

PARTIAL REPLACEMENT OF CEMENT WITH RICE HUSK ASH IN CONCRETE: REVIEW

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Abstract: In concrete the Rice husk is used in a form of partially replacing material it partially replace cement in concrete structures in modern days, it is partially used in place of cement because of having a pozzolanic reactivity. Its production is economical and it having technical advantages so that it can be used in a concrete for constructional work. Rice plants and paddy industries gives rice husk in form of by-product. We can use it in concrete as supplementary cementing material for improving the property. Use of by-product in concrete it is a good idea for disposal of waste material and also good for environment, if waste are not dispose properly they are pollute environment fresh air, land areas and sea water etc. This experiment is based upon the properly use of waste pozzolanic Rice husk ash by partially replacing to Ordinary Portland cement in concrete without affecting the concrete property. In this experiment cement is partially replace by weight, like 5%, 10%, 15% and 20%, find out the excess strength of concrete and also compare with the strength of the normal concrete at the days of 7days, 14days and 28days. In this research study the properties and strength of the concrete which is prepared by rice husk ash and partially replaced cement.

Keywords: Concrete; Workability; Compressive strength; Slump test

1 INTRODUCTION

In constructional field concrete is main important material. According to the characteristic of paste/mix we can determine the quality of concrete. Concrete is a heterogeneous mix of cement, water and aggregates. Various materials such as fly ash, rice husk and admixtures are added to concrete to obtain of a desired property. The demand of concrete rising day by day for infrastructure development. The concrete has a good strength, durability, versatility and its great affordability. In market different kinds of concrete has been available like, self-compacting concrete that enhance the durability of the concrete. High strength concrete that provide an ultra-high strength. But that concrete are having a high cost and rarely available. For reducing the high cost of the ordinary Portland cement with the desired characteristics some materials has modified. Locally available by-product such as rice husk ash is used for making concrete it is effectively fulfilling requirement. In field of agricultural we get rice husk if the form of waste material. Rice husk is a very useful material it is improve the physical and chemical properties of concrete in construction field. Comparatively supplant cement with the sufficient water cement ratio helpful to improve the suitability, durability and workability, also strength. Fine rice husk ash reduce the temperature but temperature of the ordinary Portland cement is not reduce. According the research observation that proper proportionate ration rice husk ash can reduce the initial setting time and also obtains maximum strength with a few day. Silica solidification state, silica composition, rice husk ash fineness and its exterior acreage is affected the rice husk ash.

In current worldwide markets and increasing accentuation on quality, requirement for concrete having high strength with affordable cost has increased numerous fold. Over the past decades, research on concrete has entered broad-based areas of activities to enhance the concrete performance. The reason behind this is not only to the vast range of applications that concrete offers, but also due to its great affordability, strength, durability, and versatility. Numerous method has been applied and different kinds of concrete has been introduced like, Self-Compacting Concrete(SCC) was introduced that enhances the durability of the concrete, high strength concrete(HSS) was introduced that provide ultra-high strength. But such concrete is rarely available and high cost. The need to reduce the high cost of Ordinary Portland Cement with the desirable characteristics some materials has to be modified. From the intensified research into locally available products and reduction in cost partial replacement of the OPC with rice husk ash is proven to be effective fulfilling requirement.

Rice husk Ash is an agricultural product on which rice husk is burnt into ashes. RHA is found to be good material which fulfils the physical characteristics and chemical composition of mineral admixtures. A small amount addition of RHA (lesser than two to three by weight of the cement), to a given water cement ratio, is sufficient and helpful to improve the stability, durability as well as the workability tends to increase the compressive strength and durability of the concrete. Usage of the fine rice husk ask reduces the temperature as compared to the normal opc temperature. As per the researcher observation is was found that proper proportionate ration RHA can reduce the initial setting time and also it obtains its maximum strength with a few days. RHA depends mainly on silica content, silica crystallization phase, and size and surface area of ash particles. Rice husk usage benefits are briefed in many literatures, very few of them deals in their real life.

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 600 micron where further impurities are being minimized. Smoldering the husk beneath controlled temperature beneath 800 °C will deliver fiery remains with silica primarily in shapeless structure. As of late, Nair et al. reportable an examination on the pozzolanic movement of RHA by utilizing completely different systems as an area of request to examine the impact of combustion temperature and smoldering length. He expressed that the specimens blazed at 500 or 700 °C and smoldered for over 12 hours delivered fiery junk with high reactivity with no noteworthy measure of crystalline material. The short blazing spans (15 – 360 minutes) caused high carbon content for the created RHA even with high burning temperatures of 500 to 700 °C.

