Experimental Study on Green Concrete using Eco Sand and Sugarcane Bagases ash as Partial Replacement of Sand & Cement

Sagar Gupta[1], Nitesh Kushwaha[2]

[1]*M. Tech. Scholar*, [2]*Professor*

Department of Civil Engineering, Millennium Institute of Technology & Science, Bhopal India

Abstract - Concrete is a complex material which is composed primarily of cement, fine aggregates and coarse aggregates mixed with portable water that hardens with time. Storage and safe disposal of industrial by product such as SCBA and eco sand is a huge problem everywhere, reuse of these waste eliminates/reduce the problem. Eco sand is a by-product of cement manufacturing process and it poses a serious land fill problem. Hence, as a solution to the above mentioned issue, it can be used as an aggregate in concrete depending on its property.

I. INTRODUCTION

In India, solid waste management is currently a burning issue that demands attention. Around 4.4 billion tonnes of solid wastes generate yearly, However, in India agricultural sector alone has generated about 600 million tonnes of biomass waste.

Currently, in India, around 960 million tonnes of residual solid waste have been generated from the agricultural, mining, industrial, and municipal processes yearly.

Concrete is a composite material which consists eccentrically of a binding medium. Concrete is no longer made of aggregate Portland cement and water only. Often but not always it has to incorporate at least one of the additional ingredients such as admixture or cementitious material to enhance its strength and durability within which are embedded particles or fragments of relative inert filler in Portland cement concrete. The binder is a mixture of Portland cement. The filler may be any of a wide variety of natural or artificial. Fine and coarse aggregate and in some instances an admixture. Concrete is presently one of the most essential materials that have been used in the civil engineering construction works. When concrete is reinforced with steel, it has got a higher capacity for carrying loads. Concrete being a heterogeneous mix of several ingredients, the quality of the constituent material and their respective proportions in the concrete, determine its strength and other properties.

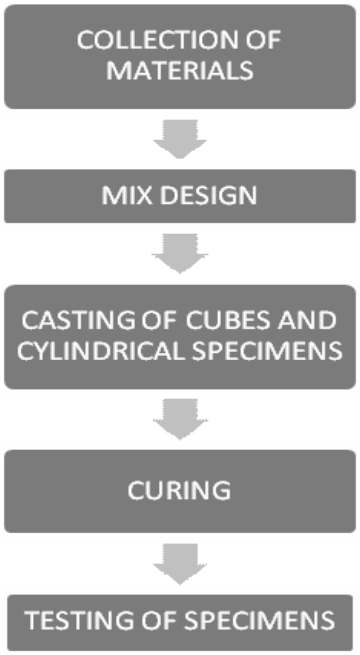
II. OBJECTIVES

The objectives of the research are outlined below:

- To investigate the effect of Eco sand & Sugarcane Bagasse Ash waste materials in M-35 grade of concrete on its strength.

III. METHODOLOGY

In this experiment fine aggregate is replaced 0%,5%,10%,15% and 20% of its weight by eco sand and cement is replaced 10% of its weight by Sugarcane Bagasse Ash in all concrete mix and there effects are studied.



Flow chart of methods

IV. RESULTS AND ANALYSIS

In this stage the experimental work is carried out by using cement, fine aggregate, coarse aggregate, Eco sand and Bagasse Ash. The specimens were casted for M35 grade of concrete by replacing the fine aggregate and cement. In this experiment fine aggregate is replaced 0%, 5%, 10%, 15% and 20% of its weight by eco sand and cement is replaced 10% of its weight by Sugarcane Bagasse Ash in all concrete mix and there effects are studied.

