A REVIEW ON UTILIZATION OF COIR FIBRE AS A COMPONENT MATERIAL IN MANGALORE TILES

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ABSTRACT

This study was conducted to utilize coco coir fiber as a component material in Mangalore tiles. As technology innovation, the Breaking load tests of the Mangalore tiles was conducted to determine the fracture or to cause the sample to fail of using a Breaking load Testing machine. Coco coir fibers were air-dried and shredded, segregated and cut into a maximum length of 15 millimeters to prevent these from bending during the mixing process. Statistical results showed that the use of coco coir fiber as a component material significantly affected the tensile strength of Mangalore tiles .Brown coir and white coir should be mixed with clay by selecting a different proportion. Then tiles are made with machine. These tiles were dried and burnt for 20 days. Then breaking load test and water absorption test must be done. As a result, white coir reinforced tile gives more strength and it is more durable when compared with brown coir reinforced tile.

***Keywords*-:** *Coconut Fibers, Water Absorption, Breaking Load, Permeability test.*

I. INTRODUCTION

In almost all developing countries, there is a great shortage of roofing material. Local materials are often used, like soil, stone, grass and palm leaves. These roofs require a lot of maintenance and are not always resistant to heavy rain. Materials like Corrugated Iron Sheets (CIS) and asbestos cement sheets have replaced traditional material. Roofing materials tend to be the biggest expense for individual home builders.

Asbestos cement sheets should not even be considered, because of the health Hazard associated with making them. Ceramic tile roofs are good. However, if the Kiln does not allow adequate temperature control during firing, the quality of the finished tiles can be very much uneven. Concrete tiles have partially replaced ceramic tiles for purely economic reasons but what limits the use of concrete tiles is their weight on the roof, which requires a strong load bearing structure.

Coir fibre is one of the natural fibres abundantly available in tropical regions, and is extracted from the husk of coconut fruit. Coir is stiff coarse fibre and is being found between the husk and the outer shell of a coconut. It is a fibre abundantly Available in India the second highest in the world after Philippines. The individual fibre cells are narrow and hollow, with thick wall made of cellulose. There are two Varieties of coir; (i) Brown coir- extracted from a varieties ripe coconut which contains more lignin and less cellulose and are stronger but less flexible. (ii) White coir- The immature husks are suspended in a river or water-filled pit for up to ten months. During this time micro-organisms break down the plant tissues surrounding the fibres to loosen them – a process known as retting. Segments of the husk are then beaten by hand to separate out the long fibres, which are subsequently dried and cleaned. This fibres are extracted from coconut before they are ripe, which are white or light brown in Colour and are smoother and finer. There are many general Advantages of coconut fibres e.g. they are mooth-proof, resistant to fungi and rot, Provide excellent insulation against temperature and sound, not easily combustible, flame-retardant, unaffected by moisture and dampness, tough and durable, resilient, springs back to shape even after constant use, totally static free and easy to clean.

II. LITERATURE

Cook et.al. (1978) Reported the use of randomly distributed coir fibre Reinforced cement composites a slow cost materials for roofing sheets. The Studied parameters were fibre lengths, fibre volume sand casting pressure. They concluded that the optimum composite was a composite with a fibre length of 3.75cm, a fibre volume fraction of 7.5% and cast at a pressure of 1.67MPa. Cost comparison revealed that this composite was substantially cheaper than the locally available roofing materials.

Rama swamy et.al. (1983) Reveals that, natural fibres such As jute, coir and bamboo can be used with advantage in concrete, in a manner Similar to other fibres. It was also observed that, improvement in impact strength of over 25% and increased ductility under static loading and considerably lower Shrinkage characteristics of the order of 50% to 70% compared to those of plain concrete, are obtained when natural fibres are added

Rama Krishna et.al. (2005) studied the durability of natural fibres and the effect of corroded fibres on the strength of mortar. Coir fibres were found to retain higher percentages of their initial strength than all other fibres after the specified Exposure in the various mediums.

Penamora, et.al. (2005) explains the manufacturing process of Coir Fibre Cement Boards (CFB) created from a mix of cement and coir fibre in 70:30 ratio. Fibres are extracted from husks soaked in water, mixed and blended with pre weighed cement, Pressed and finally trimmed before drying and conditioning. They also illustrated its application in wall panel, roofing, flooring, and partitioning and Form work systems.

