Study on Sugarcane Baggage Ash Replace By Cementitious Material

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Abstract— Today Concrete is huge demanded construction material which consumes a very high amount of cement. One tone of cement produces almost one tone of CO2 (Carbon dioxide) which is a very series problem for the environment. So present condition requires alternate solution of cement in the proposed paper I will try to replace cementitious Material by Sugarcane Bagasse Ash. Which is Sugar industrial west material. Utilization of industrial and agricultural waste products in the industry has been the focus of research for economic, environmental, and technical reasons. Sugar-cane bagasse is a fibrous waste-product of the sugar refining industry. Huge quantity of ash which is a waste product, available at very negligible rate. In these Paper Sugarcane Baggase Ash Replacing with Cement Material. Generally Sugarcane Baggase Ash Replace With Cement at 5%, 10%, 15%, 20%, 25% and 30%.

Key words: Sugarcane Baggase Ash, Cement, Fine Aggregate, Coarse Aggregate

I. INTRODUCTION

In most of countries of the world, the construction activity is increased day by day. In most of the structure concrete plays very important role. The reason behind its popularity is its properties like durability, toughness and economy. Concrete is used everywhere from roads, dams, bridges, tunnel, industrial floor to parking slots, residential and commercial buildings and numerous other applications. Now as per need there is quite good quantity of concrete is available like high performance concrete, high strength concrete etc.

Ordinary Portland cement is recognized as a major construction material throughout the world and in terms of its per capita consumption, it is second most consumed material in the country, next only to water. However, the production of Ordinary Portland cement, an essential basic of concrete, leads to the release of significant amount of CO2, a greenhouse gas (GHG); production of one ton of Portland cement produces about one ton of CO2 The objectives of this research were to make utilization of Sugar cane bagasse ash (SCBA) as replacement for cement is incorporated in concrete in order to achieve increase in strength and a better bonding between aggregate and cement paste. The environmental issues associated with GHG, in addition to natural resources issues, will play a leading role in the sustainable development of the cement and concrete industry during this century. Researchers all over the world today are focusing on ways of utilizing either industrial or Agricultural waste, as a source of raw materials for industry. This waste, utilization would not only be economical, but may also result in foreign exchange earnings and environmental pollution control.

Industrial wastes, such as blast furnace slag, fly ash and silica fume are being used as supplementary cement replacement materials. When this bagasse is burned under controlled conditions, it gives ash having amorphous silica, which has pozzolanic properties Therefore it is possible to use sugarcane bagasse ash (SCBA)) as cement replacement material to improve quality and reduce the cost of construction materials in concrete and also reduce the environment pollution . This bagasse ash has been chemically and physically characterized replaced in different proportion with cement and incorporated in concrete. Fresh concrete test such as slump cone test were carried out as well as hardened concrete test like compressive strength at the age of 3, 7 and 28 days will be carried out and the optimum limit of replacement of bagasse ash as replacement for cement in concrete is conducted.

A. Sugarcane Baggase Ash

Bagasse is a by-product from sugar industries which is burnt to generate power require for different activities in the factory. The sugarcane bagasse consists of approximately 50% of cellulose, 25% of hemi cellulose and 25% of lignin. The Property that would potentially be used as a cement replacement material. The residue after combustion presents a chemical composition ominates by silicon dioxide (SiO2). Each ton of sugarcane generates approximately 26% of bagasse (at a moisture content of 50%).

Fig. 1: Bagasse

II. LITERATURE REVIEW

The sugarcane bagasse consists of approximately 50% of cellulose, 25% of hemi cellulose and 25% of lignin. Each ton of sugarcane generates approximately 26% of bagasse (at a moisture content of 50%) and 0.62% of residual ash. The residue after combustion presents a chemical composition dominates by silicon dioxide (SiO2). In spite of

being a material of hard degradation and that presents few nutrients, the ash is used on the farms as a fertilizer in the sugarcane harvests.

Some of experimental work is as follow

A. Workability

- Partial replacement of cement by SCBA increases workability of fresh concrete; therefore use of super plasticizer is not essential.
- The slump and weight density of concrete decrease monotonically as the replacement percentage of cement with SCBA increases. The workability increase when cement is replaced partially with SCBA.
- As a conclusion, all the objectives of this study are achieved; concrete with using waste SCBA has a very high workability from control sample. This result achieved from the slump test that use of SCBA will increase the workability of concrete.
- The slump of concrete containing SCBA as fine aggregate replacement decreased with increases in the SCBA content, but in spite of this decline in the slump, the mixes remained good workability.
- The slum value of control mix give value of 60mm compare to concrete mix with SCBA of 5% is 187mm, 10% is 200mm, 15% is 220mm, 20% is 225mm and 25% is 230mm. Therefore the value of slum its increase if the percentage of waste glass powder increased. Therefore it is shown that compared to control mix, by using waste glass powder will give another benefit which is the workability of concrete which is much higher

