

# DEVELOPMENT OF NON WOVEN LANDSCAPE FIBER MAT MADE WITH COCOS NUCIFERA FIBER AND ITS WATER ABSORBENCY TESTING

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## **ABSTRACT:**

An innovative fibrous structure, Agro-Mat has been developed to reduce the consumption of water during irrigation of plants. Some trials have established that the newly developed Agro-Mat could save water by 72% in comparison with traditional watering techniques, such as, Overhead Watering/Sprinkling. Water is a more essential for agriculture for productions of crops, plants herbs and trees. Natural Fibers have an outstanding potential as reinforcement in their properties. The objective of this Study is to develop Landscape Mat and is made with Cocos Nucifera fibers. This study deals with the preparation of Mat by using needle punching technique and it is utilized to agriculture land to reduce water consumption for vegetable crops and plants.

**Keywords:** *Fibers, Mulch Sheets, plants, agro textiles.*

## **INTRODUCTION:**

Agriculture is one of essential for human beings and livestock. It is the main stay of India's economy. India is the world's largest producer of pulses, rice, wheat, spices and spice products. India remains among main three as far as production of different agricultural things like paddy, wheat, pulses, groundnut, rapeseeds, natural products, vegetables, sugarcane, tea, jute, cotton, tobacco leaves. Cropping systems vary among farms depending on the available resources and constraints geography and climate of the farm. As water usage becomes a more pervasive global issue, irrigation practices for crops are being refined and becoming more sustainable. Textiles have great contribution towards the agriculture through which the ideas are generating gradually.

The usage of agro textiles will be benefited in terms of products with enhanced quality, higher yields fewer damages and bearable losses, they provide weed suppression and ground moisture conservation, whilst allowing roots to breathe and water, air and nutrients to permeate through. The various fibers used in agro textiles are Nylon, Polyester, Polyethylene, Polyolefin, Jute, Coir and Wool. Soils have many important functions. Perhaps the best appreciated is the function to support the growth of agricultural and horticultural crops. Hence the objective of this work is to develop Cocos Nucifera fiber mat and it is used to reduce the utilization of water in agriculture field and dry lands.

## MATERIALS AND METHODS:

### Fiber Extraction

Fiber is extracted from coconut, which are a single seed of a fruit of the *Cocos Nucifera*. The coconut seed is stripped of its external leathery skin and the thick intermediate layer of fibrous pulp, whose fibers are known as coir. The husks separated from the nuts are retted in lagoons up to ten months. The retted husks are then beaten with wooden mallets manually to produce the golden fibre.

### Mechanical Extraction

This is a mechanical processes using either de-fibering or decorticating equipment process the husks after only five days of immersion in water tanks. Crushing the husk in a breaker opens the fibers. By using revolving drums the coarse long fibers are separated from the short woody parts and the pith. The stronger fibers are washed, cleaned, dried, hackled and combed.



Figure:- 1 Husk of *Cocos Nucifera*

Figure:- 2 De-Fibering Machine

### Formation of *Coco Nucifera* Fiber

The *Cocos Nucifera* fiber is converted in to the form of layer with the method of non-woven Needle Punching. The sheets are made by different types of GSM with different thickness for the purpose preparing mat for less water consumption in agriculture.



**Figure :- 3 Mulch Sheet Formation Machine**

### **Water Availability and Consumption**

Water is an essential input into agriculture in nearly all its aspects having a determining effect on the eventual yield. Mainly the water is getting from ground water and surface water in our Indian regions, Although overall available of groundwater is 62 percent, it will vary depending upon the regions and climate conditions where groundwater usage is on a limited scale only. In India more over 48 percentage of surface and ground water is utilised as irrigation for agriculture alone. While the climate change will have negative impact on agricultural and increases the demand of water.

### **RESULT & DISCUSSION**

#### **PREPARATION OF LANDSCAPE MAT**

Hence the *Coco Nucifera* bunch was converted to fiber form after that the fibers were immersed with water for more than 24 hours, and then the fibers were dry in shade. The dry fibers were separated in the form of long and short, with the help of needle punching method the fibers were converted in to sheet form after that the sheets were resized. Coir pith is used to support the water consumption inside the mat, the coir pith is spread over the surface and the nonwoven sheets were fixed by multilayer and two test were conducted namely water absorbency test was conducted to know the deep penetration of water in the mats. Four samples were tested for this purpose according to the samples the test results is herewith discussed.

