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Partially Replacement of Cement by Bagasse Ash

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Abstract: In this report recycle of bagasse ash as a cement replacement in concrete. This gives a satisfactory solution to environmental concerns associated with waste management. The results of that bagasse ash is an effective mineral admixture and pozzolan with the optimal replacement cement, which reduced the chloride diffusion without any adverse effects on other properties of the concrete.
Keywords: ***Cement, Sugar Cane Bagasse Ash, Partial Replacement, Advanced concrete.***

I. INTRODUCTION

The industrial byproducts which have been disposed earlier are now being considered for beneficial use. Beneficial use can reduce our nation's carbon production and consumption of virgin material and result in economic gains. It is important component of nation's solid waste management hierarchy that first promotes source reduction and waste prevention followed by reuse, recycling, energy recovery and disposal. Researches all over the world today are focusing on ways of utilizing either industrial or agricultural wastes as a source of raw materials for the industry. These wastes utilization would not only be economical, but may also result to foreign exchange earnings and environmental pollution control.Ordinary Portland cement is recognized as the major construction material throughout the world. Industrial wastes, such as blast furnace slag, fly ash and silica fume are being used as supplementary cement replacement materials. In addition to these, agricultural wastes such as rice husk ash and wheat straw ash are also being used as pozzolanic materials and hazel nutshell used as cement replacement material. When pozzolanic materials are added to cement, the silica (SiO2) present in these materials reacts with free lime released during the hydration of cement and forms additional calcium silicate hydrate (CSH) as new hydration products , which improve the mechanical properties of concrete formulation.

II. BACKGROUND INFORMATION

Bagasse is the matted cellulose fiber residue from sugarcane that has been processed in a sugar mill. Previously, bagasse was burnt as a means of solid waste disposal. However, as the cost of fuel oil, natural gas, and electricity has increased, bagasse has come to be regarded as a fuel rather than refuse in the sugar mills. The bagasse ash is a by-product from the combustion of bagasse as a fuel in sugar industry. Bagasse ash is one of an agricultural waste from sugar manufacturing. When juice is extracted from the cane sugar, the solid waste material is known as bagasse. When this waste is burned under controlled conditions, it also gives ash having amorphous silica, which has pozzolanic properties. SCBA has proved to be a viable by-product for mineral admixture in cement, with its intrinsic characteristic such as high content of silica in the form of quartz. Pozzolanic materials are siliceous or aluminum-siliceous compounds that separately possess little or no cementitious properties. Bagasse is used such as Fuel for generation of Electricity, paper industry.

III. METHODOLOGY

According to the objective of the project the minimum requirement of the strength of the structure is decided i.e. M20 and from that mix design for M20 concrete is carried out and sampling has been decided and from that the overall quantity of the material has been calculated and material is purchased. Before casting to find out the property of materials different tests on cement has been done such as normal consistency, initial & final setting time, soundness & fineness tests, etc. The sieving of CA through 20 mm sieve and the fine aggregate through 4.75 mm sieve is done and the sieving of bagasse ash before grinding & after grinding is done for getting appropriate results. The trial mix is done with water cement ratio 0.45, 0.46 & 0.50. The concrete blocks are casted with bagasse ash as a supplementary cementitious material. There are six blocks for each trial mix in which 3 blocks for 7 days testing & 3 blocks for 28 days testing. Then the two graphs are plotted, one is w/c ratio Vs 7 days Compressive strength and second is slump Vs water content. According to graphs two more trails are taken for required slump, water content and 7 days compressive strength. Then the mix for water cement ratio 0.55 is final according to compliance requirement is adopted. Then the final casting has been done as per the above mix design by using 0, 10, 15, 20, 25 & 30% bagasse ash for 7, 28 & 56 days compressive strength testing

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and for each % there are four samples for each testing day and each sample there are three blocks.

IV. RESULTS AND DISCUSSIONS

A. *Compressive strength*

Compression test is the most common test conducted on harden concrete, partly because it is an easy test to perform and partly because most of the desirable characteristic properties of concrete are qualitatively related to its compressive strength.In this test, the values of compressive strength for different replacement levels of bagasse ash contents (0%,10%,15%,20%,25% &30%)at the end of different curing periods (7 days,28 days,56 days) are given in table. These values are plotted in figure and which show the variation of compressive strength cement replacement at different curing ages respectively.

Table No.5.1- Result Compressive Strength Comparison with 0% Replacement.