Li et.al. (2006) on coir mesh reinforced mortar (CMRM) using non-woven coir mesh matting. The results indicate that the addition of coir mesh to mortar significantly improves the composite post-cracking flexural stress, toughness, ductility, and toughness index, ,compared to plain mortar materials

Song (1779) this paper states that the addition of rice husk ash to a concrete mixture has been proven to increase corrosion resistance. It has a higher early strength than concrete without rice husk ash. The rice husk ash forms a calcium silicate hydrate gel around the cement particles which is highly dense and less porous.

Hwang (1985) this paper shows the ash has very significant application in the construction industry, as the production rate of rice husk ash is about 20% of the dried rice husk, the amount of RHA generated yearly is about 20 million tons worldwide. The rice husk ash is a highly siliceous material that can be used as an admixture in concrete if the rice husk is burnt in a specific manner. The characteristics of the rice husk ash are dependent on the components, temperature and time of burning.

Malhotra and Mehta (Year: 1999) Malhotra and Mehta state that pozzolans are defined as siliceous and aluminium materials which in themselves possess little or no cementing property, but will in a finely dispersed form in the presence of water chemically with calcium hydroxide at ordinary temperature to form compounds possessing cementitious properties. When water is added to a mixture with pozzolanic material it acts as cement, in some instances providing a stronger bond than cement alone.

Zemke and Woods (2009) they concluded that during the burning process, the carbon content is burnt off and all that remains is the silica content. Pozzalonic behaviour is a necessity if you intend to use it as a substitute or admixture in concrete. If the rice husk is burnt at too low temperature or for too short, a period of time the rice husk ash will contain too large an amount of un-burnt carbon.

Omatola (2009) According to Omatola, Rice is the major staple that is consumed worldwide and is grown on every continent except Antarctica. It is a primary source of food for billions of people, and ranks second to wheat in terms of area and production. Nigeria which ranks the 17th largest rice producing country in the world. Rice husk is the waste we can get from these areas.

Opara (2011) In the research work he concluded that Rice husk is the waste product generated from the accumulation of the outer covering of rice grains during the milling process. Each country is faced with the challenging problem of the disposal of this low valued by product within the framework of her economy.

Otuoze et.al (2012) He researched that cement as the major classical binder in construction industry is very expensive. This is because of phenomenal population growth and urbanization which have triggered high demand of cement for several construction purposes to meet up with the need to expand infrastructures.

Therefore the need to connect the gap between demand and high price has warranted the need to investigate the use of cheaper alternative sources.

Agbede Olufemi, Tersoo Akuto (2016) they concluded that addition of RHA in a mortar mix increases workability in so far as the w/c ratio is balanced to meet the standards consistency of cement paste. RHA blended concrete can improve the compressive strength of concrete. RHA helps in enhancing the early age mechanical properties as well long term strength properties of concrete tiles.

Saravanan J. (2017) from their experimental study, they conclude that replacement of river sand in making roof tiles will effective if the replacement ratio lies below 5%. Thus, both economic and environmental benefits occurs in this manner if the manufacturing of roof tiles is made in large scale.

Mrs. K. Saranya, Mythily K. (2018) from their experimental study, they conclude that replacement of Rice husk ash in making roof tiles will be light effective if the replacement ratio lies below 7%.

III. CONCLUSION

On the basis of literature and tests which are conducted to know their various physical properties, the following conclusion can be made:

- It is possible to replace coir reinforced Mangalore tiles in place of normal Mangalore tiles, which has more strength, less self-weight, more stable and durable and eco-friendly one.
- Using white coir reinforced Mangalore tile is more advantageous when compare to Brown coir reinforced Mangalore tiles. As its strength and water absorption ability is preferably good as per the requirements.
- Currently, now a day's all are using normal Mangalore tiles as a roofing material. But now by the conduction of above tests we come to know that white coir reinforced Mangalore tile has more strength when compared to brown coir reinforced one.
- Hence we can replace the white coir reinforced Mangalore tile as a roofing material in place of normal Mangalore tile.

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