B. Compressive Strength

- The strength of concrete containing SCBA when subjected to Sulphate attack and results concluded that highest compressive strength is achieved with 20% of replacement of cement in both the conditions and the strength decreases with increases in percentage beyond 20%.
- After the study it was found that the conventional concrete tested at 28 days compressive strength as 24.45N/mm^2, Replacement of SCBA in cement by 0%, 5%, 10%, 15%, and 20% increases the compressive strength is 24.45 N/mm^2, 24.89 N/mm^2, 25.58 N/mm^2, 26.73 N/mm^2, and 28.05 N/mm^2 respectively.
- Conventional concrete shows at 7 days compressive strength as 20 N/mm^2, Replacement of SCBA in cement by 5%, 10%, 15% and 20% increases the compressive strength after 7 days is 20.22 N/mm^2, 20.98 N/mm^2, 21.50 N/mm^2, 22.43 respectively.
- Compressive strength of the concrete with partial replacement of sand by SCBA increased with the increment ratio of SCBA upto 20%.
- The 7 days, 28 days and 60 days compressive strengths of concrete increase initially as the replacement percentage of cement SCBA increases, and become maximum at about 20% and later decreases.

C. Tensile Strength

- In their research on concrete containing mineral admixtures at high temperatures resulted that 20% replacement is perfect once concrete isn't subjected to various wetting and drying and as well once concrete subjected to various wetting and drying.
- After the study it was found that the conventional concrete tested at 28 days split tensile strength of 2.82N/mm^2, Replacement of glass powder in cement by 20% increases the split tensile strength by 3.88 N/mm^2% respectively.
- Conventional concrete shows at 7 days split tensile strength of 1.89 N/mm2, Replacement of SCBA in cement at 20% split tensile strength is 2.54 N/mm^2.
- The split tensile strength of concrete increases initially as the replacement percentage of cement with SCBA increases, and becomes maximum at about 20% and later decrease.

D. Flexural Strength

- Flexural strength in his study and resulted that 20% dose of SCBA is perfect for replacement cement.
- After the study it was found that the conventional concrete tested at 28 days flexural strength of 3.46N/mm^2, Replacement of glass powder in cement by 5%, 10%, 15% and 20% increases the flexural strength by 63.07%, 88.07% and 100% respectively.
- Conventional concrete shows at 7 days flexural strength of 2.72N/mm^2, Replacement of SCBA in cement by 5%, 10% 15% and 20% increases the flexural strength after 28 days by 5.88%, 30% and 44.85%, and 13.97% respectively.
- Replacement of SCBA in cement by 5%,10% and 20% increases the Flexural Strength by 22.97%, 31.45% and 41.34% respectively.
- The flexural strength of concrete with 20% waste SCBA content increased by 5.28 %, 18.38% and 8.92% respectively at 28 days.
- Experimented on replacement of cement by SCBA and concluded that a Considerable improvement in the flexural strength was seen at 20% replacement of cement**.**

E. Durability

- From the studies concluded that at 28 days the water absorption of concrete decreases as the percentage of SCBA and industrial waste increases and at 20% SCBA and 50% industrial waste that is foundry sand it is least.
- The waste glass, if ground finer than 600µm shows a pozzolanic behavior. It reacts with lime at early stage of hydration forming extra CSH gel there by forming denser cement matrix. Thus early consumption of alkalis by SCBA particles helps in the reduction of alkali-silica reaction hence enhancing the durability of concrete.
- Water absorption decreased with increase SCBA aggregate ratio. The highest reduction was obtained with 20% of SCBA aggregate replacement with a reduction of 14.68% at 28-day age compared to control.
- They were conducted the study on the effect of 15% and 30% replacement of cement by silica fume, fly ash, and glass powder, SCBA on compressive strength and durability in the form of capillary absorption.

III. CONCLUSION

Based on Study drawn by following Conclusion

- When the proportion of bagasse ash increase in concrete then make light weight concrete.
- As per study I can clearly seen that 5%, 10% and 15% Bagasse ash replacement of cement compressive strength increase for M20 and M25 at 7,28 and 56 day.
- As per Study I can clearly seen that Sugarcane Baggase Ash replace with Cement Tensile Strength and Flexural Strength of Concrete Increase.
- As per study I can clearly seen that Sugarcane Baggase Ash replacing by Cement than Workability of Concrete Increase and Relative Density Decrease.
- As per study I can clearly seen that the compressive strength of concrete increase up to 20% replacement of Sugarcane Cane Baggase ash with Cement If SCBA replace more than 20% Compressive strength is Decrease.

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