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Impact of Rice Husk Ash in Concrete Mix Design

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Abstract**—***An attempt have been made, in this paper to achieve a target strength in concrete which is better than the strength achieved in conventional concrete by partially replacing cement by admixture rice husk ash. Experiments have been carried out in the laboratories in the M-20, M-25, M -30 GRADE of concrete by mixing 10%, 20% and 30% of rice husk ash as the partial replacement of concrete. Strength of these cubes were tested on 7, 14 and 28 days, and the strength of cubes were found to be better then that tested without mixing rice husk ash.*

Keywords:—*Admixtures, Concrete, Cubic strength, Mix design, Rice husk ash*

1. INTRODUCTION.

Concrete is a widely use composite building material in the modern era. Now a days new technologies have been came into force for obtaining extraordinary strength in R.C.C. From the research done in the recent past it is evident that RHA is used as a partial replacement for cement for making concrete of grade M-20, M-25, M-30 in various countries .Hence research regarding RHA can proof substantial in India. Hence for the research work regarding RHA laboratory experiments have been carried out in this project. RHA which is a waste pozzolonaic substance is been used as an admixture as a parial replacement of cement in various proportions in various grades of concrete to achieve a desired strength in a form of concrete cube. In recent years, research work has been carried out in many countries including India have led to a result that rice husk if burnt properly can turn into a reactive ash which can be used as a partial replacement for cement for making concrete. This is because as high as 85% to 95% of the ash by weight is silica (sio2) and most of it is reactive depending upon the burning process.

2. METHODOLOGY

Many tests are carried out to test the various characteristics of concrete but compressive strength test is of utmost importance. Various characteristics can be judged by this test of concrete. According to IS 456-2000 compressive strength of concrete is tabulated below in Table 1. Similarly, according to I.S. 456-2000 types of mixes are: (1) Nominal Mix (2) Standard Mix and (3) Designed Mix. Out of these, Standard Mix Design Method has been adopted here in this experimental study.

In this paper only M-20, M-25 and M-30 grade of Concrete Mix design has been prepared by weighing the ingredients cement, sand and aggregates with required water along with adding RHA as an admixturein a definite proportion of 10%, 20% and 30%. Mixing was done by in a laboratory batch mixer. The specimens were cast in steel mould and compacted on a table vibrator. The specimens of 150 mm × 150 mm × 150 mm size of cube were cast for the determination of compressive strength. Curing of the specimens was started as soon as the top surface of the concrete in the mould was hard enough. Spreading wet gunny bags over the mould for 24 hours after the casting was carried out for the initial curing. The specimens were later placed immediately in water tank for further curing. The strength of cubes in 7 and 28 days are shown in the Table 1.

3. EXPERIMENTAL ANALYSIS

An experimental study has been carried out in laboratory to find the compressive strength of M-20, M-25, M-30 mix concrete cubes at 7, 14 and 28 days by using Rice husk ash at 10, 20 and 30% as partial replacement of cement.

The strength of concrete cubes with rice husk ash was found superior as compared to that without RHA .Results and analysis are engraphed in form of graphs 1-9 and table 2 below.

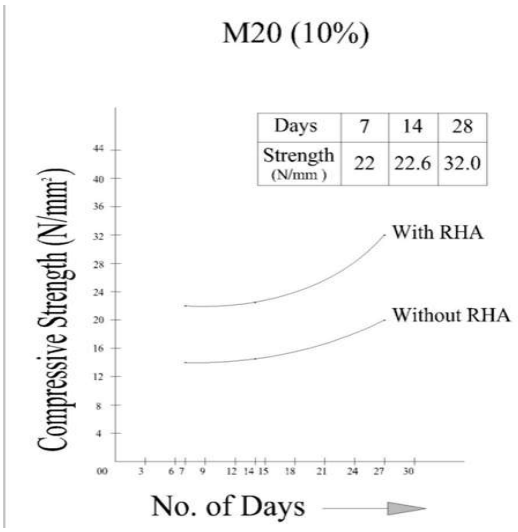

Figure 1: Compressive Strength of Cube of M-20(10%)

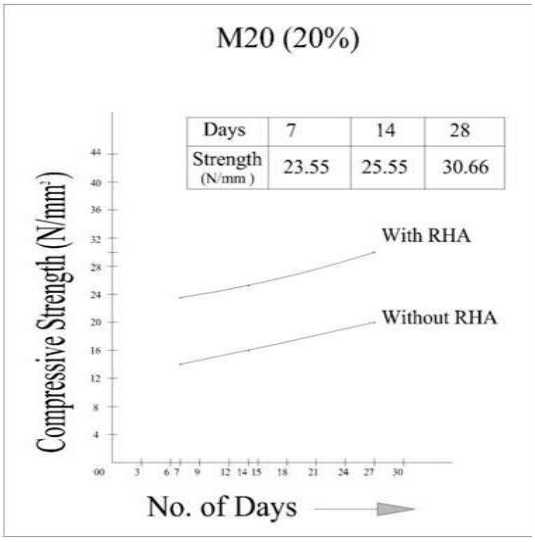

Figure 2: Compressive Strength of Cube of M-20(20%)