## TESTING RESULT

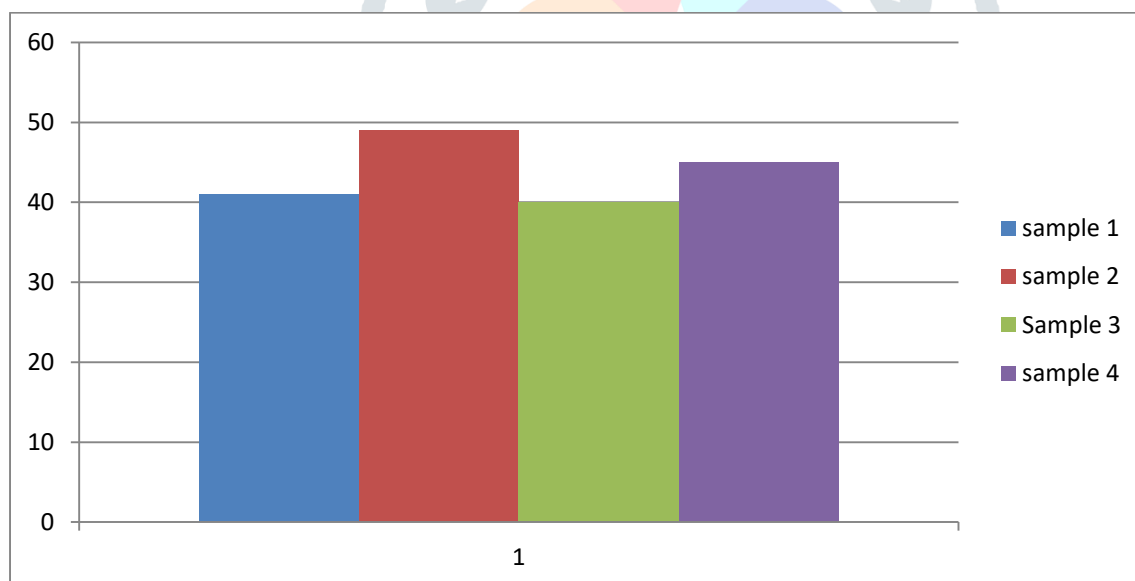
### WATER ABSORBENCY TEST

**Sample Specification :** The below table shows the water absorbency ratio of a coir pith mat in reference to different samples.

**Table :1**

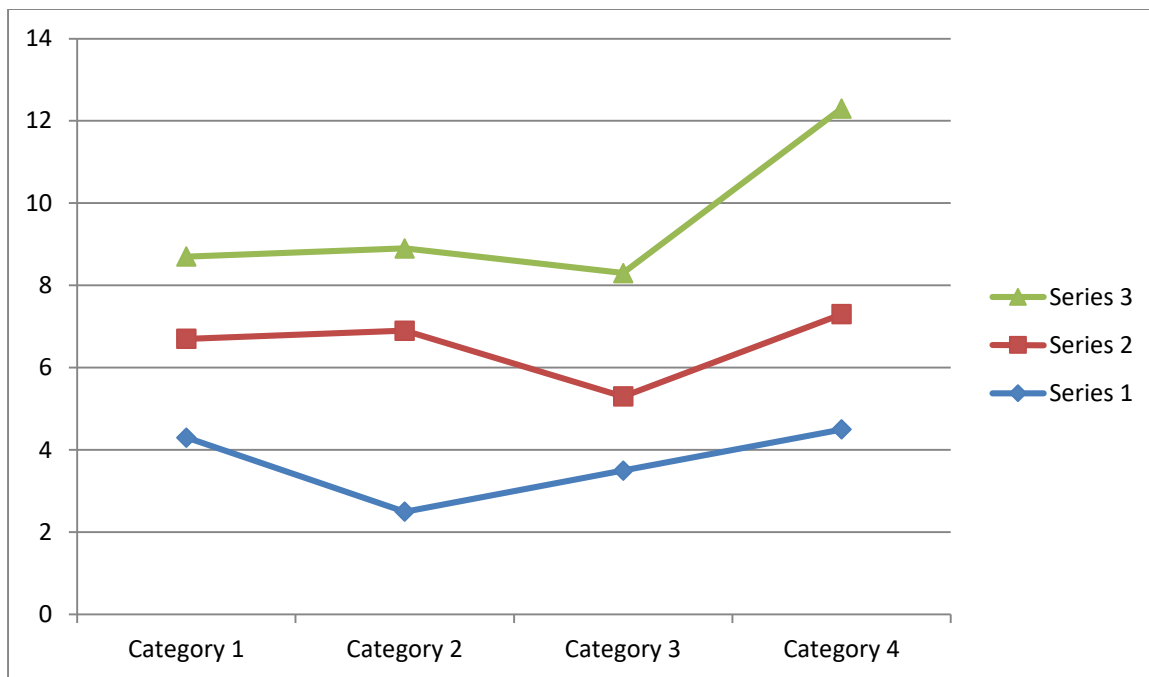
| Sample Number | Absorbency @1 Drop (Sec) |
|---------------|--------------------------|
| Sample 1      | 41                       |
| Sample 2      | 49                       |
| Sample 3      | 40                       |
| Sample 4      | 45                       |

The above table shows the water absorbency ratio of a coir pith mat with reference to different samples and different soils.



**Figure 1**

The above graph shows the water absorbency ratio of a coir pith mat with reference to different samples and different soils



**Figure 2**

The above figure is a general reference of water absorbance level at different series.

Water is a very important input into agriculture and is nearly used in all aspects having a determining effect on the eventual yield. The water is mainly obtained from ground and surface water in our Indian regions, although overall available groundwater is 62 percent, it varies depending upon the regions and climatic conditions where groundwater usage is on a limited scale only. Thus the usage of water can be limited by the coir pith used in the study and the consumption can be controlled with the crop yielding lesser water with higher yield.

## CONCLUSION

Agro textile improves plant growth and crops in the orchards. Unique manufacturing techniques and properties of the agro-textile sector products whose cost is lesser. This study, Mulch Sheets specimens are prepared from *Cocos Nucifera* fiber. Experimental investigation is done on the Customized and ISO testing method with different kind of GSM sheets. The study confirms that various mechanical properties of the *Cocos Nucifera* Mulch Sheets. Textile industry is the second largest industry next to agriculture. Agro textiles contribute 8% share in the technical textiles break up. The usage of agro textiles will be benefited in terms of products with enhanced quality, higher yields fewer damages and bearable losses. This paper emphasizes the application of agro textiles in various areas of agriculture and horticulture. The use of mulch sheet developed from Husk of *Cocos Nucifera* is definitely said to be efficient and plays an eminent role in the field of agro textiles.

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