% Replacement	Compressive strength of concrete blocks(Mpa)			% different in compressive strength of concrete blocks with 0% of bagasse ash		
	7 days	28 days	56 days	7 days	28 days	56 days
0%	21.84	32.73	32.87	0	0	0
10%	25.22	35.15	37.50	+15.50%	+7.40%	+14.09%
15%	17.05	23.46	23.69	-21.93%	-28.32%	-27.93%
20%	16.14	21.83	26.00	-26.10%	-33.30%	-20.90%
25%	14.12	18.00	21.50	-35.34%	-45.00%	-34.60%
30%	9.28	13.93	16.00	-57.51%	-57.43%	-51.32%

Table No 5.2 -Result of 7 days compressive strength

Sample no.	0%	10%	15%	20%	25%	30%
1	18.82	25.28	17.90	16.71	14.54	9.24
2	21.66	25.70	17.79	15.17	13.46	8.74
3	23.13	26.31	17.25	15.73	13.60	8.53
4	23.77	23.59	15.26	16.93	14.86	10.61
Average	21.84	25.22	17.05	16.14	14.12	9.28

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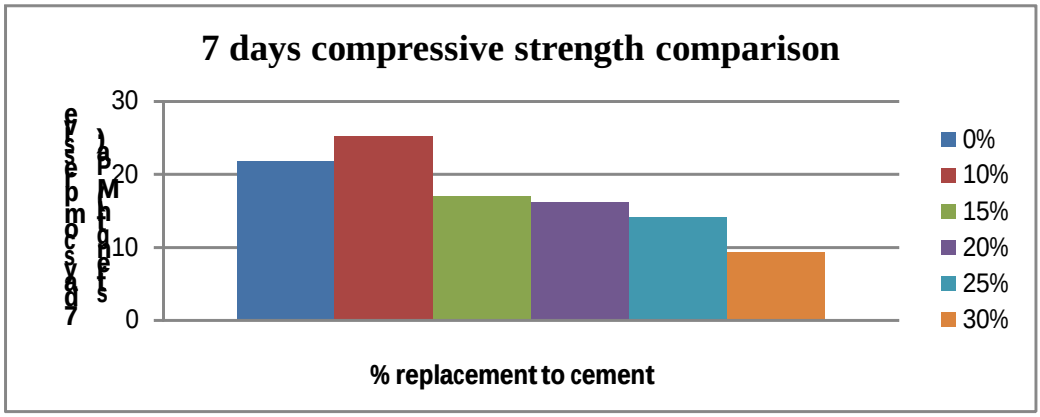
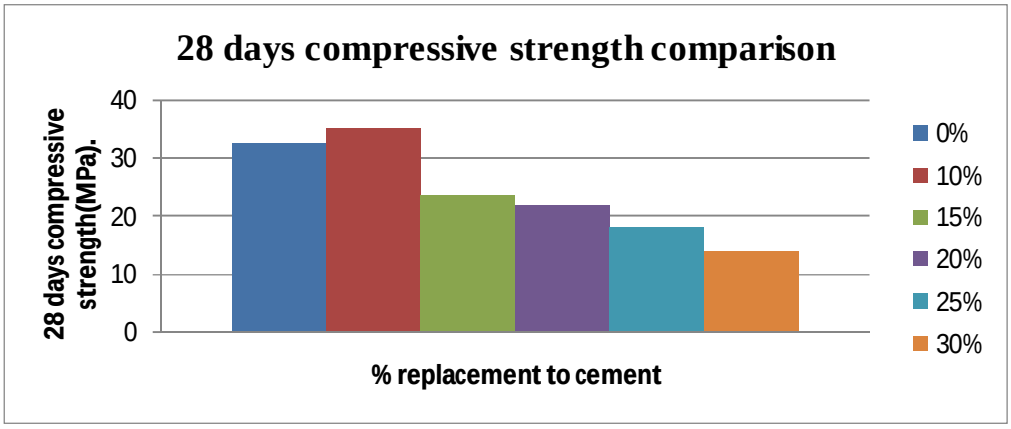
Graph No 5.1 - 7 days compressive strength Comparison



Comment:From the graph of 7 days compressive strength comparison, it can be seen that compressive strength of concrete with 10% replacement of bagasse ash is increased nearly 14% as compared to 0% replacement of bagasse ash. And further replacement to cement with bagasse ash decreases strength of concrete.