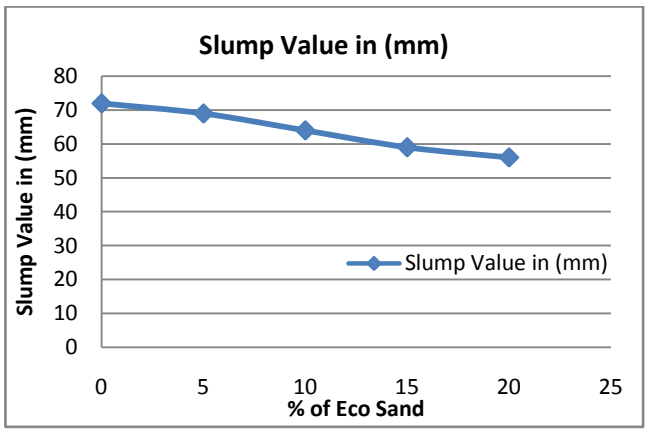


Figure 5.1 Line Chart of Slumps of M-35 with 10% Bagasse Ash

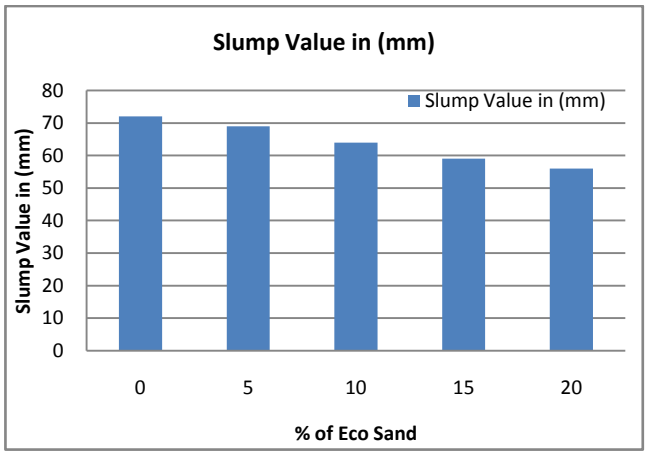


Figure 5.2 Bar Chart of Slumps of M-35 with 10% Bagasse Ash

Discussion: By analyzing the slump value, it is understand that the slump value is always decreases by increasing the percentage of the Eco sand and replacing the cement by Bagasse Ash.

Figure 4.7 Compressive Strength Test

5.4 COMPRESSIVE STRENGTH TEST

The result of the compressive strength with partial replacement of Eco sand and without using Bagasse Ash for 7, 14 and 28 days are shown for M-35concrete and their graphical representation for M-35 Concrete by replacing 10% cement with Bagasse Ash along with Eco sand is shown in the Table 5.3 for M-35 concrete and their graphical representation is shown in the Figure 5.3 and Figure 5.4 respectively.

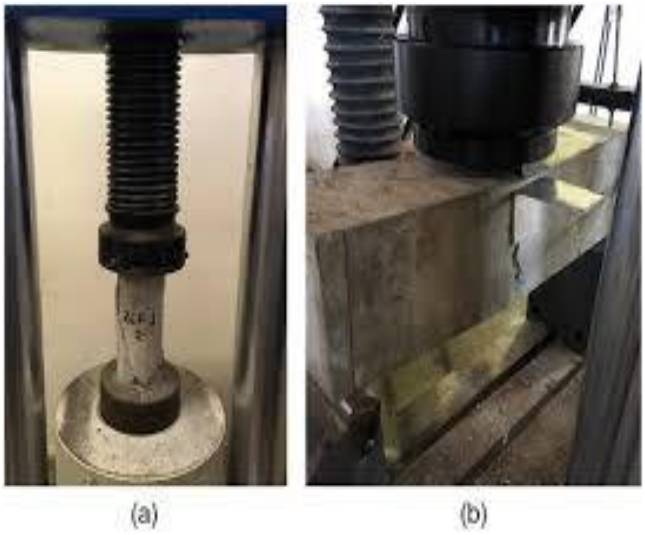


Figure 4.8 Flexural & Split Tensile strength test

Discussion: From the above table is seen that the compressive strength with 10% Bagasse Ash and 90% cement in M35 grade of concrete at 7, 14 and 28 days increases when the percentage of the Eco sand increase from 0% to 20%.

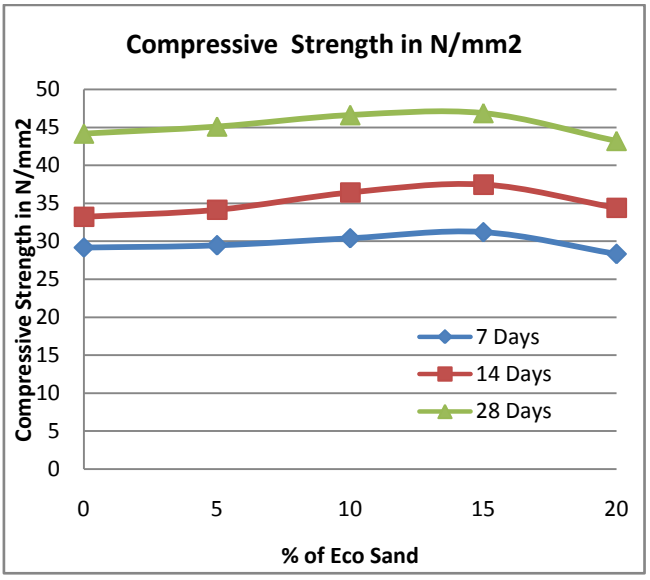


Figure 5.3 Line Chart Compressive Strength of Different Mix of M-35 Concrete

(With Bagasse Ash 10% & Cement 90%)

