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Comparative Study on Compressive Strength of Coconut Fibre and Coconut Shell in M25 Concrete according to IS Codes

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ABSTRACT

Rapid industrialization and construction in developing countries like India natural resources are depleting continuously and due to development projects in this field it causes various environment related issues like global warming, carbon footprint etc. To reduce the carbon footprints of traditional concrete materials natural carbon concrete plays a vital role. This research paper is for investigates the compressive strength of M25 concrete Incorporating coconut fibre and coconut shell as partial replacements for conventional aggregates. The study aims to evaluate the impact of these natural materials on concrete properties and comparative their effectiveness based in Indian standard codes.

Keywords: coconut fibre (coir) and shell, concrete, compressive strength, M25.

INTRODUCTION

Concrete is a most important construction material, but it has same bed effect on environment and range of global warming due to use of conventional material and aggregates. From excavation of core material to construction process it has great impact on environment and sustainability of material and resources.

This environment reason has generate the lot of concern in the infrastructure development world so here comes the idea of using the natural material like coconut residue (coir and shells), sugarcane residue, rice husk, many more which are generally not use for other work and burn it which is again the reason of environmental pollution enhancement. Natural fibre are sustainable material and they can find out locally and affordable comparing to ordinary material. Therefore, there is a need to explore and to find out suitable replacement material to substitute the extracted stones and other material in construction. In developed countries, the construction industry have identified many replaced material which can make structure light and eco-friendly. coconut shell and fibre when dried it contains lignin, cellulose etc. The purpose of this research is to disseminate awareness of using coconut shell as partial replacement of aggregates and determine its compressive strength.

OBJECTIVE

To access the compressive strength of M25 concrete grade with coil and coconut shell. To compare the performance of coconut fibre and coconut shell in enhancing concrete properties.

LITERATURE REVIEW

RESEARCH 1

The experiment by Kautak SAgrawal, RAAgrawal, Sanket S Dhase (2014) states that for decrease the steel requirement up to 2 percent in the concrete we can put coconut fibre in the concrete for reinforcement if coconut fibre limit exceed 3 percent then concrete‘s strength starts decreases.

RESEARCH 2

After an research done in 2008 by Kumar and Gunkasekaran and they find out if in plain concrete added some fibre in it then water absorption in concrete is hikeby 24 percent. Also if curing of cubes done for 28 days than 19.1 percentage of compressive strength increment was noticed.

RESEARCH 3

In 2013 an experiment conducted by R.naga Lakshmi ,to knew the characteristic and its properties with the replacement of different percentage of coarse aggregate with the shell of coconuts and partially exchange the fly ash with content of cement. The results are when coconut shell is exchange by coarse aggregate continually then the compressive strength, split tensile strength get reducing.

METHODOLOGY

The study is conducted with the partially replacement with waste coconut residue like fibre sand shells.

MATERIALUSED

Cement – Ordinary Portland Cement (OPC) 43 grade is used

Fine aggregate– rivers and is used conforming to IS 383:2016

Coarse aggregate- crush destone aggregate conforming to IS 383:2016

Potable water is used in concrete mix. It is important factor as it actually participates in the chemical reaction with cement.

Coconut fibres– the fibres are washed in tap water for 30 minutes then soaked again for 30 minutes. The soften fibres are straightened manually and combed with a steel comb. To accelerated the process, the wet long hair are dried into hot oven at 30 degree for 15 minutes so moisture will be removed, and finally cut into required shape and size.

Coconut shell- raw shells are purchased from market, wash it properly and break into small pieces as per requirement, and dried it with the help of sunlight and oven.

MIX PROPORTION

Grade of concrete m25 is selected as per IS standard.

EXPERIMENTAL PROCEDURE

Various codes related to Indian standard codes are

referred.

- IS 456:2000
- IS 299
- IS 2387
- IS 383:1970
- IS 516:1959

RESULT AND DISCUSSION

Compressive strength test– for M25 concrete grade

S.no.	Coconut fibre (%)	Compressive strength (N/mm^2)
1	No Replacement	27.23
2	1%	26.57
3	2%	26.83
4	3%	27.61

Mixing–concrete mixture with coconut fibre and coconut shell replaced at varying percentage such as 0%,1%,2%,3%, and 10%,20%,30%, respectively.

ANALYSIS OF RESULT:

1. *Coconut fibre*: here the pattern is not continuous firstly it is decrease and after that strength is increased at 3% addition of fibre.
2. *Coconut shell*: value is slightly decreases with increasing the percentage of coconut shell.

CONCLUSION:

Both coconut fibre and coconut shell impact the compressive strength of M25 concrete. These become light weight with the help of these. They can use in partition wall, floor tiles, and light load bearing structures. Use of coconut residue in concrete reduce the depletion of natural sources of conventional aggregate and will Due to its reducing pattern of strength we can further study with different types of admixtures and other natural material for its strength improvement. Also be helpful to make eco-friendly environment. It is not only cost effective but also solve the problem of waste disposal.

RECOMMENDATION:

Investigate the long-term durability and environment impact this material.

REFERENCES:

1. Vajje Sandeepani and Murthay Krishna N.R.2013, study on addition of the natural Fibre into concrete. International journal of science and technology research, 2277-8616.
2. Light weight aggregate concrete-science, Technology and applications by Satish Chandra and Leif Berntsson.
3. Concrete technology by M.L. Gambhir 5th edition, 2013 and by M.S.Shetty Rai, AJoshiY.P.
4. Application and properties of fibre reinforced concrete.int J.Eng. Res.Ind.Appl.2014,4,123-131.
5. Amarnath Yerramala Ramachand RuduC," Properties of Concrete with Coconut shells as Aggregate replacement," International Journal of Engineering Invention, 1(6) (2012).
6. Bencardino, F:Rizzuti, L; Spadea G:Swamy R. N. experimental evaluation of fibre reinforced concrete fracture properties Compos. Beng. 2010,41.17-24.
7. S Ghosal, SC Moulik, use of coconut shell as an aggregate In concrete: a review, 2277-1581 volume no.4 issue no.9,, pp-476-477.
8. Cordilia mar b oh, Amrita Agnihotri, Rajani, Raja Tomar, Rhula Kumar Stabhaiya- behavior of reinforced Concrete beam with coconut shell as a course aggregate Concrete.