

EXPERIMENTAL INVESTIGATION ON THE EFFECT OF RICE HUSK ASH IN COCONUT SHELL CONCRETE

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Abstract— The properties of concrete using rice husk ash (RHA) as partial replacement for ordinary Portland cement (OPC) and coconut shell (CS) as coarse aggregate were examined in this study. OPC is replaced by RHA and coarse aggregate by coconut shell by 0%, 5%, 10% and 15%. Workability, density of concrete, mechanical properties such as compressive strength, splitting tensile strength, flexural strength were examined and compared with the standard values.

Keywords— Rice Husk Ash, Coconut Shell, ordinary portland cement,

I. INTRODUCTION

Infrastructure development across the world created demands for construction material. Concrete is the leading material in building construction. involves consumption of ingredients like cement, aggregates, water & admixtures.. The chemical composition of the coconut shell is similar to wood. It contains 33.61% cellulose, 36.51% lignin, 29.27% and ash at 0.61%. Rice husk ash is an agricultural waste material. Rice husk ash (RHA) is obtained by burning of rice husk in a controlled manner. The preliminary and inevitable interest in the use of partial replacements or by – products as complementary pozzolanic materials was mostly induced by enforcement of air pollution control resulted from cement production industry. Rice husk is by- product taken from rice mill process, with approximately the ratio of 200 kg per one ton of rice, even in high temperature it reduces to 40 kg.

Rice husk ash waste and coconut shell can be managed by using it in concrete and hence landfill can be minimized. Eco friendly concrete combining both rice husk ash and coconut shell can be produced.

II. LITERATURE REVIEW

Syed Mehdi Abbas, Dada Patil, Sanjeev Raje[1]

This paper summarizes the research work on the properties of Rice Husk Ash (RHA) when used as partial replacement for Ordinary Portland Cement (OPC) in concrete. OPC was replaced with RHA by weight at 5%, 10% and 15%. 0% replacement served as the control. Compressive Strength test was carried out on hardened 150mm concrete cubes after at 1, 3, 7, 28, 45 & 56 days curing in water. The results revealed that the Compacting factor decreased as the percentage replacement of OPC with RHA increased. The compressive strength of the hardened concrete also decreased with increasing OPC replacement with RHA. It is recommended that further studies be carried out to gather more facts about

the suitability of partial replacement of OPC with RHA in concrete

K. Gunasekaran et al. [2]

Aggregates provide volume at low cost, comprising 66 percent to 78 percent of the concrete. With increasing concern over the excessive exploitation of natural and quality aggregates, the aggregate produced from industrial wastes and agriculture wastes being viable new source for building material. This study was carried out to determine the possibilities of using coconut shell as aggregate in concrete. Utilising coconut shell as aggregate in concrete production not only solves the problem of disposing this solid waste but also helps conserve natural resources. In this paper, the physical properties of crushed coconut shell aggregate were presented. The fresh concrete properties such as density and slump and 28-day compressive strength of a lightweight concrete made with coconut shell as coarse aggregate also presented. The findings indicated that water absorption of the coconut shell aggregate was high about 24 % but the crushing value and impact value was comparable to that of other lightweight aggregates. The average fresh concrete density and 28-day cube compressive strength of the concrete using coconut shell aggregate were 1975 kg/m³ and 19.1 N/mm² respectively. It is concluded that crushed coconut shells are suitable when it is used as substitute for conventional aggregates in lightweight concrete production.

III. MATERIALS USED

The basic materials used for an investigation are:

1. Cement- Birla shakti OPC 53 grade of cement was used.
2. Rice Husk Ash was obtained from Pune, India.



Rice Husk Ash

Coconut Shell

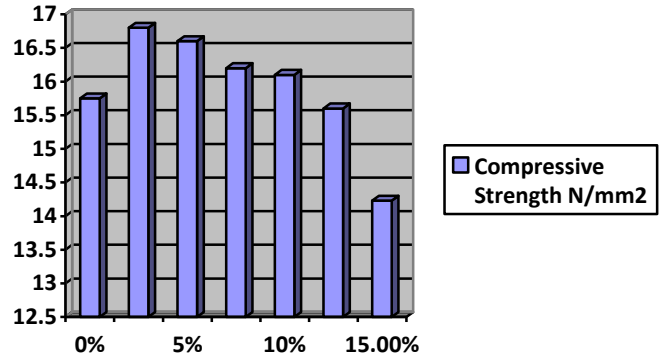
4. Coconut Shell- Coarse Aggregates of size 10mm & 20mm were used for this research work. It was sourced from a quarry in savedi, Ahmednagar, India.

5. Fine Aggregate- Fine Aggregates used for this research work was crushed sand (VSI). It was sourced from a quarry in kedgaon in ahmednagar, India.

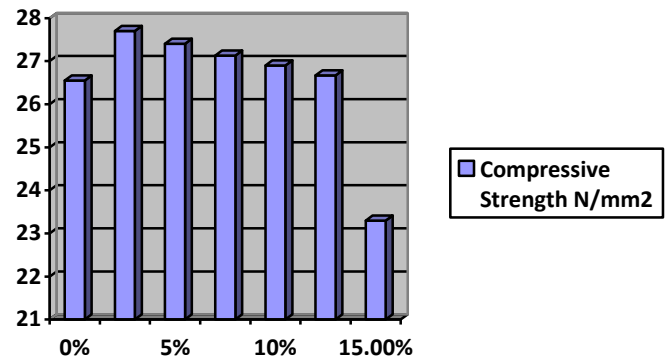
6. Water- Water was obtained from a well. The water was clean and free from any visible impurities. It conformed to IS 456-2000 requirements.

IV. METHODOLOGY & INVESTIGATION

Ordinary Portland cement is replaced by Rice Husk Ash and Course aggregates are replaced by Coconut shell in 0%, 2.5%, 5%, 7.5%, 10%, 12.5% & 15% by Weight and 7days & 28 days Compressive strength of the cubes are investigated. Water cement ratio taken was 0.4 and M 20 mix proportion was used.



7 Days Compressive strength



28 days Compressive strength

V. RESULTS

% replacement of RHA&CC	Compressive strength (N/mm ²) 7 DAYS	Compressive strength (N/mm ²) 28 DAYS
0%	15.75	26.55
2.5%	16.8	27.7
5%	16.6	27.4
7.5%	16.2	27.13
10%	16.1	26.9
12.5%	15.6	26.67
15%	14.23	23.3

VI. CONCLUSION

1. It can be concluded that up to 10% of Replacement of Rice husk ash & Coconut shell ; 7 & 28 days Compressive strength increases however beyond 10% it decreases significantly.
2. Up to 10% of replacement gives the better results in compressive strength thus we can use Rice husk ash as replacement for cement and coconut shell as Aggregate to reduce the overall cost of the concrete.

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