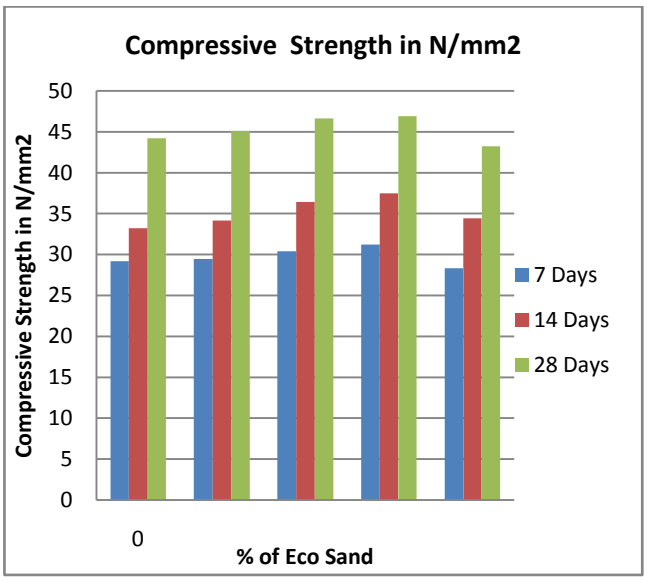


Figure 5.4 Bar Chart Compressive Strength of Different Mix of M-35 Concrete

(With Bagasse Ash 10% & Cement 90%)

5.5 FLEXURE STRENGH TEST

The result of the flexure strength with partial replacement of Eco sand and without using Bagasse Ash for 7, 14 and 28 days are shown in for M-35concrete by replacing 10% cement with Bagasse Ash along with Eco sand is shown in the Table5.3.

Discussion: From the above table is seen that the flexure strength in M35 grade of concrete with 10% Bagasse Ash and 90% cement at 7, 14 and 28days increases when the percentage of the Eco sand increase from 0% to 20%.

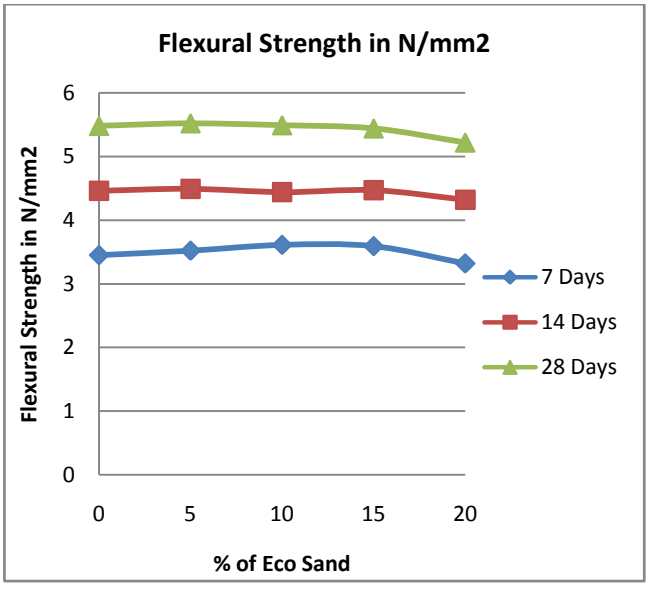


Figure 5.5 Line Chart Flexure Strength of Different Mix of M-35Concrete (with Bagasse Ash 10% & Cement 90%)

