



AN EXPERIMENTAL INVESTIGATION OF CONCRETE WITH REPLACEMENT OF BAGASSE ASH

Manikandan. N. R¹ , Rishi. S² , Pugalenth. K³ ,

Kumaravel. R⁴ , Ranjith Kumar.V⁵

¹ AP, Department of Civil Engineering, Sengunthar Engineering College,(INDIA)

^{2,3,4,5} Student, Department of Civil Engineering, Sengunthar Engineering College,(INDIA)

ABSTRACT

Any development should aim to meet human needs while preserving the environments that these needs can be met not only in the present, but also for future generations. The field of sustainable development can be conceptually broken into three constituent parts of Environmental sustainability, Economic sustainability and sociopolitical sustainability. Natural resources are depleting worldwide while at the same time the generated wastes from the industry are increasing substantially. The sustainable development for construction involves the use of nonconventional and innovative materials, and recycling of waste materials in order to compensate the lack of natural resources and to find alternative ways to conserve the environment.

Bagasse is a by-product from sugar industries which is burnt to generate power required for different activities in the factory. The burning of Bagasse leaves Bagasse ash as a waste, which has a pozzolonic property that can potentially be used as a cement replacement material. The Bagasse ash was found to improve some properties of the paste, mortar and concrete including compressive strength and water tightness in certain replacement percentages and fineness. The higher silica content in the Bagasse ash is the main cause for these improvements.

Keywords: Sugarcane, Baggage Ash, Replacement, Recycle, Concrete.

INTRODUCTION

Due to the recent researches in the field of concrete technology it is possible to utilize industrial byproducts as well as other waste materials in the production of normal concrete and high strength concrete as partial or full



replacement of cement or aggregate. Also, it has been demonstrated that many of the produced concrete made with wasteland industrial resources possesses superior properties compared with the conventional concrete in terms of strength, performance and durability. The Bagasse ash was found to improve some properties of the paste, mortar and concrete including compressive strength and water tightness in certain replacement percentages and fineness. The higher silica content in the Bagasse ash is the main cause for these improvements. Although the silicate content may vary from ash to ash depending on the burning conditions and other properties of the raw materials including the soil on which the sugarcane is grown, it has been reported that the silicate undergoes pozzolanic reaction with the hydration products of the cement and results in a reduction of the free lime in the concrete.

S.No	Oxides	SBA (%)	OPC (%)
1	SiO ₂	67.81	20.98
2	Al ₂ O ₃	19.41	5.24
3	Fe ₂ O ₃	3.85	3.92
4	CaO	4.03	62.85
5	MgO	1.11	1.76
6	Na ₂ O ₃	0.35	0.28
7	SO ₃	0.66	2.36

1.1 Applications of SCBA

- Due to its cementitious property SCBA is used in concrete as alternative for cement.
- SCBA is also used as Soil Stabilization Material
- SCBA as alternatives to other ingredients in construction materials
- SCBA is used in Alkali-Activated Systems
- SCBA is also used as a Partial substitute for aggregates in concrete
- It is also use as raw material in paper industries.



2.1 REVIEW OF EARLIER WORKS

2.1.1 Experimental investigation on properties of concrete with Bagasse ash and copper slag

S.Dinesh, A.Dinesh, K.Kirubakaran

- This journal deals with the economic and environmental friendly cement replacing material such as sugarcane bagasse ash.
- In this investigation they used SBA at 5%, 10% and 15% and copper slag at 30%, 40% and 50% as replacing elements.
- Compressive strength of cube specimens were found at 7th, 28th and 56th day and tensile strength of cylindrical specimen were found at 28th day.
- The optimum percentage of cement replacement is at 10% to get maximum strength.
- This partial replacement leads to reduction in cost of concrete.