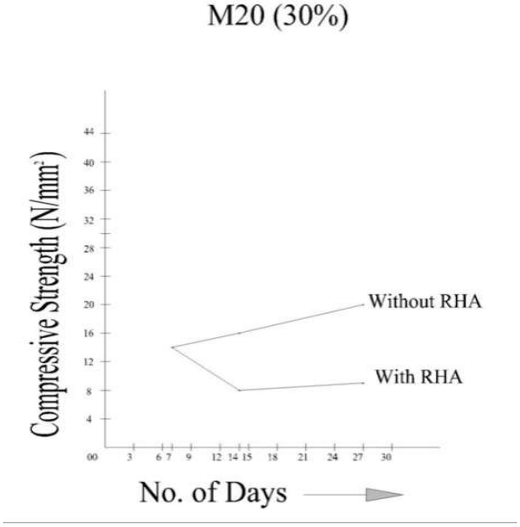

Figure 3: Compressive Strength of Cube of M-20(30%)

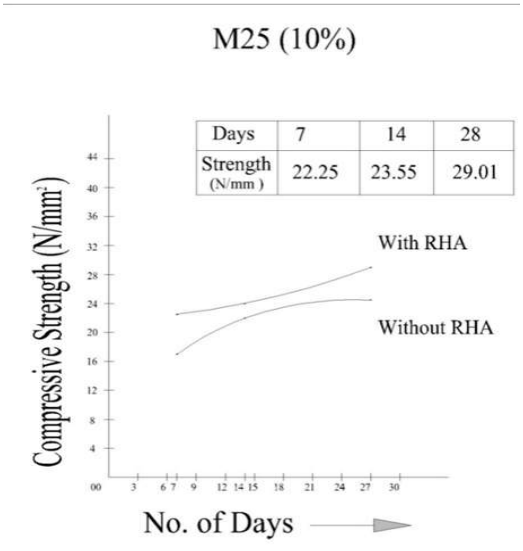

Figure 4: Compressive Strength of Cube of M-25(10%)

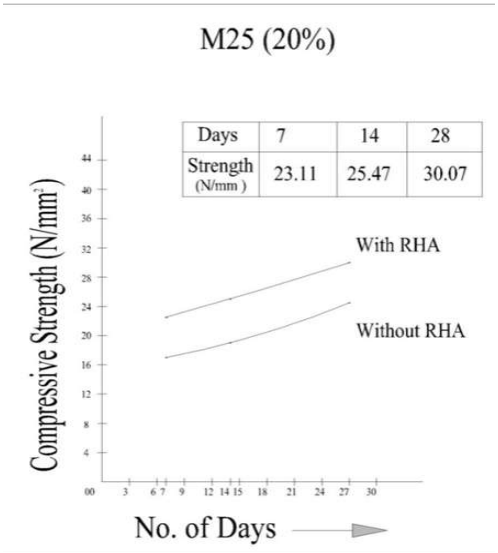

Figure 5: Compressive Strength of Cube of M-25(20%)

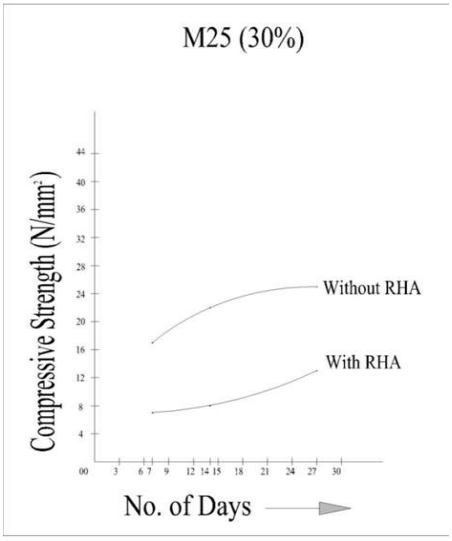

Figure 6: Compressive Strength of Cube of M-25 (30%)