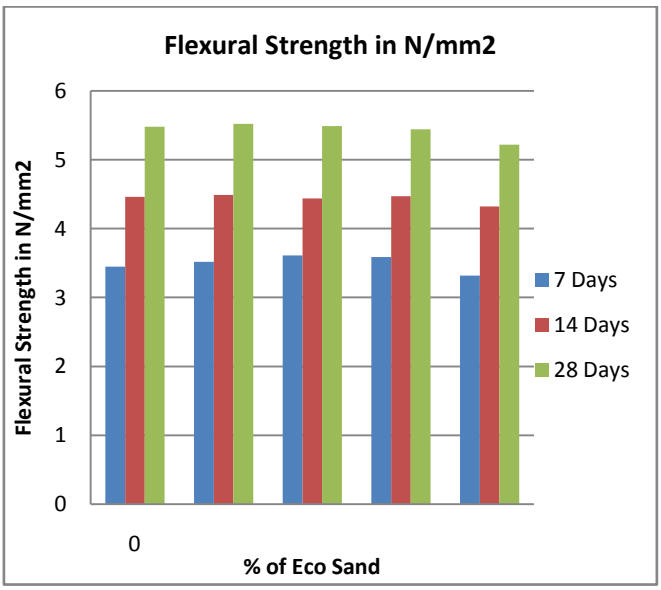


Figure 5.6 Bar Chart Flexure Strength of Different Mix of M-35Concrete (with Bagasse Ash 10% & Cement 90%)

5.6 SPLIT TENSILE STRENGH TEST

The result of the split tensile strength with partial replacement of Eco sand with 10% cement with Bagasse Ash is shown in the Table5.4 for M-35concrete and their graphical representation is shown in the Figure 5.7 & 5.8.

Discussion: From the above table is seen that the split tensile strength with 20% Bagasse Ash and 80% cement in M35 grade of concrete at 7, 14 and 28 days increases when the percentage of the Eco sand increase from 0% to 20%.

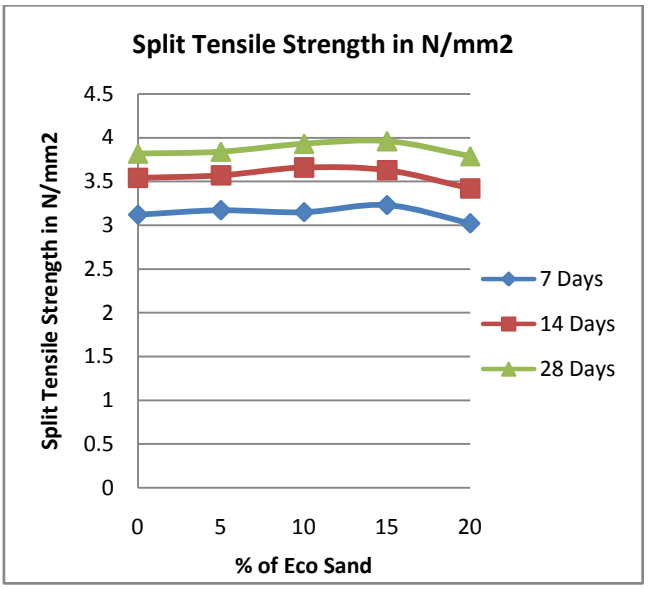


Figure 5.7 Line Chart Split Tensile Strength of Different Mix of M-35 Concrete

(With Bagasse Ash 10% & Cement 90%)

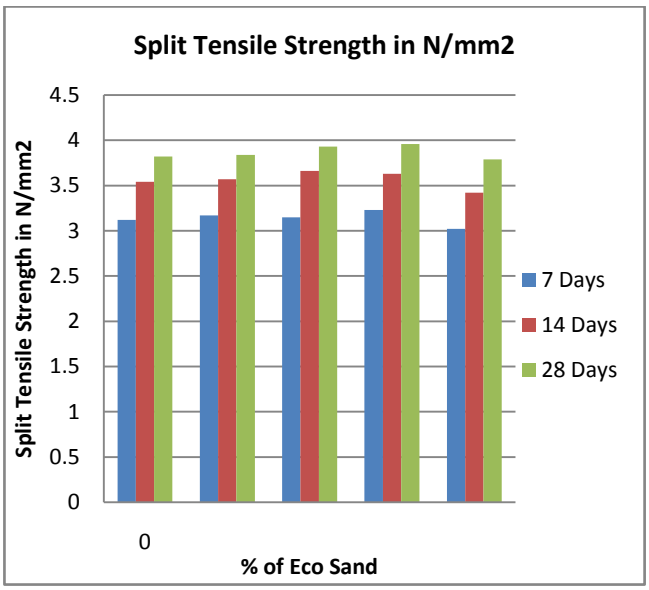


Figure 5.7 Bar Chart Split Tensile Strength of Different Mix of M-35 Concrete

(With Bagasse Ash 10% & Cement 90%)

V. CONCLUSION

From the present work the strength analysis is carried out which is explained in the following given points:

- The compressive, flexural & split tensile strength of the concrete by replacing the 15% sand by Eco sand and 10% cement by the Bagasse Ash the strength increases in M-35concrete. As compared to the conventional concrete.

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