It use in concrete due to the following reasons:-

- 1) In the coastal states of India large scale production of rice.
- 2) Mostly countries grow rice in large amount yearly because it is staple food.
- 3) It pollute the environment because the agricultural industries are save rice grains and thrown husk openly in environment.
- 4) We can utilize the rice husk waste to giving a domestic or pet animals as an eating material.
- 5) It serves as good manure to the plants, when its little part mix in cow excreta.
- 6) It is Helpful in reducing the construction cost it is build an economical buildings.
- 7) Rice husk ash is serves as an environment-friendly construction material.

2. LITERATURE REVIEW

[1] **Mehta and Pirth (2000)**: they are proved that the rice husk ash is decrease the temperature of high strength concrete more than ordinary Portland cement. In rice husk find a pozzolanic characteristics which is found from paddy industries and from rice and agricultural industries as a form of by-products of a company. We got rice husk ash when rice husk is burning in a control temperature.

[2] **Malhotra and Mehta (2004)**: they are invested that the fine grounded rice husk ash is increase the concrete compressive strength more than ordinary Portland cement. Rice husk is improve the characteristics of concrete in a less water absorption value.

[3] **Adewuyi and Ola (2005)**: They are try to mix ordinary Portland cement with various types of pozzolanic materials like rice husk ash its increase the concrete workability, durability and compressive and tensile strength. They are used rice husk ash as a supplementary material.

[4] **Habeeb and Fayyadh (2009)**: they are find out that after the 28 days the fine particals of the rice husk ash gives more strength then the coarse rice husk ash in concrete. That means the average partical size of rice husk ash are very much affected the strength of the concrete which is made by rice husk ash.

[5] **Lee et al (2005)**: They are study for using waste materials they are given an ideas about the utilization of a waste materials and improve the property of the concrete. They are used for their experiments waste materials like silica fumes, rice husk ash and fly ash etc.

[6] **Gunduz and Ugur (2004)**: they are conclude the characteristic of light weight concretes in this type of concrete less reinforcement is used it is economical and easy to transport the rice husk ash the unite weight is very low is it can use for making light weight concrete. In this type concrete the air voids are removes by the partially compaction of concrete. The main aim of their experiments to provide light weight concrete and reduce the voids ratio of mortar of concrete.

[7] **Khedari et al (2001)**: they are study the use of a waste products and it is using for improving the properties of the concrete they are use the different types of aggregates used in there experiment like fly ash, rice husk ash, wheat ash, coconuts

[8] **Sari and Pasamehmetoglu (2004)**: They are conclude that the rice husk is a by-product and paddy industries .the rice husk is not used properly the rice husk is maximum harvest then after burn it is causes environment problems and causes problems .For making light weight concrete we can use rice husk ash. The light weight concrete is classified into three categories according to its density and strength properties.

[9] **Obilade and I.O. (2014)**: they are conclude in the rice husk ash is used for making light reinforcement concrete. In the two types of concrete weight batched rice husk concrete and volume batched light weight concretes. They have different bulk density, strength and having a same properties. Volume batched having a workability, and compressive strength and loss of bulk density is lower than weight batched rice husk. Volume batched is used for the slab section and concrete beams which are making by light weight concrete mixed with rice husk ash. They are study the flexural behaviour of sections.

[10] **Husk, K.S. Low and C.K. (1997)**: They are study that the rice husk ash is a good admixture of concrete. They are having pozzolanic properties. Rice husk ash increase the strength of concrete member and also reduce the corrosion of the concrete.

[11] M. Fang (2004): In their study they studied that the rice husk ash is not only reduce the construction cost it is also remove or reduce the carbon di oxide emission on the environment. By the pozzolanic reaction in a hydrated cement block the voids they also reduce the alkali nature of aggregate and also minimizes the expansion of concrete. The fine porous structure is diffuse the alkali iron on the above surface of aggregate of the rice husk ash concrete.

[12] Mehta and Pirth (2000): Investigated that the use of the rice husk ash as a replacement material reduce the temperature in the high strength mass concrete.

[13] Cordeiro et al (2009): Carried out the studied of Brazilian rice husk ash and rice husk straw ash and explained that the grinding of these ashes increases the pozzolanicity of rice husk ash and the strength.

3. CONCLUSION

Following conclusion drawn from the literature review:

- a. Rice husk ash is environment polluting material and is best supplementary material for cement replacement as it is easily available in rice producing areas.
- b. The rice husk concrete mix is economical than conventional concrete mix. It decreases the cost at a rate of 3.35% by replacement.
- c. By using Rice husk ash in concrete as replacement the emission of greenhouse gases can be decreased to a greater extent.
- d. RHA based sand cement block can significantly reduce room temperature. Hence air conditioner operation is reduce resulting in electric energy saving.
- e. Moreover with the use of rice husk ash, the weight of concrete reduces, thus making the concrete lighter which can be used as light weight construction material.
- f. The pozzolonic activity of rice husk ash is not only effective in enhance the concrete strength, but also in improving the impermeability characteristics of concrete.
- g. As the Rice Husk Ash is waste material, it reduces the cost of construction.

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