Table No 5.2 -Result of 28 days compressive strength

Sample no.	0%.	10%	15%	20%	25%	30%
1	30.07	33.30	22.24	19.83	16.63	14.10
2	30.62	33.93	22.65	21.01	19.83	14.86
3	32.71	36.21	23.11	22.57	16.94	12.83
4	34.52	37.16	25.82	23.89	19.06	13.91
Average	32.73	35.15	23.46	21.83	18.00	13.93



Graph No 5.2 – 28 days compressive strength Comparison.

Comment:From the graph of 28 days compressive strength comparison, it can be seen that compressive strength of concrete with 10% replacement of bagasse ash is increased nearly 7.4% as compared to 0% replacement of bagasse ash. And further replacement to cement with bagasse ash decreases strength of concrete.

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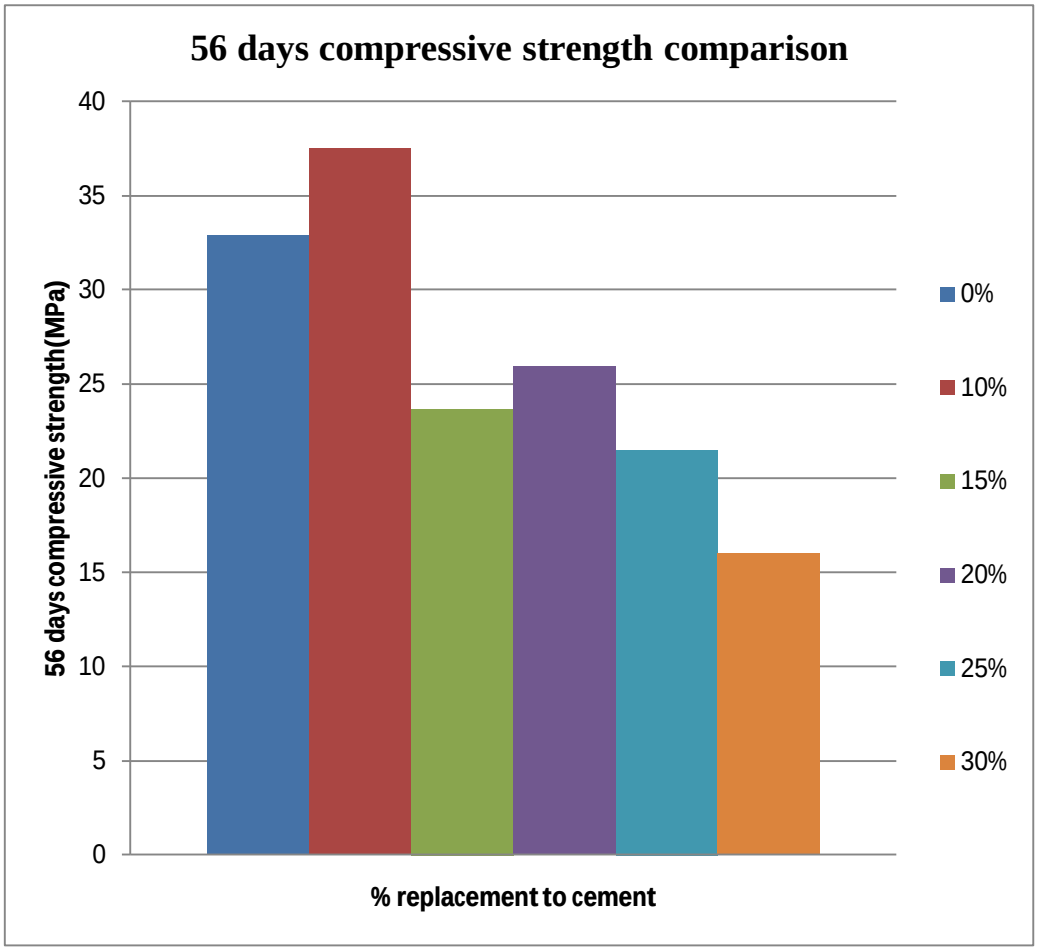
Table No 5.2 -Result of 56 days compressive strength

Sample no.	0%.	10%	15%	20%	25%	30%
1	33.91	38.30	21.03	26.80	22.19	17.18
2	32.34	37.56	23.07	25.38	20.05	16.78
3	33.13	36.06	26.14	27.14	22.69	15.34
4	32.11	38.07	24.51	24.50	21.01	14.70
Average	32.87	37.50	23.69	26.00	21.50	16.00



Graph No 5.3 -56 days compressive strength Comparison.

