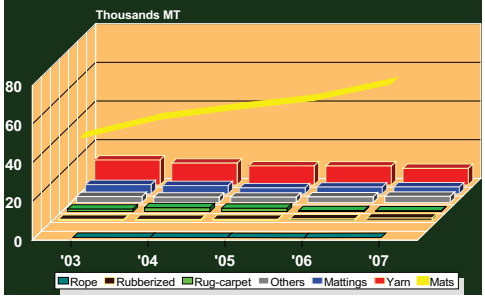


Figure 3. Sri Lanka Export of Coir Products, 2003 – 2007

Figure 3. Sri Lanka Export of Coir Products, 2003 – 2007

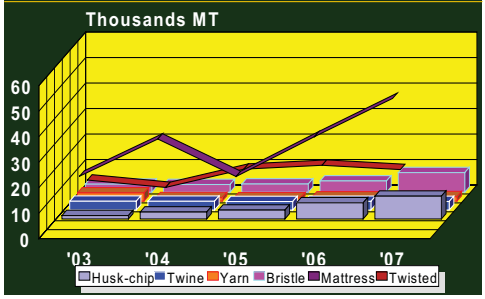


Figure 4. India Export Prices of Coir Products, 1983 - 2007

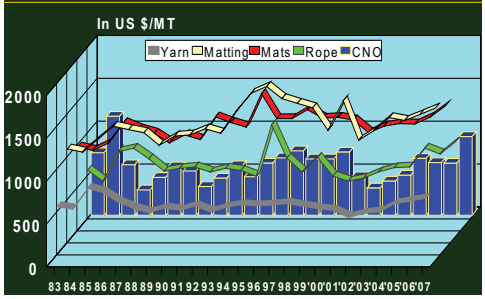


Figure 5. Sri Lanka Export Prices of Coir Products, 1983-2007

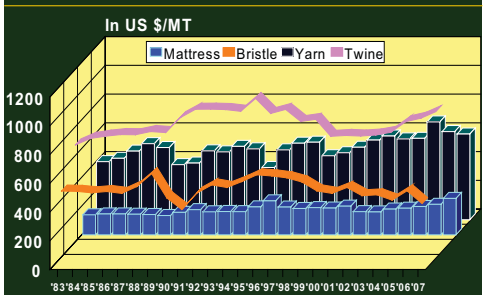


Figure 6. Main Importers of Coir Yarn, 1990 – 2007

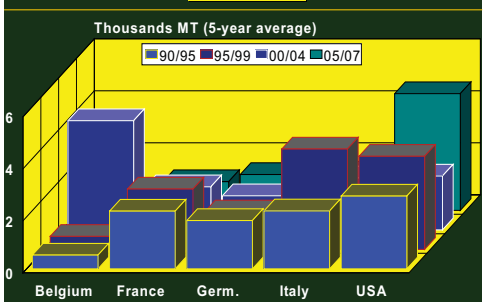
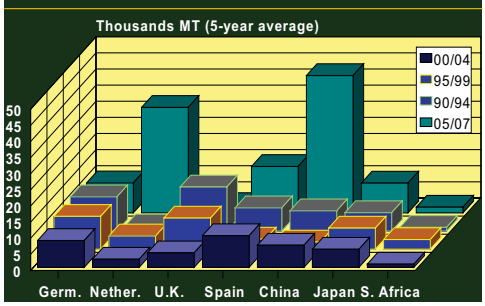
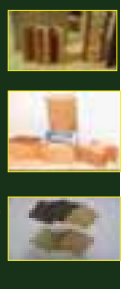


Figure 7. Main Importers of Coir Fiber, 1990 – 2007



V. EMERGING APPLICATIONS OF COIR AND COIR PITH

- Natural fibres as reinforcements in industrial products have made considerable headway in the automotive interiors especially in Europe for reducing cost and weight.
- Several European firms are testing whether coir can play a role in a growing automotive market for "bio composites", or as thermal insulation in home construction.

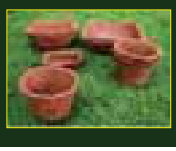
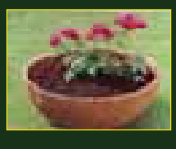


V. EMERGING APPLICATIONS OF COIR AND COIR PITH

- Coir fibre products for soil strengthening as reinforcement in tropical soils has been shown to be effective.
- In horticulture sector, natural fibre can play a vital role (with reasonable strength and disposability in transporting flowers, vegetables, fruits, etc. pots for planting).

V. EMERGING APPLICATIONS OF COIR AND COIR PITH

- In the Netherlands about 2 million pots of plants are produced consuming about 30,000 tonnes of synthetic plastics. Bio-degradable pots using natural fibres can be produced replacing synthetic plastics.

