

EXPERIMENTAL STUDY ON LIGHT WEIGHT BRICKS BY USING CEMENT, SAND, BAGASSE ASH, WITH FOAMING AGENT : A RESEARCH PAPER

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ABSTRACT

Bricks are most extensively used construction material in the region of the social order like as high rise building. Cement is most crucial ingredients of the concrete or cement- bricks but it is producing high amount of CO₂, which is destructive to environment. So it is main concern to reduce the usage of cement. Utilization of industrial and agricultural waste product in the industry has been the objective of research for economic, environmental, and technical reasons. Sugar-cane bagasse is fibrous waste product of the sugar refining industry. Bagasse ash make available strength in bricks and also imparts light weight. It not only enhances the brick superiority but also provide better environment. (these we are using SCBA replacing sand by 15%, 20%, 25%, 30%, 35%). Brick mould size 220mm*110*70*. The mean of this examine was to make economical to maintain environmental stability and avoid problem of ash stability.

Keywords—Cement, Compressive strength, Fine aggregate, foaming agent, Sugar-cane bagasse ash. Light weight.

I. INTRODUCTION

Ordinary Portland cement is used as a main construction material in world, but many of the researchers from all over the world are focused on the optimization of agricultural waste material such as, bagasse ash etc. It also reduces the cost of construction material and improves the strength of (bagasse ash and foaming agent) bricks. The foaming agent is such chemical which is highly used in the field of construction for making bricks, simply this bricks made up with the proper amount of cement, fine aggregate, bagasse ash and foaming agent. And finely mix with water in different proportion. These bricks which are made with foaming agent different from other bricks due to some specific qualities such as eco-friendly and very light weight, so it is very easy for transporting. It also has the sound proof quality which makes it different from other bricks. This Foaming agent produces about no fumes of contaminated or any release over the life span.

II. OBJECTIVE

The objective of using SCBA and foaming agent is to increase the strength of bricks. The use of bagasse ash reduces the cost of construction as well as dumping problem of bagasse ash reduced.

III. MATERIAL AND METHODOLOGY

3.1 Cement

The cement used in this study is ordinary Portland cement (OPC) of 43 grades conforming to IS (8112-1989). It possesses high strength. This cement can be used for all kinds of normal construction which is manufactured by (Grinding high quality clinker).

Table 1:- Physical properties of cement

S. No.	PROPERTIES	RESULT	
1	Fineness	1%	
2	Specific gravity	3.017	
3	Consistency	33%	
4	Initial setting time	31 minutes	
5	Final setting time	10 hours	
6	Soundness	7mm	
7	Compressive strength	After 3 days	8 N/mm ²
		After 7 day	19N/mm ²

3.2 Physical properties of fine aggregate

Fine aggregate increases bonding and compressive strength and also reduce shrinkage in brick. Fine aggregate provides better workability with less quantity of cement,, moorum was used throughout the study as the fine aggregate conforming to zone II (383:1970).

Table 2:- Fine aggregate

S.No.	Physical properties	Result
1.	Fineness modulus	2.36
2.	Specific gravity	2.60
3.	Water absorption	30%
4.	Color	Light orange

3.3 Properties of Bagasse ash

The bagasse ash an important by product of the sugar cane industry and also most used for producing electricity. After the bagasse ignition a new product is obtained by the sugar cane bagasse ash (SCBA). It mainly consists of silica (Silica also provides hardness, durability, and prevents shrinkage and warping). The result of this explore list indicated that SCBA can be used as a pozzolan and substitute cement. Since durability is very important concern for implementing new construction material. Bagasse ash can increase the overall strength of bricks .Use of ash in brick can solve disposal difficulty and also environment consequence of waste can be reduced. It reduces the cost of material per bricks as compare to the nominal brick.

Table 3:-Bagasse ash

S. No.	Physical properties	Result
1.	Specific gravity	1.10
2.	Fineness	15%
3.	Water absorption	31%
4.	Color	Black
5.	Appearance	fine powder



Fig. 1 Bagasse ash

Table 4:-Chemical properties of OPC and SCBA

S.No.	Description	SCBA	OPC-43
1.	Silicon dioxides (SiO ₂)	64.48	18.3
2.	Magnesium(MgO)	2.54	1.5
3.	Calcium oxides(CaO)	11.71	66.6
4.	Iron oxide(Fe ₂ O ₃)	6.78	3.0
5.	Aluminum oxide(al ₂ O ₃)	4.36	5.5
6.	Loss on Ignition	4.71	2.1

3.4 Foaming Agent (Specification)

Use of foaming agent combine that will create emergent density and absorption of getting low. There are some qualities of foaming agent like as-:

- Eco-friendly
- Light weight
- Easy for transporting
- Sound proof
- This Agent produces almost no fumes of toxic or any emission over the life time.

Table 5:-FOAMING AGENT

S No.	Property	Results
1	Physical Appearance	light yellow translucent
2	Specific gravity	1.0 to 1.05
3	PH	>7.5
4	Chloride content	<0.10%
5	Shelf life	up to 2 year



Fig: 2 foaming agent

3.5 Water

Potable water with pH value 7 was used for mixing and curing throughout this experiment. Water is an important ingredient of brick as it actually used for manufacturing of bricks since it helps to bind all the raw material for giving proper mix. Water used for making brick should be free from impurities.

