

# Effect of Coconut Shell as a Coarse Aggregates on Behavior of Concrete

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## ABSTRACT

The prices of building materials are rising day by day. The main ingredient of the concrete is coarse aggregate. Nowadays, many of the researchers are researching the material which can reduce the cost of construction as well as increase the cost. In developing countries, the possibility of using some agricultural wastes as well as industrial by-products from different industries as construction materials will be highly desirable & has found to have several practical advantages. It was observed that the coconut shell has a great potential as a partial replacement of the aggregate in the concrete. The present work is only an accumulation of information about GFRGC and the research work which is already carried out by other researchers. Coarse aggregate were used in proportions of 5%, 10%, 15% to replace coarse aggregate in conventional concrete. The high demand for concrete in the construction using normal weight aggregates such as gravel and granite drastically reduces the natural stone deposits and this has damaged the environment there by causing ecological imbalance. This study aims in development the mix design of lightweight aggregate concrete using Coarse Shell as coarse aggregate together with cement and river sand. Coconut shell reinforced composites have been used as cheap and durable non structural elements.

**KEYWORDS:** Coconut shell, aggregate, partial replacement, lightweight concrete, Coconut Shell, Coarse Aggregate

## INTRODUCTION

Concrete is an artificial material similar to similar in appearance & properties to some natural lime stone rock [4]. It can be assumed to be manmade composite; the major constituent of it is natural aggregate such as gravel or crushed rock, sand & fine particles of cement powder & ultimately mixed with the water. While the construction material cost is increasing day by day; the reasons are high demand, scarcity of raw material as well as high price of energy Coconut shell represents more than 60% of domestic waste volume [6]. Coconut shell is an abundantly available agricultural waste from local industries. So, in developing countries like India, these wastes can be used as potential material or replacement material in the construction field.

Traditionally aggregates have been readily available at economic prices and of qualities to suit all purposes. But, the continued extraction of aggregates from nature has caused its depletion at an alarming rate. Therefore, there is a growing demand to find alternate materials that can be used as coarse aggregate in concrete. India produces about 20% of the coconut produced in the world. Within India, Kerala produces 45% of it. Disposal of coconut shells poses environmental issues as it is not easily degradable. Aggregates made by crushing coconut shells can be effectively used in concrete by partially replacing coarse aggregate up to a certain amount. This will not only reduce the unit weight of resulting concrete made, but also provides an efficient solution to the disposal of coconut shells.

**How to cite this paper:** Shubhangi B. Dhoble | Dr. S. G. Makarande | Prof. V. A. Kalmegh "Effect of Coconut Shell as a Coarse Aggregates on Behavior of Concrete" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-5 | Issue-2, February 2021, pp.11-12, URL: www.ijtsrd.com/papers/ijtsrd38055.pdf



IJTSRD38055

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## AIM & OBJECTIVE

**Aim:** To encourage the use of these harm free waste products as construction materials in low-cost housing. Analyzing flexural and compressive strength characteristics of concrete produced using crushed, granular coconut as substitutes for conventional coarse aggregate.

### Objective:

- To encourage the use of these 'seemingly' waste products as construction materials in low-cost housing.
- It is also expected to serve the purpose of encouraging housing developers in investing these materials in house construction.

## LITERATURE SURVEY

J. P. RIES (2011) studied that Lightweight aggregate sustainable concrete, Lightweight aggregates contributes to sustainable development by lowering transportation requirements, optimizing structural efficiency that results in a reduction in the amount of overall building material being used, conserving energy, Reducing labor demands and increasing the survive life of structural concrete.

AMARNATH YERMALLA (2012) et al studied the strength of coconut shells (CS) replacement and different and study the transport properties of concrete with CS as coarse aggregate replacement. They concluded that

- A. Increase in CS percentage decreased densities of The concrete.

B. With CS percentage increased the 7 days strength gain also increased with corresponding 28 days curing strength.

S. M. SUBASH, P. M. DHUREEN KARTHIK Concrete a composite Man-made material is the most widely used building material in the construction industry. It consists of a rationally chosen mixture of binding material such as lime or cement, well graded fine and coarse aggregates, water and admixtures. The matrix is usually 22-34% of the total volume. The project was carried out with various % replacement of coconut shell in place of coarse aggregates.

K. GUNASEKARAN, P. S. KUMAR (2008) The high cost of conventional building material is a major factor affecting housing delivery in India. In developing countries where abundant agricultural and industrial waste are discharged, these wastes are can be used as potential material or replacement material in the construction industry. admixtures. The matrix is usually 22-34% of the total volume. The project was carried out with various % replacement of coconut shell in place of coarse aggregates.

#### METHODOLOGY

The following four steps were adopted to do the process:

1. Collection of samples and testing their properties
2. Mix design calculations
3. Design of beam
4. Casting of specimens

**Experimental programme** The target of the experimental program was to determine the contribution of natural material aggregate type to the development of the strength behaviour of the confined concrete. The experimental program comprises the following:

- A. To investigate the best mix proportion of the combination of coconut shell as coarse aggregate in concrete by the value of strength per weight ratio of sample specimen.
- B. To investigate the feasibility of the combination of coconut shell as coarse aggregate in concrete by determining its compressive strength and durability.
- C. To investigate the effect of the combination of coconut shell as coarse aggregate in concrete content and length to the workability as lightweight aggregate in concrete and also the mechanical properties mentioned above.
- D. To determine the optimum content of the combination of coconut shell as coarse aggregate in concrete to

improve the ductility and does not cause reduction in the compressive strength.

#### CONCLUSION:

Then the further researches have been conducted with the waste Coconut Shell as the replacement for the coarse aggregate with the various proportions. The compressive strength is calculated for all the proportions of the sample. From that strength we can conclude the optimum replacement level of coarse aggregate. In this research the replacement percentage is up to 50% with the conventional coarse aggregate. The compressive strength of the CSC is 37.7N/mm<sup>2</sup> by replacing 25% of coarse aggregate. Then the beam is casted and tested for the above compressive strength and the result obtained is 90KN. From this results, we undoubtedly adopt this for small housing and office buildings.

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