IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 11, May 2023

Use Rice Husk Ash as Partial Replacement of Cement in Concrete

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Abstract: *In India rice milling produces a by-product which is known as Husk. This husk is used as fuel in rice mills to produced steam for boiling process. This husk contains near about 75 % organic matter and the remaining 25% of this husk is modified into Ash during the firing process which know n as rice husk ash (RHA). The rice husk ash (RHA) contains near about 85 % to 90 % amorphous silica. By using rice husk ash in concrete, we can improve the properties of concrete. The current study and experimental investigation were taken to study the properties of concrete made with Rice husk ash. the replacement is done partially in the proportion of 0% ,20% and its effect on workability of concrete made with rice husk ash were investigated for the 20% rice husk ash replacement, the hardened properties such as compressive strength observed were good as compare to 0 % RHA. The compressive strength test was conducted at 0 % and 20 % rice husk ash replacement and the highest compressive strength at 20 % RHA replacement as compared to 0% RHA replacement at 14 ,21 and 28 days. Rapid increase in construction activities has resulted in shortage of conventional construction materials. In the present scenario, the high cost of conventional building materials is a major factor affecting housing delivery in the world.This has necessitated research into alternative materials of construction. The effective housing techniques deal with reduction in cost of construction as well as providing strength to buildings. Mainly gravel, sand and cement are used in the preparation of conventional concrete. While the use of agricultural by-product i.e., rice husk as a partial replacement with the conventional fine aggregates is expected to serve the purpose of encouraging housing developers in building construction. Rice husk is produced in about 100 million tons per annum in India. Twenty kg of rice husk are obtained from 100 kg of rice. It contains organic substances and 20% inorganic material. Ash from rice is obtained as a result of combustion of rice husk at suitable temperature. Proper utilization of it aims to save the environment, encourages the Government to find solutions regarding disposal to landfills of waste materials, and provides new knowledge to the contractors and developers on how to improve the construction industry by using rice husk, to sustain good product performance and to meet recycling goals.The rice husk ash concrete aims to prepare light weight structural concrete which may reduce considerably the self-load of structures and permits large precast units to be handled. The main objective is therefore to encourage the use of these 'seemingly' waste products as construction materials in low-cost housing.The various basic properties of rice husk concrete are reviewed in this paper.*

Keywords: Concrete, Rice Husk Ash, Compressive Strength, Split Tensile Strength, etc.

I. INTRODUCTION

Construction industry relies heavily on conventional materials such as cement, sand and granite for production of concrete. Concrete is the basic civil engineering composite. The quality of concrete is determined by the quality of paste/mix. It is the world's most consumed man made material. Its great versatility and relative economy in filling wide range of needs has made it a competitive building material. The demand for concrete for today's infrastructural development is rising day-by -day. In light of this, the non-availability of natural resources to future generation has also been realized. Concrete production is not only a valuable source of societal development but also a significant source of employment. Following a natural growth in population, the amount and type of waste materials have increased accordingly creating thus environmental problems. Historically agricultural and industrial wastes have created waste management and pollution problems. Different alternative waste materials and industrial

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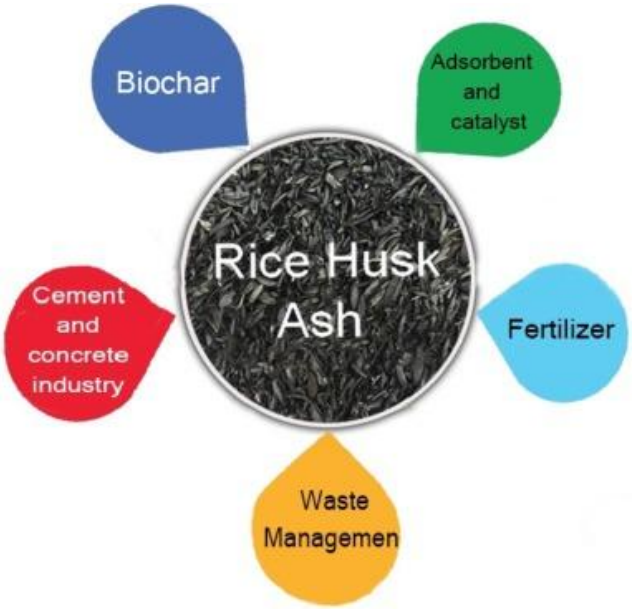
by-products such as fly ash, bottom ash, recycled aggregates, crumb rubber, saw dust, brick bats etc. were replaced with natural aggregates. Although these materials are traditionally considered as "primitive" and therefore inferior to more highly processes in terms of safety, durability, performance, occupant's health and comfort with respect to environmental issue, consumption of environmental products and energy within the construction industry has created a significant demand for raw materials and for production thereby contributing to the many environmental problems associated with diverse ecosystem. The wastes have generally no commercial value and are locally available at a minimal transportation cost. The use of these wastes has complemented other traditional materials in construction and hence provides practical and economic advantages. Also proper utilization of these wastes conserves the natural resources and protects the environment. Apart from the above mentioned waste materials, the rice husk can also be used in concrete due to the following points