Comment: From the graph of 56 days compressive strength comparison, it can be seen that compressive strength of concrete with 10% replacement of bagasse ash is increased nearly 14% as compared to 0% replacement of bagasse ash. And further replacement to cement with bagasse ash decreases strength of concrete.

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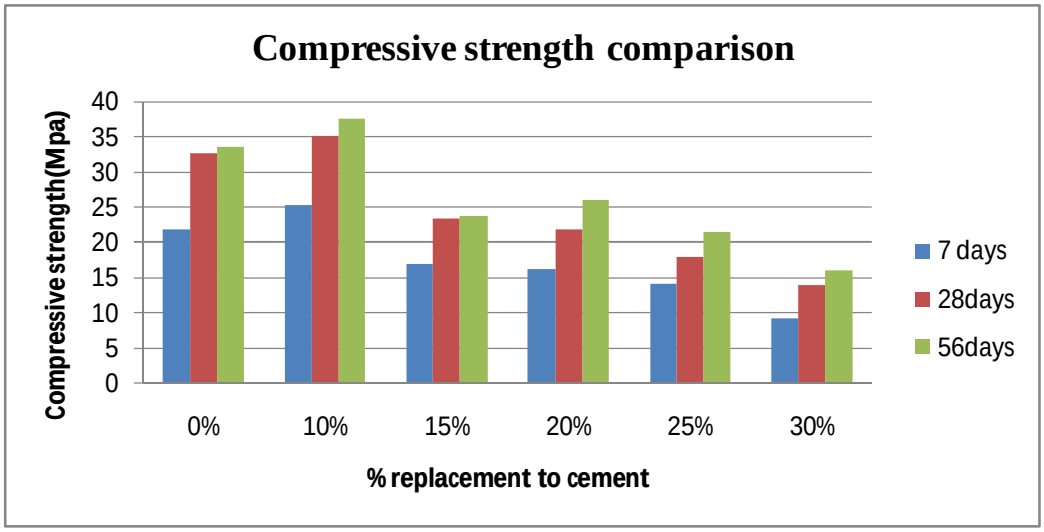
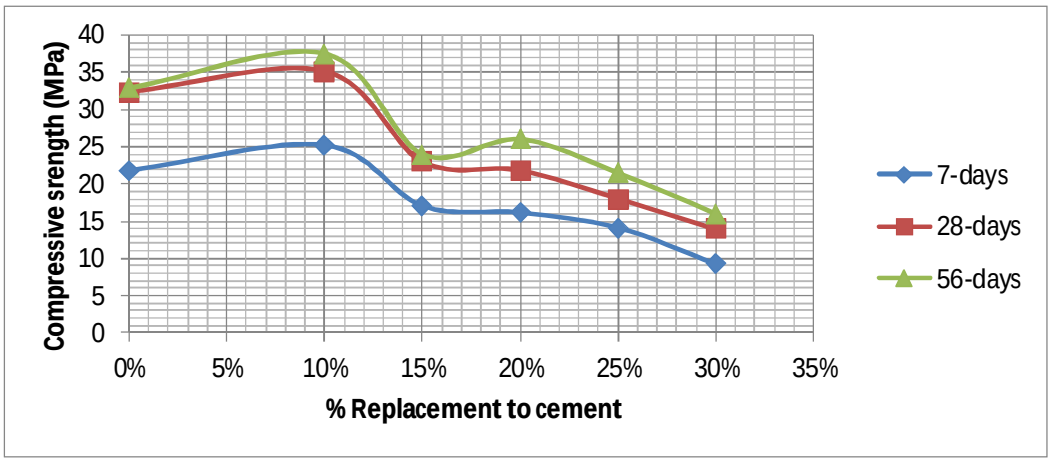


Graph No 5.4 - Compressive Strength Comparisons.



Graph No 5.5 - Compressive Strength Comparisons.

Comment:From the graph of compressive strength comparison it can be seen that the compressive strength of concrete mix with 10% replacement of bagasse ash 56 days is more as compared to compressive strength of 0% replacement of bagasse ash.

V. CONCLUSIONS

Result of this investigation suggests that used Bagasse ash could be very conveniently used in making good quality concrete and construction materials. It can be inferred from these results that the use of waste Bagasse ash benefits the environments as well since such stocks can be put to profitable use and the transportation cost and requirements are reduced considerably.