2.1.2 Experimental study on partial replacement of cement by Bagasse ash in Concrete mix with glass fiber as admixture

AravindYadav, Harinadh

- The present experimental work is to study the behavior of bagasse ash content with glass fiber in concrete.
- In this work they focused on the experimental result of m25 grade of concrete with glass fibers of 1%.
- Cement is partially replaced with 5%, 10% and 15% of bagasse ash for a w/c ratio 0.5.
- Result obtain for compressive strength test has been analyzed and compared with control specimen for 7 days and 28 days are represented graphically.
- Workability of concrete is improves when bagasse ash percentage increases.
- The optimum compressive strength obtained is 36.36N/mm² for m25grade of concrete at the age of 28 days

2.1.3 Experimental investigation of sugar cane bagasse ash and glass powder as partial replacement of cement in concrete

ShettyAshishVishwanath, Mahadev Rani

- This study deals with the utilization of waste glass powder and SCBA as partial replacement of cement in concrete.



- To find consistency, setting time, workability, compressive strength are examined by experimentally investigating the replaced concrete.
- In this investigation SBGA and glass powder is added from 5% to 30%.
- It is found that upto 20% of partial replacement as good result.
- The consistency is increase upto 50% for SBGA and 30% for GP.
- The strength increase with addition of sugarcane bagasse ash and water glass powder at 5%, 10%, 15% and 20% after that declines at 25% and 30%.
- Flexural and split tensile strength of concrete also increased as compared to control mix upto 15% replacement but after that strength starts reduces.

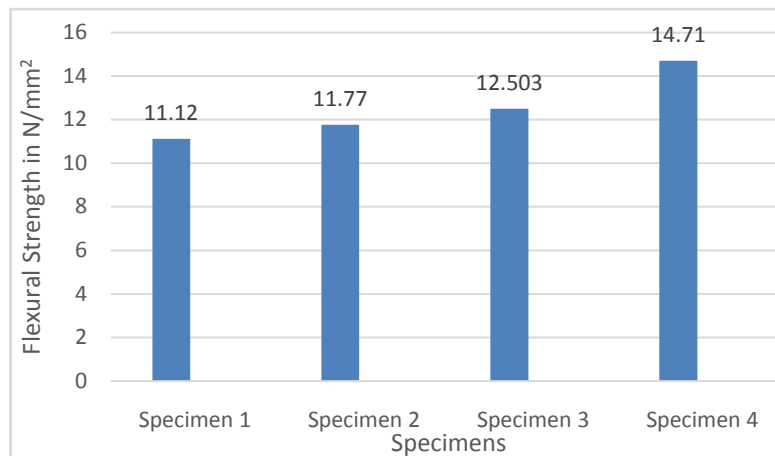
2.1.4 An Experimental study on partial replacement of cement by SBGA for M30 Concrete

Arshee Khan, Saxena

- In this investigation the concrete cubes, beams, cylinder of M30 grade were casted and tested to examine various properties of concrete.
- Sugarcane bagasse ash was partially replaced with cement at 3, 6, 9 and 12% by weight of cement in concrete.
- After performing the test on M30 grade concrete with partial replacement of cement with SBGA it has been observed that the compressive strength, flexural strength and split tensile strength increases with increasing in percentage of SBGA
- The strength should be maximum for 6% and then starts decreasing.

specimens	Percentage of replacement of %	Load at initial cracking kN	Load at second Cracking kN	Ultimate load kN
Specimen 1	0	3.9	7.012	11.12
Specimen 2	5	4.118	7.06	11.77
Specimen 3	10	4.413	7.354	12.503
Specimen 4	15	4.413	8.82	14.71

Tabulation of comparison of loads at first and second cracking



Specimens	Percentage of replacement Of SBA with cement	Cement (kg)	Press mud (kg)	Fine aggregate (kg)	Coarse aggregate (kg)
Specimen 1	0%	9.56	0	9.56	19.12
Specimen 2	5%	9.083	0.478	9.56	19.12
Specimen 3	10%	8.604	0.956	9.56	19.12
Specimen 4	15%	8.126	1.434	9.56	19.12

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