Study of Sugarcane Bagasse Ash As Sustainable Material In Partial Replacement of Cement

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Abstract- *Construction industry is playing a major role for in the country's economy growth and infrastructure development. In the modern era, concrete has become the most predominant construction building material all over the world. Moreover, it is the scenario to alternative raw material in manufacturing construction material. Sugarcane Bagasse Ash (SCBA) is a huge industrial fuel waste. In the view of environmental impact due to dumping industrial wastes in cultivable land, it is required to adopt a sustainable solution for effective disposal of waste. Hence, it is very essential to do these researches and it leads to making use of industrial waste as a raw material in various fields. This paper gives a clear idea about the partial replacement cement by of SCBA up to 10% - 20% maximum. The study of partially replacing sugarcane bagasse ash useful in the construction industry such as concrete, cement mortar, bricks as well as for environmental protection.*

Keywords- Sugarcane Bagasse Ash (SCBA), Cement, Concrete, etc.

I. INTRODUCTION

In India, sugar production is undertaken practically throughout the. According to the reports for the last crushing season, there were 338 factories in operation which crushed about 60 million tonnes of cane, producing 6.1 milliontonnes of sugar and 2.5 million tonnes of molasses. Average bagasse production is about 30 percent of the sugarcane crushed and about 90 percent of bagasse produced is used as fuel. After controlled burning of bagasse, the ash obtained is known as bagasse ash. Nowadays, bagasse is also being used in the manufacturing of pulp and paper products. A sugar factory produces nearly 3 tons of wet bagasse which is a waste product of the sugar cane industry. Bagasse ash is a residue obtained from the burning of bagasse in sugar-producing factories.

II. OBJECTIVE OF THE STUDY

- To carry out a literature survey sugarcane bagasse ash used concrete to determine the most feasible alternate for cement.
- To prepare different nominal mix proportions by incorporating the different volumes of sugarcane bagasse ash.
- To attain the percentage of replacement of cement by sugarcane bagasse ash to be added to concrete to obtain optimum results.
- Reducing the environmental impact by dumping the industrial waste by-products like Bagasse ash.

III. LITERATURE SURVEY

BAGASSE ASH

G. Nithin Kumar Reddy1 et al. Partial Replacement of Cement in Concrete with Sugarcane Bagasse Ash and its Behaviour in Aggressive Environments SCBA concrete performed better when compared to ordinary concrete up to 10% replacement of sugar cane bagasse ash due to presence of high amount of silica in SCBACompressive strength was decreased when cured in 5% MgSo4 comparatively when cured in normal water. It is observed that the usage of sugarcane bagasse ash in concrete helps in increasing the resistivity towards sulphate attack. The percentage reduction in compressive strength was decreasing with increase in percentage replacement of sugarcane bagasse ash when cured in 5% MgSo4 which concludes that SCBA helps in resisting the concrete towards sulphate attack.

Miss. Nimitaet al.(2013) Utilization of Sugarcane Bagasse Ash in Concrete. It is concluded that, the SCBA in blended concrete had significantly higher compressive strength, tensile strength, and flexural strength compare to that of the concrete without SCBA. It is found that the cement could be advantageously replaced with SCBA up to maximum limit of 10%. Partial replacement of cement by SCBA increases workability of fresh concrete; therefore, use of super plasticizer is not substantial. The density of concrete decreases with increase in SCBA content, low weight concrete produced in the society with waste materials (SCBA).

Dr. M. Vijaya Sekhar Reddy et.al. (2015) had studied in Utilization of Sugarcane Bagasse Ash (SCBA) In Concrete by Partial Replacement of Cement. The experimental

results show that the maximum compressive strengths for seven- and 28-days curing period achieved are 17.93 and 30.57 N/mm2 respectively with 10% replacement of cement by bagasse ash. The results show that the SCBA in blended concrete had significantly higher compressive strength compare to that of the controlled concrete. It reveals that the cement could be advantageously replaced with SCBA up to maximum limit of 10%.

Sagar W. Dhengare1 et.al (2015) Investigation into Utilization of Sugarcane Bagasse Ash as Supplementary Cementitious Material in Concrete. Based on the conducted experiment and according to the result obtained, it can be concluded that The SCBA concrete gives higher compressive strength than that control concrete. The result shows that the addition of SCBA improves the compressive strength up to 20% addition of SCBA after that no considerable improvement is observed. The maximum flexural strength obtained is at 15% SCBA replacement in both M25 and M35grade of concrete for 28 days curing. The maximum split tensile strength obtained is at 10% SCBA replacement in M25 and M35. Partial replacement of cement by SCBA increases workability of fresh concrete; therefore, use of super plasticizer is not essential.

Shruthi H R et.al (2014) a study on bagasse ash replaced plain cement concrete Detailed description of experimental results has been carried out. It has been observed that the experimental result for the 10% replacement of bagasse ash to OPC has increase in strength in comparison with 0% and 5% replacement. Beyond 10% replacement of bagasse ash, the strength was decreased. The analytical results obtained are not much varied compared to experimental results. It gives very near values to the experimental values so we can use the developed equations of this present study for the calculation of values compressive strength, split tensile strength and flexural strength for bagasse ash replacement with OPC up to 20% replacement.

Vanathi. M et.al (2014) Potential Utilization of BAGASSE Ash Steel Fiber Reinforced Concrete-An Experimental Study. Based on the test results of the experimental investigation using SCBA with steel fiber concrete the following conclusions have been drawn: It can be concluded that the bagasse ash is a valuable pozzolanic material and it can be potentially be used as a partial replacement for cement. Up to 10% SCBA in concrete can be considered as the optimum replacement level with the addition of 0.125% steel fiber by weight of cement.

IV. DISCUSSION OF RESULTS

In the various study, the authors suggested their results that the compressive strength was considerably increased with replacement up to 10%. The cement replacement by SCBA slightly increased the workability without adding any admixture with the designed water-cement ratio. Flexural and tensile strength also increased up to 10% replacement beyond that there was a slight decrease in all the properties according to the replacement value.

Table 1. Use of bagasse of ash as supplementary cementitious material

Research By	Compressive Strength	Splitting Tensile Strength	Workability	Setting time	Flexural Strength	Suggested Repl. Ratio
G.Nithin Kumar Reddy1 et al.	Increased	-	-	Increased	-	15.00 % with cement
Miss Nimita et al. (2015)	Increased	Increased	-	-	Increased	10.00 % with cement
Dr.M.VS.Reddy et al(2015)	Increased	-	-	-	-	10% with cement
VanathiM et.al (2014)	Increased	No Change	-	-	No Change	10% with cement
Sagar W. Dhengare1 et.al.	Increased	Increased	Increased	-	Increased	10.% with cement
Shruthi H R et.al (2014)	Increased	No Change	-	-	Increased.	10.00 % with cement
K.Gopi Sankar et.al	No Change	No Change	Increased	-	Increased.	10.00 % with cement

V. CONCLUSION

Based on the literature study, we can conclude that replacing the cement with SCBA maximum of 10% for the better result, and beyond that, we can go up to 20% replacement with a slight decrease in concrete properties which may use in the area where strength is not an as prominent one. It is proposed for effective use of bagasse ash used as pozzolanic materials in concrete. Further, it was observed that the 10% replacement of cement by bagasse ash partially gives better result in compressive strength, Split Tensile Strength and flexural strengths are increased considerably. The workability of the concrete is not affected with 10% replacement. Finally based on the literature study of several author's papers I suggest that 10% replacement of SCBA with cement will be cost-effective by using industrial wastes.

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