Review on Use of Agricultural Waste as a Partial Replacement of Cement in Concrete

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Abstract— It has been seen that agricultural waste such as Rice Husk and Saw Dust is available in abundant on our earth and there byproduct i.e. Rice Husk Ash and Saw Dust Ash has a binder property due to which it can be used in concrete as a partial replacement of cement. In this paper the exact percentage of Rice Husk Ash and Saw Dust Ash has been tried to find that can replace cement, as cement is the most costlier material used in concrete and also emits Carbon dioxide which is harmful to our environment.

Key words: Rice Husk Ash, Saw Dust Ash, Concrete, Environment Friendly

I. INTRODUCTION

Advancement in concrete technology is growing day by day, researchers has found many things that can replace cement, sand and aggregate so that a better concrete can be formed with a better performance, similarly Rice Husk Ash and Saw Dust Ash is also an agricultural waste that can replace cement and can form an environment friendly concrete, so if we find the exact percentage of Rice Husk Ash and Saw Dust Ash for partial replacement of cement so that a high strength concrete can be formed then we can reduce the usage of cement which ultimately reduces the cost of concrete. This paper is based on literature survey.

II. REVIEW OF LITERATURE

Mane research's has been conducted on partial replacement of cement by Agricultural waste. This paper will cover some of the important papers based on similar studies.

Rahim et al. (2014) prepared M20 grade of concrete and replaced cement with 5%, 15% and 25% of RHA, It was concluded that the optimum RHA replacement for cement was found 5 %, which provided the highest compressive strength at 28 days i.e. 26.24mpa.

Adekunle & Daramola (2013) replaced cement with 5, 10, 15, 20% of RHA and SDA by weight with 0.5 water cement ratio, After 28 days of curing compressive strength is tested and it is concluded that RHA and SDA are good materials that can supplement cement to some extent but the percentage of SDA recommended should not be more than 10% while the RHA is permissible to 15% of cement.

Chugh & Bansal (2016) replaced cement with Saw Dust Ash as 5%, 10%, 15%, 20%, by weight for M-25 mix. After 28 days it was observed that 5% replacement of cement gives the highest increase in strength i.e. 16.96%.

Dangi & Joshi (2014) target to determine the optimum percentage (10, 20, 30%) of RHA & SDA as a partial replacement of cement for M40 grade of concrete with 0.4 water cement ratio, The result of study shows that there are good prospects of using RHA and SDA as a pozzolana combination with OPC and compressive strength increases with curing time, the highest strength of concrete using RHA was found 48.42mpa at 10% of RHA replaced with cement, and it was found that replacing 30% of SDA gives highest strength i.e. 44.21mpa.

Gupta et al. (2015) target to see the optimum proportion (8, 16, 32%) of RHA & SDA as a partial replacement of cement for M30 grade of concrete and found that replacing cement with RHA at 8,16,32% gives 35.42, 31.03, and 27.22 N/mm² strength respectively and SDA gives 34.57, 32.41, 30.20 N/mm² strength respectively.

Malik (2015) replaced cement by Saw Dust Ash as 5%, 10%, 15% and 20% by weight for M-25 mix and concluded the permissible of using Saw Dust Ash as partial replacement of cement up to 10% by weight for particle size of range 90micron.

Marteong (2012) has done a comparative study on effects of concrete properties when OPC of varying grades was partially replaced by SDA, Author concluded that addition of Saw Dust Ash as partial replacement of cement results in increase in setting time, decrease in Workability , increase in compressive strength

Nair et al. (2013) prepares 100 plus samples of concrete block of M60 grade of concrete by replacing cement by 0, 5, 15, 25% of RHA with water cement ratio of 0.35, 0.40, and 0.45. From this experimental study it is inferred that the incorporation of RHA in concretes results in improved compressive strength and flexural strength.

Raheem et al. (2012) investigated the physical properties and chemical composition of SDA as well as the workability, and compressive strength concrete produced by replacing 5%, 10%, 15%, 20% and 25% of OPC. Author concluded that the compressive strength generally increases with curing period and decreases with increased amount of SDA. Only 5% SDA substitution is adequate to enjoy maximum benefit of strength gain.

Thakur et al. (2014) prepared M40 grade of concrete by replacing 10%, 20% and 30% of cement by Rice Husk Ash and Saw Dust Ash separately with 0.4 water cement ratio and concluded that compressive strength of concrete with Rice Husk Ash RHA10 mix gives excellent compressive strength, i.e. 54.2 N/mm², whereas Saw Dust Ash SDA30 mix possess good compressive strength, i.e. 49.6 N/mm².

Sayed et al. (2017) Replaced cement with RHA in 5%, 10%, 15%, and 20% by weight And concluded that, adding the ash with 15% of the weight of the cement showed the highest compressive and tensile strength.

III. CONCLUSION

After studying all of these research papers I conclude that the partial replacement of cement with agricultural waste can be a very good and beneficial step to form an environment friendly concrete but it is also very important that concrete gives its best strength, so the percentage of RHA should be kept between 5 to 15% and parentage of SDA should be kept between 5 to 10% whereas percentage can vary for different.
grades of concrete. Exceeding the percentage can result in reduction in compressive strength of concrete. Further study can be done on mix percentage of RHA and SDA with varying water cement ratio.

REFERENCES