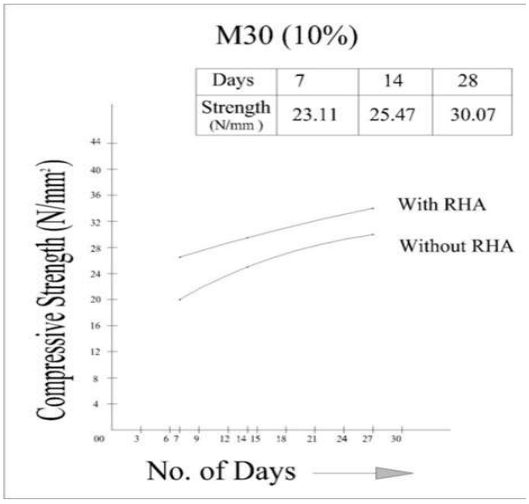

Figure 7: Compressive Strength of Cube of M-30(10%)

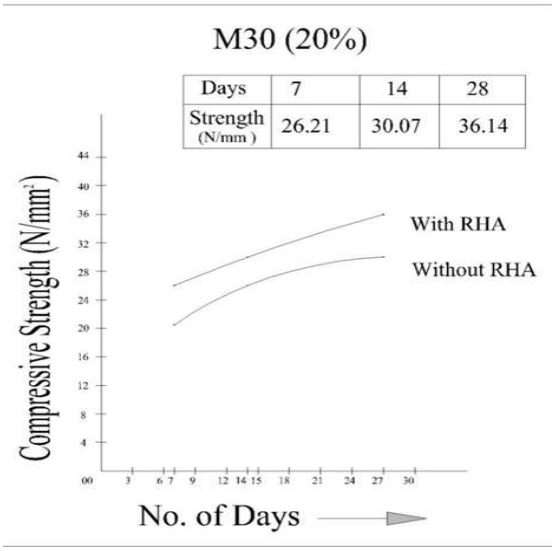

Figure 8: Compressive Strength of Cube of M-30(20%)

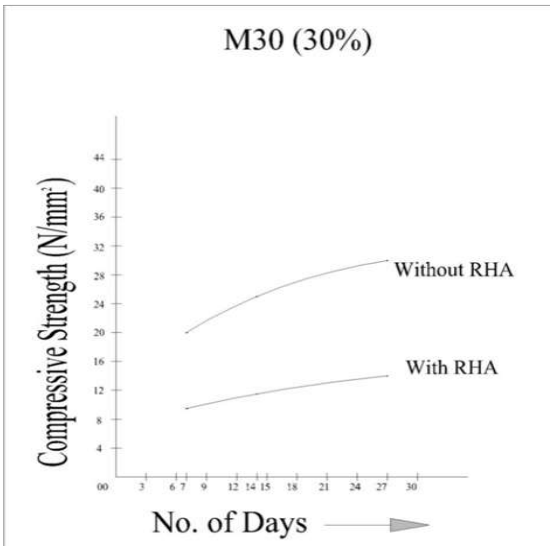

Figure 9: Compressive Strength of Cube of M-30(30%)

Graph 1-9 shows the compressive strength of cube of M-20, M-25 and M-30 grade of concrete at 7, 14 and 28 days respectively with mixing of 10%, 20% and 30% of RHA as a partial replacement of cement.

Table 1 Compressive Strength of Different Grades of Concrete at 7 and 28 days

Grade of Concrete	Minimum compres-sive strength N/ mm2 at 7 days	Specified characteristic compressive strength (N/ mm2) at 28 days
M20	13.5	20
M25	17	25
M30	20	30

4. RESULTS & DISCUSSIONS

On the basis of experiment done in the laboratory, the results obtained are shown in the following table . It increases about 30% at 7days and 50% at 28 days by inclusion of RHA as Admixture as compared to without Admixture and it is shown in graphical representation in graph 1 to 9. Thus, the use of this admixture can prove economical and substantial where early strength is needed.

Table 2-The final tally of the Compressive Strength of Cubes as Tested in the Laboratory for M-20, M-25 and M-30 Grade of Concrete.

Grade of con-crete	% of RHA	Comp. Strength in 7 days	Comp. Strength in 14 days	Comp. Strength in 21 days
M-20	10%	22.00	22.6	32.00
	20%	23.55	25.55	30.66
	30%	13.55	7.55	8.00
M-25	10%	22.25	23.55	29.01
	20%	23.11	25.47	30.07
	30%	6.66	7.66	12.54
M-30	10%	23.11	25.47	30.07
	20%	26.21	30.07	36.14
	30%	9.00	10.66	11.33

5.CONCLUSION

In this paper we have performed an experimental study on admixture RHA, by mixing it as a partial replacement of cement in 10%, 20% and 30% proportion in M-20, M-25 and M-30 grade of concrete. The conclusion is that the strength of concrete increases about 50% at 7days and 60% at 28 days for M-20 grade of concrete and 30% at 7 days and 20% at 28 days for M-25 grade of concrete by inclusion 10% and 20% of partial replacement of cement with RHA aws compared to that of without RHA.

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