IV. MIX PROPORTION

In our study different mix proportions of cement, sand, bagasse ash, and foaming agent are prepared. Where the relative proportions of cement and foaming agent are kept constant and relative proportions between sand and bagasse ash are varied. Five tests are conducted are as follows:

Table 6:-Mix proportions

S.No.	SCBA	SAND	CEMENT	FOAMING AGENT
1.	15%	70 %	15%	1%
2.	20%	65 %	15%	1%
3.	25%	60 %	15%	1%
4.	30%	55 %	15%	1%
5.	35%	50 %	15%	1%

Table 7:-Water absorption tests [RESULT]

S. No.	Conventional clay brick	Bagasse ash brick
1	20	8.01
2	20	11.51
3	20	13.97
4	20	16.26
5	20	19.6

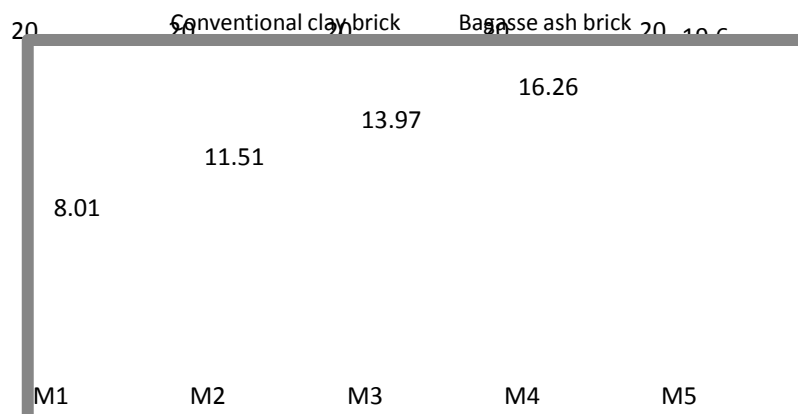


Fig. 3 Water Absorption Comparison Graph



Fig:4 Water Absorption Test For Bricks

Table 8:-Compressive strength Conventional clay bricks V/s Bagasse ash brick result

(SBA : SAND : CEMENT : FOAMING AGENT)	Avg. min. compressive strength (N/mm ²) of conventional clay Bricks	Avg. compressive strength (N/mm ²) of bagasse ash Bricks after 28 days
15% : 70% : 15%	10.5	21.967
15% : 70% : 15%	10.5	19.974
25% : 60% : 15%	10.5	16.404
30% : 55% : 15%	10.5	11.484
35% : 50% : 15%	10.5	10.636

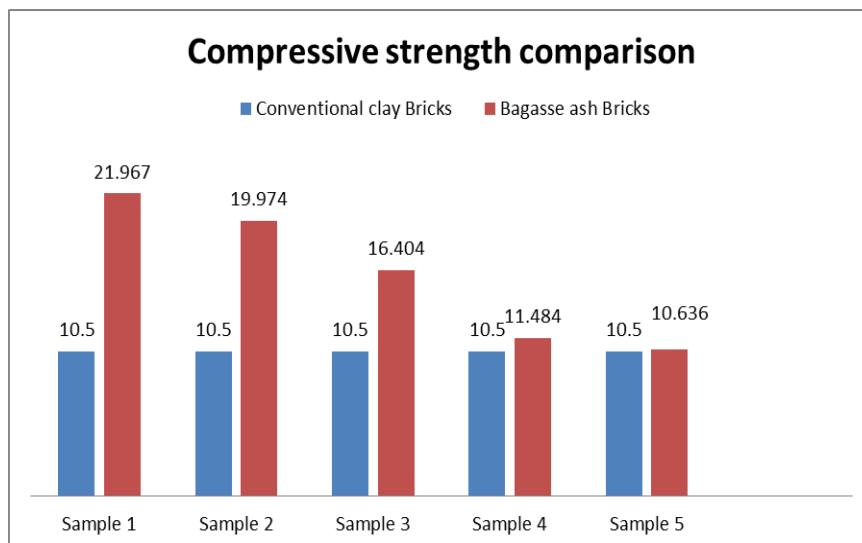


Fig. 5 Compressive Strength Comparison Graph



Fig.6 Compressive Strength Test M/C

V. CONCLUSION

1. The replacement of sand with SCBA is reduce the weight of bricks due to which the cutback of the weight of beam , column and floor of building takes place and hence the dead load of building is reduced and the total cast of construction is reduced up to 15%-20% .
- 2.The lightness of material increase resistance against earthquake as well as less chances of loss / damage human living condition.
- 3.Using SCBA as replacement of OPC in mortar the emission of green housegases can be reduced up to a greater extent.
- 4.The strength of bricks reduces if content of bagasse ash is increases in the proportion, and it require more water for mixing sample
5. The Bagasse ash bricks gives better appearance and finishing compare to clay bricks, due to which reduce the chances of plaster on masonry wall.
6. When percentage of bagasse is increases in the composition, the water absorption capacity is also increases and reduces bricks strength.

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