

# UTILIZATION OF DOMESTIC WASTES AS SOIL STABILIZERS

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**Abstract** - Soil stabilisation has become a major concern in construction engineering. The use of different natural fibres to reinforce soil is an old and ancient idea. Domestic wastes have become a major environmental hazard too. Consequently domestic waste fibre reinforced soil have recently attracted attention in geotechnical engineering. Not only the inclusion of fibres eliminate the problem of waste accumulation, but also it helps in increasing the bearing strength of soil. In this paper, attempts are made to study the effect of domestic waste fibres, hair and coir, on strength of soil.

**Key Words:** domestic waste fibres, CBR value

## 1. INTRODUCTION

The objective of this project is to utilize domestic waste fibre for enhancing the bearing strength of soil in an optimal way. Domestic waste requires a large area for its disposal. Human hair fibre (HHF) a non degradable matter is creating a serious environmental hazard. So its use in soil improvement can minimise the problem. In Kerala and other coastal regions of the country, availability of coir fibre is huge. So even after its major applications in coir industries, disposal of the same is also a major concern. This study includes the effect of hair and coir fibres on bearing strength of soil. Fibres randomly mixed in soil samples were tested for its engineering properties by performing CBR tests with varying percentages of fibres.

## 2. METHODOLOGY

Soil sample (Red soil) is collected from local sources and geotechnical properties are determined as per IS 2720 (given in Table 1). HHF and Coconut husk fibres were collected from nearby areas and HHF was segregated manually based on length.

TABLE1-GEOTECHNICAL PROPERTIES OF SOIL

Index properties	Sample1
Field density	2.04g/cc
Specific gravity	2.67
Moisture content	39.84%
Liquid limit	44.7%
Plastic limit	27.3%
Proctor test	
OMC	19.2%
MDD	1.74g/cc
Theoretical max. dry density	1.8g/cc
CBR value	6.93%

Fibres were used as an additive to the soil by weight (0.5%, 1%, 1.5%, 2% for hair fibre and 0.25%, 0.5%, 0.75%, 1% for coir fibre) to evaluate the strength of soil.

California bearing ratio test is used for evaluating the strength of soil.

## 3. EXPERIMENTAL RESULTS

Proctor Tests and CBR tests were conducted with 0.5%, 1%, 1.5%, 2% percentages of Hair fibres and results are as shown below.

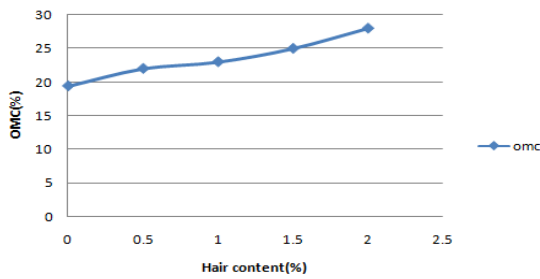


Fig.1.Variation of OMC for HHF

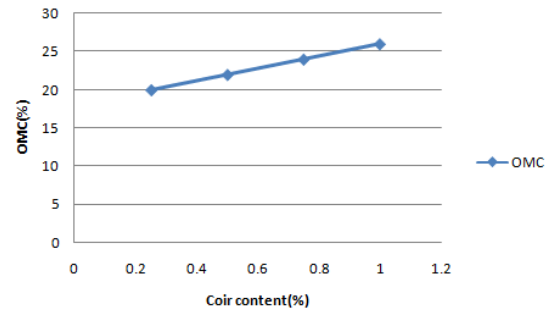


Fig 5 Variation of OMC for coir

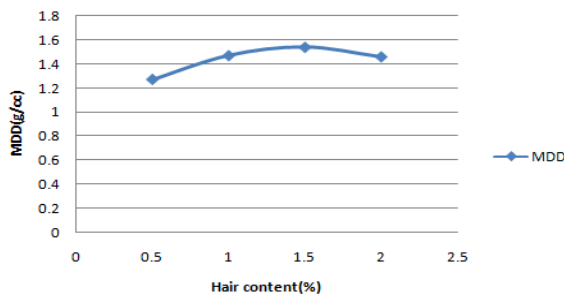


Fig 2 Variation of MDD for HHF

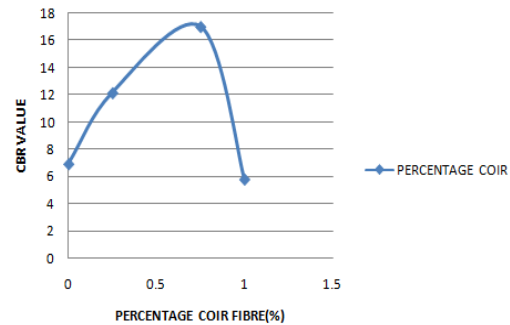


Fig 6 Variation of CBR for coir

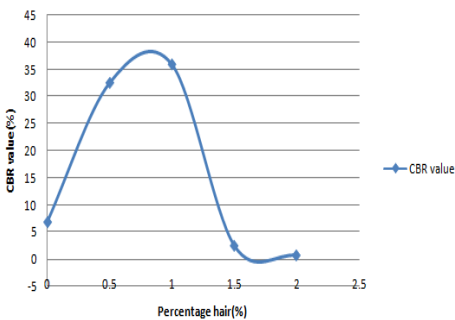


Fig 3 Variation of CBR value for HHF

Similarly tests were done for coir fibre and variation of OMC, MDD and CBR are as shown in fig. 4,5 and 6

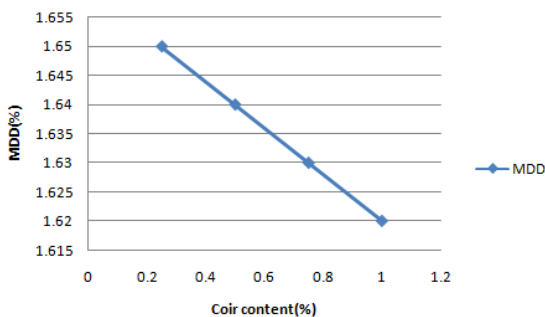


Fig.4 Variation of MDD for coir

For HHF , CBR value is increased from 6.93% (unreinforced) to 36% (reinforced) at 1% hair fibre content at an OMC of 24%.

For coir fibre, maximum CBR value obtained is 17.03% at 0.75% fibre content and corresponding OMC is 24%.

#### 4. CONCLUSION.

Different percentages of domestic wastes such as hair and coir are introduced and their effect is studied in detail. From this study following conclusions were drawn.

- It was concluded that inclusion of both fibres lead to an increase in the bearing strength of soil. The increase in strength is due to the improved frictional force between the soil and fibre.
- In case of hair fibre, CBR value was found to increase till 1%, after which further increase in percentage of fibre lead to a downward trend in CBR value .

- There was a constant increase of CBR value from 0.25 % till 0.75% of coir fiber .Then the value was found to decrease at 1% coir fiber.
- Final conclusion is that inclusion of HHF upto 1% and coir fibre upto 0.75% will cause increase in strength of soil and can be safely disposed off in soil without any lose in its strength.

For avoiding the balling of the hair fibre more studies are required to find randomly mixing methods of the fibre without balling effect so that better results are obtained in the future.

## 5. REFERENCES

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