

COIR BOARD OF INDIA

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**International Seminar on Technical Textiles
(Mumbai, India, 2-3 June 2001)**

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APPLICATIONS OF COIR IN AGRICULTURAL TEXTILES

SYNOPSIS:

Coir is a biodegradable organic fibre and hardest among other natural fibres. It is much more advantageous in different application for agricultural textiles. Coir is used commercially for the manufacture of wide range of products for various end use applications. Here in this paper emphasis has been given on the properties of coir and some of the specific applications.

INTRODUCTION:

The fibrous material forming part of the soft mass surrounding coconut, the fruit of the tree "Cocos Nucifera" or the coconut palm is world over known as coir. Coconut husk is the raw material for the coir industry, which is available in enormous quantities wherever there is large-scale coconut cultivation. The palm is essentially a plant of tropics and it thrives within 20° of the equator. Philippines, Indonesia, Thailand and neighboring islands, India, Sri Lanka, Pacific territories, East and West Africa and the West Indies are the important coconut producing countries in the world. India and Sri Lanka account the major contributions out of the above. Coconuts are usually harvested at the end of every 45 days all throughout the year.

PROPERTIES:

Coir is a versatile hard fibre obtained from the husks of coconut. The Coir fibre is one of the hardest natural fibres because of its high content of lignin; Coir is much more advantageous in different application for erosion control, reinforcement and stabilization of soil and is preferred to any other natural fibres. The fibre is hygroscopic, with moisture content of 10% to 12% at 65% humidity and 22% to 55% at 95% relative humidity. Of all natural fibres coir possesses the greatest tearing strength, retained as such even in very wet conditions.

The physical appearance and quality of the fibres varies widely. The color of the fibre is not only influenced by the species of the nut from which it is derived but also its maturity, time lapse between dehusking and retting etc. However under identical conditions of these variables, the fibres extracted from infant nuts exhibit a pale yellow color. The intensity of color and thickness increase with age and the fibres are remarkably stiff and possess good extensibility.

Morphologically, coir is a multi cellular fibre with 12 to 24 microns in diameter and the ratio of length to thickness is observed to be 35. Cells of the fibre surface are occasionally covered with the silicified stigmata. The chemical constituents have found to be cellulose, lignin, hemicellulose and pectin. The percentage of the ingredients in the fibre is largely governed by the age of the nut from which it is derived. Cellulose and lignin are the major constituents and higher lignin content makes the fibre stiffer and tougher. The physical properties and the chemical compositions of coir are shown below.

Chemical Composition Of Coir		Physical Properties Of Coir	
Lignin	45.84%	Length in inches	6-8
Cellulose	43.44%	Density (g/cc)	1.40
Hemi-Cellulose	00.25%	Tenacity (g/Tex)	10.0
Pectin's and related Compound	03.00%	Breaking elongation%	30%
Water soluble	05.25%	Diameter in mm	0.1 to 1.5
Ash	02.22%	Rigidity of Modulus	1.8924 dyne/cm ²
		Swelling in water (diameter)	5%
		Moisture at 65%RH	10.50%

USE OF COIR IN AGRICULTURAL TEXTILES:

Coir being having the strong characteristics of retention of moisture is preferred for the agricultural applications. It is naturally resistant to rot, moulds and moisture. To suit the specific applications the coir fibre can be used as thus or by making a suitable product, which adapts the specific needs. Coir can be converted to coir yarn and then to woven mesh matting, which is used mainly controlling soil erosion and conditioning the soil. One more conversion of coir is to coir non-woven which is also used for controlling soil erosion and conditioning the soil by more ground cover and soil retention Non woven coir used in the manufacture of basket liners, mulching mats, grow sticks, cultivation mats for plants, roof green applications, portable lawn or instant lawn and many more applications. The coir fiber is also used for coco logs and coco beds for shore protection and stream banks

EROSION CONTROL BLANKETS FOR CONTROLLING SLOPE EROSIONS:

The natural coir material is having a very good application in erosion control blankets for landscaping. The mesh of woven coir matting acts as miniature dams and prevent the seeds or seedlings which used to be washed away by rain and wind and facilitating the growth .The netting breaks up run off from heavy rains and dissipates the energy of flowing water. Once the growth of vegetation is occurred the function of the coir is over and the vegetation will takeover the protection of soil further. Coir also promotes the growth of new vegetations by absorbing water and preventing the topsoil from drying out

Non-woven erosion blanket protects the soil from effective erosion and creating microclimates and mulching action. The blankets will be much suited for dry lands and low fertile soil. The applications are road embankments; rail embankments, river embankments and hill slide slopes.

MULCH BLANKETS:

Coir due to its property can retain moisture for longer period. The coir non-woven or closely woven matting acts as a filter allowing the water to flow across its plane as well as separator. The mulch mats will suppress the weeds and retain moisture in the soil, which will protect the roots from winter frost and summer scorching sun.

BASKET LINERS:

Coir basket liners are used for hanging baskets. These coir pads facilitate better aeration of the growing media. As air can flow on more easily through the pores of coir pad, it will help the roots to grow faster and more vigorously. Coir non-woven felt cut in different shapes depending upon the size of the wire basket are used as basket liners. Coir non-woven felt due to its permeability will increase the growth and retain moisture for longer period and separate the pot soil by filtering the excess water. Basket liners are available in standard sizes or according to customer requirements.

BIO-ROLLS:

Coir non-woven felt mats made in the form of rolls filling it with peat moss/coir pith composite are used for bio-rolls. Rapid root growth is observed using these bio-rolls. The natural product combination will support the development of plant. The bio rolls are available according to customer requirements.

ROOF GREENING MATS:

Roof greening mats are manufactured with coir non-woven felt spread with seeds or seeds in laid with stitch bonded coir pads. These roof greening mats will spread on the roof surface and the seeds on the coir pads will sprout out and grow evenly on the surface. Roof greening mats are available in standard sizes or according to customer requirements.

GROW STICKS:

Grow sticks are used as natural supports for plants and creepers. They consist of wooden pole wrapped with the layer of coir-fibre or non-woven felt. The roots of the plant can easily penetrate on the pores of coir pad. Grow stick are available in standard sizes or according to customer requirements.

COCO LOGS:

Coco logs are used along stream, river, and lake banks to protect against scour. It consists of coir fiber or coir non-woven pads in the form of rolls and covered with coir nets. Coco logs are kept at the edge of the bank secured by wooden pegs may be used on alternate sides of logs. Coco logs work as a brake on waves and reduces the impact of erosion. The natural product combination will support the development of plant by roots binding take over the protection. Coco logs are available in standard sizes or according to customer requirements.

GROW MEDIA:

Apart from coir fibre the other bi-product of the coir industry is the coir pith, which is mainly used as a growing media for the plants and also has replaced as a pot mixture by converting it to compost.

CONCLUSION:

Coir is having a very high potentiality in agro textile application. Its moisture retention capability and high wet strength has been excellent and the characteristic has been made use extensively in agro textile applications. In the paper only some of the applications were briefed for the beneficiary of the readers and for more details the office is much grateful to extend the assistance to who interested.

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