Apart from the above-mentioned waste materials, the rice husk can also be used in concrete due to the following points:

1. Large scale production of rice in the coastal states of India and in the other countries of Asia.
2. It is the staple food in majority of the countries of the world and thus generates the husk in Mega-tonnes per year.
3. After the rice grain is collected, the husk is thrown away here and causing environmental pollution.
4. Some percentage of husk serves as eatables for the domestic animals, while majority are being wasted.
5. Little part of it when mixed with cow dung and other organic wastes serves as good manure to the plants.
6. Helpful in cost effective housing and low-rise buildings.
7. Serves as an environment-friendly construction material. With the quest for affordable housing system for both the rural and urban population of India and other developing countries, various proposals focusing on cutting down conventional building material costs have been put forward. Finding a substitute for the aggregate used today is a task that is worth studying because it helps in preserving conventional materials for future.



II. MATERIALS AND METHODS

1. Cement:

Cement is the fine grey powder that acts as binding materials Which is used for the construction. The cement that was used During experiment was Ordinary Portland Cement 43 grade Confirming to IS 8112 impurities were removed before the Process.

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2. Rice Husk Ash (RHA):

Rice Husk Ash is the ash that is obtained by burning the rice Husk until it gets reduced by 25%. The Rice Husk for the Research was obtained locally. These husk then were deliberated Until fine ash is being produced. These ashes were sieved by the 25mm sieve.

(a)

(b)

3. Water:

The water that is used for the research work was obtained Locally that fulfill the requirement provided by Indian Standard. The water was clean and free from any visible impurities. Water Is being supplied partially deliberating the proportionate ratio.

4. Fine Aggregate:

The sand that was used for the research work was obtained Locally that fulfills the requirement provided by Indian Standard 383 1970.The purity of the sand was analyzed glancing the code Provided by Indian Standard.Coarse Aggregates The aggregates that are used for this research work are taken from the locally available natural rocks that are get retained on 4.75micron sieve after being crushed.

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III. TESTING THE BUIDING MATERIAL

1. Compressive Strength Test:

The IS code followed for testing IS: 516 1959. The concrete cubes are casted of size 150mm Ã—150mm Ã— 150mm. These samples are tested in UTM (Universal Testing Machine) of capacity 2000KN. At pace of 140 kg/cm2/min. The compressive strength test is performed at 7 days and 28 days.

2. Split Tensile Test:

This test is an indirect method for finding tensile strength of concrete. The cylinder of dia 150mm and height 300m is casted and afterward tested at 7 days and 28 days. The loading rate is kept 1.2 MPa.

3. Tensile Strength Test:

At 7 days, it is observed that strength decreases with the Increase in replacement percentage.Later on 28 days test, the strength increased when compared to 7 days and the max strength is at 0% replacement (M-sand as aggregate). It may show better result, if the replacement is carried on river sand aggregate mix design concrete. The results are Convincing. Considering cost and environment it is satisfactory.

IV. RESULT AND CONCLUSION

As per reference of previous research Rice Husk Ash is a large amount waste product in farming to reuse these waste materials in concrete construction to get light wet structure and better for environment and it is eco-friendly. As per the previous research Paper the strength of rice husk ash in construction is better.As it is available in cheaply available

V. CONCLUSION

The review of earlier studies related to the partial replacement of cement with rice husk ash that there is a significant change in the strength properties of concrete such as compressive strength, flexural strength and split tensile strength. These experiments were carried out in various grades of concrete to find out the result. From the above literature reviews, the optimum percentage of rice husk ash varies from 10% to 30% by weight of cement. Up to these percentage replacements, improvement in the strength of concrete has been observed in terms of Compressive Strength, Flexural Strength and Tensile Strength. Previous studies also show that the utilization of rice husk ash replacement in concrete enhances the durability of concrete.

The use of rice husk ash results in a good effect on compressive strength and these materials are environmental-friendly Rice husk ash is one of the most active research areas thatencompass a number of disciplines including civil engineering and construction materials. Rice husk ash is an agricultural waste product which is produced in large quantities globally every year and due to the difficulty involved in its disposal, RHA is becoming an environmental hazard in rice producing countries. India alone produces around 120 million tons of paddy per year, giving around 24 million tons rice husk per year and 6 million tons of rice husk ash per year.As rice husk is piling up everyday, there is a pressure on rice industries to find a solution for its disposal. It is most essential to develop eco-friendly concrete from RHA.

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