

## Erosion Control Blankets made of Rice Straw-An Experimental Study

Smruti Swagat Ray Mohapatra<sup>1</sup>, Satyajeet Nayak<sup>2</sup>, Chinmaya Behera<sup>3</sup>

<sup>1,2</sup> Assistant Professor, <sup>3</sup> Student  
Department of Mechanical Engineering  
Einstein Academy of Technology and Management  
Bhubaneswar, Khurdha Odisha, India

**Abstract:** Erosion control blankets are typically biodegradable, open-weave blankets that provide temporary cover and support for establishing vegetation on bare soil areas. It provides cover for bare soil and support for emergent vegetation from the time of seeding until root density and top growth are capable of long-term erosion protection. It function by shielding bare soil and newly seeded areas against raindrop and wind erosion, providing a dense matrix of biodegradable material (e.g., straw, coconut) that stabilizes and supports emergent vegetation and later decomposes to further aid in plant growth. In this research we will use rice straw to make erosion control blanket which is environment friendly, readily available and cost effective too.

**Keywords:** Rice straw blanket, erosion, biodegradable, erosion controlling measures.

### I. Introduction

Soil erosion is one of the major problem which is increasing and needs an economic solution. In several slope, steep areas and various land forms protection methods are currently used to stabilization. Among these methods, the use of naturally obtained products is popular. But apart from all this measures coir blankets were successfully used as an erosion control measure, and to make it more economic and totally biodegradable. We are implementing a new measure for controlling soil erosion through rice straw blanket.



Figure 1: Coir Blanket

### II. Related Works

Coir Mat Blankets are made with 100% coconut fiber with photodegradable or biodegradable top and bottom grids/ net stitched together. The top and bottom net layers are stitched with yarn. Coir Mat is used to prevent the seeds and soil losses until vegetation is fully developed. The layer resist wind and rain forces. These technique help in accelerated development of crops while the blankets decompose over time and get degraded and become part of the soil. Each Coir Mat is designed for a specified range of erosion control and vegetation conditions considering geological conditions. Coir Blankets can be supplied in form of roll with a maximum width of 2.4 Meters and length of 50 Meters. Each roll is packed with impermeable wrapping which shall not undergo deterioration or damage during handling, transportation, storage and placing.



**Figure 2:** Blanketing technique

### **2.1 Erosion control through Rice Straw**

**Straw** is an agricultural by product and the dry stalks of cereal plants. It is a waste product of half of the cereal crop such as barley, oats, rice and wheat. It is used in Animal feeding, Basketry, Biofuel, Biogas, Construction material (binding clay & concrete), Craft Erosion control Horticulture, Paper making.

### **2.2 Rice Straw Blanket**

Like coir blankets, straw blankets are designed for slope erosion protection and furnished vegetation growth. They are used to hold soil in place and promote the growth of new vegetation and on all types of slopes. Straw blankets prove extremely effective in retaining moisture and contouring to soil surface irregularities. Straw blankets help prevent and control the natural displacement of soil in areas such as slopes, hills, channels, streams, rivers, and coasts. It prevents loss in NPK nitrogen, phosphorus and potassium present in fields.



**Figure 3:** Wheat straw blanket

### **2.3 Straw blanket models**

There are basically three types of models used for making straw blankets the first type of standard netting made up of polypropylene which is used in slopes, hills and banks. The span of this standard netting is up to 12 months. The biodegradable net is made up of jute. This type of netting is used in environmental sensitive areas, its life span is same as standard netting i.e. 12 months. The third type of net used is rapid degradable which is made up of rapid degrade polypropylene it is used in sloppy areas and where fast rooting vegetation is available its life span is about 90 days.

### III. Explanation

- [1] The products used : Rice straw blankets are used at a thickness of 3” to 4” , straw net for photodegradable and biodegradable covering, bamboo pins used for anchoring at 1 meter spacing.
- [2] The technology behind the product: It can be implemented as same as the coir blanket ( coconut coir) theory but the raw materials used are only made up of rice straw.
- [3] The scalability: The straw blankets can be produced in large scale for controlling soil erosion so as to obtain developed vegetation.
- [4] The market: The rice straw is a residual product and can be easily available at Chhattisgarh state in least cost.

#### 3.1 Availability of raw materials

Rice straw is easily available at various rice producing areas/ fields of Chhattisgarh state. The jute used for netting purpose can be exported from states like Bihar and Assam. The cotton used for netting can be exported from nearby states like Maharashtra, Gujarat and Punjab. Apart from the jute and cotton netting if rice straw netting is provided then it will prove more economical as it is easily available.

#### 3.2 Financial Requirements

**Cost of infrastructure:-** For initial establishment one room office is sufficient because the entire work can be carried out on open ground/fields.

**Cost of purchase of raw material:-** rice straw: Rs 1 per kg. Rice straw netting will cost very low price i.e. Rs 5 per kg including the labour cost. Bamboo pins for anchoring: 6” long of Rs 1 per piece.



**Figure 4:** Dual netting view

We have implemented rice straw blanket taking reference from coir blanket/coconut fibre blankets. And its construction procedure is also same as used in coir fibre blankets with dual layers, only coir which is present in the middle layer is replaced by rice straw. These pictures mentioned above are taken with reference to the wheat straw netting.

### References

- [1]. "Straw". The American Cyclopaedia. 1879.
- [2]. Anil, K. R.: Use of coir geotextiles for soil and water conservation at varying slopes, Technical Report to Coir Board, India, prepared by Kerala Agriculture University, Kerala, India, 2004.
- [3]. McNally G.H. (1998), Soil and Rock Construction Materials, E & FN Spon.
- [4]. CDM, Inc., Erosion and Sediment Control Best Management Practices: Report, Revised may 2004.
- [5]. Abramson, L.W., T.S. Lee, S. Sharma, and G.M. Boyce, Slope Stability and Stabilization Methods, John Wiley & Sons, New York, N.Y., 2002.
- [6]. Adding Value To Wheat Straw By Anduin Kirkbrid-Mc Eory. Biomass Magazine, 2007.
- [7]. Rivas, T., Erosion Control Treatment Selection Guide, Gen.Tech Rep.0677 1203—SDTDC, San Dimas Technology and Development Center, USDA Forest Service, San.