VI. ACKNOWLEDGMENT

I have great pleasure in presenting this project report entitled “PARTIALLY REPLACEMENT OF CEMENT BY BAGASSE ASH” for partial fulfillment of the Bachelor of Engineering in Civil Engineering.I take this opportunity to express my deep sense of gratitude towards my guide Asst Prof: Patil S.C, Bharati Vidyapeeth College Of Engeneering Lavale Pune, for his well-formulated and indispensable guidance in the accomplishment of this report, without which this would not have been possible.I extend my sincere thanks to Prof. Patil U. S., Professor and Head of Civil Department, Bharati Vidyapeeth College Of Engeneering Lavale Pune for extending all kinds of co-operation during preparation of this seminar.Lastly I am thankful to all those who directly or indirectly contributed to complete this seminar..

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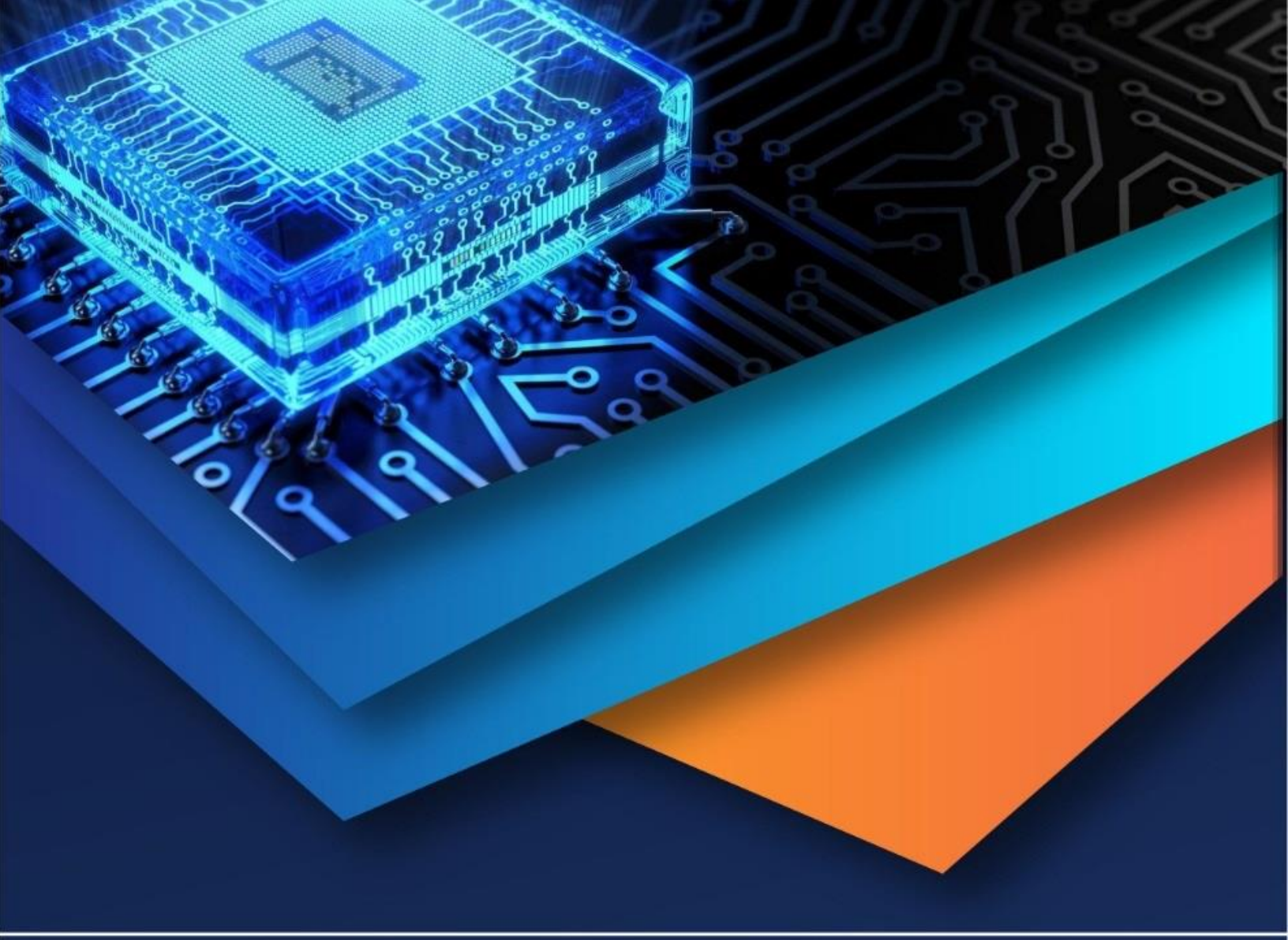

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