V. EMERGING APPLICATIONS OF COIR AND COIR PITH

- Use of coconut fibres in asphalt and unpaved rural roads can be tested on pilot scale for bulk utility.
- Rubberized coir used to be the material of choice for car seats, but largely lost out to competition from synthetic foams. Yet, the remaining use of coir in several high-end European car models is an example of how natural fiber products can stay competitive and possibly regain ground.

V. EMERGING APPLICATIONS OF COIR AND COIR PITH

- Geotextiles – made out of coir fibre is an important ecofriendly product which is gaining market in Europe, Asian and US countries as erosion control blankets, nets for slope protection, mulch blankets, basket linens, 'coir bio roll', roof greening mat, grow sticks, coco logs, grow media as well as skeffed coir for river bank / canal bank support.



V. EMERGING APPLICATIONS OF COIR AND COIR PITH

- Low cost wall panels from Blast Furnace Slag Cement using coir fibres have been developed in Brazil as a low cost environmental sensitive technology. This technology is available in the Institute de Pesquisas Technologie do Estado de Sao Paulo S.A., Brazil.
- High-tech products of industrial textiles is also possible and needs to be exploited by importing coir fibre.

V. EMERGING APPLICATIONS OF COIR AND COIR PITH

- Ecocoboards have been succesfully produced from coconut husk and have a wide scope for commercialization for use in mass housing.

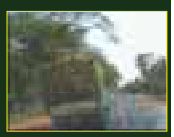
VI. CHALLENGES IN THE COIR INDUSTRY TOWARDS REDUCING POVERTY AND PROMOTING EMPLOYMENT AND INCOME

1. For about 150 years, the coir industry is still practicing traditional ways and many do not have facilities for workers and is not hygienic.

- Improving the working conditions will help to increase the efficiency of labor. Especially the large number of women who are involved in traditional fiber extraction.

VI. CHALLENGES IN THE COIR INDUSTRY TOWARDS REDUCING POVERTY AND PROMOTING EMPLOYMENT AND INCOME

2. Integrated farm level processing as a community/cooperative approach will facilitate greater availability of husk in a particular place rather than what individual smallholders are doing in a scattered way.

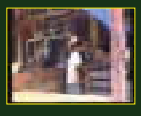


Besides providing large quantity of husk, this will also provide additional employment and income to the farming family. (Aggregator or consolidator's concept)

VI. CHALLENGES IN THE COIR INDUSTRY TOWARDS REDUCING POVERTY AND PROMOTING EMPLOYMENT AND INCOME

3. Improve efficiencies of production and processing should include improved agronomic practices to increase coconut production and ensure food security.

- An increase in the productivity will increase the raw material availability.
- Improving the processing efficiency and quality have remained to be a challenge.



VI. CHALLENGES IN THE COIR INDUSTRY TOWARDS REDUCING POVERTY AND PROMOTING EMPLOYMENT AND INCOME

4. New and improved products should be developed especially in applications where natural fibres have advantage over synthetics.

- Among these are geotextiles, carpeting, wall covering, wire rope cores, composites, ecocoboards and packaging materials.

VI. CHALLENGES IN THE COIR INDUSTRY TOWARDS REDUCING POVERTY AND PROMOTING EMPLOYMENT AND INCOME

5. Use of coconut husk, for making grow bags using cut fibre, husk chips and coir pith has potential market in horticulture and for growing vegetables and ornamental plants, flower plants, etc. However, the quality standards for these products have to the maintained (salt content).

VI. CHALLENGES IN THE COIR INDUSTRY TOWARDS REDUCING POVERTY AND PROMOTING EMPLOYMENT AND INCOME

6. Strengthening the institutional capabilities of coconut growing countries so as to enable them to undertake their own research and development activities on husk utilization.

VI. CHALLENGES IN THE COIR INDUSTRY TOWARDS REDUCING POVERTY AND PROMOTING EMPLOYMENT AND INCOME

7. Since many of the developing countries growing coconuts are not utilizing coconut husk to produce value added products, providing such facilities can go along way to provide employment, increase the income of coconut farmers and reduce poverty.

New Technologies for Fibre Extracting

Decorticator

Capacity : 3,2 tons fibre output / 8 hrs

- There is a need to develop institutional capabilities or capacity building.

VI. CHALLENGES IN THE COIR INDUSTRY TOWARDS REDUCING POVERTY AND PROMOTING EMPLOYMENT AND INCOME

- A good example is the CFC-funded project in Sri Lanka where an R & D and Training Center in a rural area is set–up to demonstrate **improved work conditions** and **best practices** in coir processing.

New Technologies for Geotextile Manufacturing

VI. CHALLENGES IN THE COIR INDUSTRY TOWARDS REDUCING POVERTY AND PROMOTING EMPLOYMENT AND INCOME

- This facility will also demonstrate **standards for quality assurance, improved the efficiency of machineries used, develop skills of operators** and prove that **productivity** and **profitability** can be achieved.

New Technologies for Floor Carpet Manufacturing

New Technologies for Floor Carpet Manufacturing