"MANUFACTURING OF BIO BRICKSBY USING SUGARCANE BAGASSE"

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Abstract - In the age of sustainability it is necessary to prevent the depletion of natural sources to maintain the needs and ecology. Hence, in the process of manufacturing bio bricks are widely used. The experiment was carried out at various ages of brick in order to determine the physical and mechanical properties of brick such as compressive strength , water absorption , hardness. The brick tested showed comparatively better properties then the conventional brick and hence the are good to beused in temporary constructions. The disposal of agricultural waste such as sugarcane bagasse as a raw material for bio brick production. The process involved the extraction of cellulose fiber from bagasse , followed by the integration of these fibres intobinder matrix. The mechanical properties, thermal stability and environmental impact of the resulting bio bricks are assessed through various test including compressive strength analysis. The findings demonstrate the potential of sugarcane bagasse derived bio bricks as sustainable alternatives to conventional construction materials, offering both environmental benefits and economic opportunities for agricultural industries. Building construction is one of the fastest growing industries in India and it puts a huge burden on its limited natural resources.

Key Words: (Red Soil , Sandy Soil , Sugarcane bagasse , Compressive Strenght).

1.INTRODUCTION

The bio bricks made up of sugarcane bagasse which are lighter then the traditional bricks and 15-20% less polluting in terms of emissions. Bio Bricks can cast walls directly on sites and as a wall or roof cladding pannel. It was found that bio bricks help to solve multiple issues of environmental air pollution, soil degredation and agrowaste disposals. Presently in sugar factories the bagasse is burnt as a fuel so as to their boilers. Instead, the sugarcane bagasse waste can be used as the construction materials.

2. OBJECTIVES

- The bio-bricks is a sustainable building material from agricultural waste as an alternate to burnt clay bricks.
- The product serves the dual purpose of waste management and development of eco-friendly, sustainable buildings.
- Good insulation to heat and sound and helps in maintaining humidity in a building.
- Waste materials from sugar mill can be converted in to construction material.
- The bagasse ash brick's compressive strength may be compared to the fly ash brick's compressive strength.
- Attain maximum strength.
- Should be economical and Eco-friendly.

3. MATERIALS

1. Red Soil taken from Auroville , Pondicherry

2. Sandy soil taken from Rock Beach , Pondicherry

3. Sugarcane Bagasse waste taken from Villanur , Pondicherry

4. METHODOLOGY

Color Test – A brick should possess bright and uniform color throughout its body.

Water Absorption Test - Brick is subjected to an absorption test to determine how much moisture it can absorb. Dry bricks are placed in an oven at temperature of 40°C till they attain constant mass. The weight (W1) of the bricks is written after cooling them to room temperature.
After that, water that is 27°C in the room is immersed behind the bricks.
The sample was then removed from the water and cleaned for 3 minutes using a moist cloth beforebeing recorded as W2 once more.
The water absorption in Percentage (%) = (W2-W1)/W1 X100

Impact Test – In this test the bricks are dropped from the height of 1m. If bricks are broken it indicates low impact value andare not acceptable for construction work.

Shape and Size Test – The shape of brick should be purely rectangular with sharp edges.

Soundness Test – The sound produced should be clear and brick should not break.

Efflorescence Test - A good quality brick should not contain any soluble salts in it. If soluble salts are there, then it will causeefflorescence on brick surfaces.
To know the presence of soluble salts in a brick, place it in a water bath for 24 hours and dry it in shade.After drying, observe the brick surface thoroughly. If there is any white or grey color deposits, then it contains soluble salts in it and is not useful for construction.

Test performed on soil -

- Sieve Analysis on Red Soil
- Sieve Analysis on Sandy Soil

RESULTS AND DISCUSSION

Table -1: Sieve analysis (sand)

S.no	Is sieve	weight retained	weightretain %	Cum % retain	cum % passing
1	4.75mm	30g	3	3	97
2	2.36mm	40g	4	7	93
3	1.18mm	50g	5	12	88
4	600µ	200g	20	32	68
5	300µ	540g	54	86	14
6	150µ	90g	9	95	5
7	PAN	50g	5	100	0

SANDY SOIL FINENESS ANALYSIS

Cummulative % retained =

335 Empty weight =

120g

Sample weight = 2000g

Fineness modulus = 335/100

= 3.35

Table -2: Sieve analysis (red soil)

S.no	Is sieve	weight retained	weight retained %	cum % retain	cum % passing
1	4.75mm	10g	1	1	99
2	2.36mm	30g	3	4	96
3	1.18mm	150g	15	19	81
4	600µ	230g	23	42	58
5	300µ	470g	47	89	11
6	150µ	70g	7	96	4
7	PAN	40g	4	100	0

RED SOIL FINENESS ANALYSIS

Cummulative % retained =

351 Empty weight =

120g

Sample weight = 2000g

Fineness modulus = 351/100 =

3.51

Table -3: Water Absorption Test on Red Soil Brick

S.no	Ratio	Dry Weight	Wet Weight	Water Absorb	% Water Absorb
1	1:2:1	2.620kg	2.934kg	0.314kg	12%
2	1:2:2	2.410kg	2.716kg	0.306kg	12.7%
3	1:2:3	2.360kg	2.678kg	0.318kg	13.5%

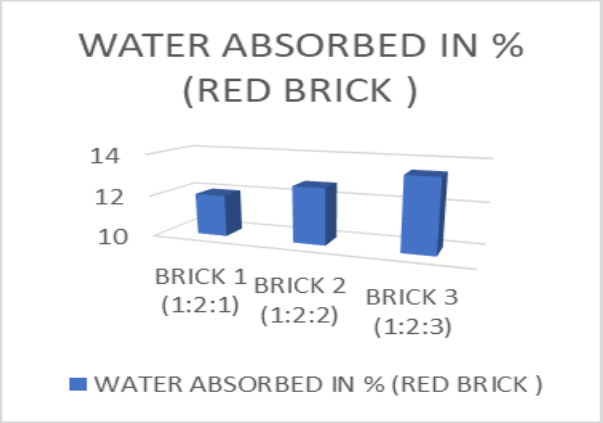
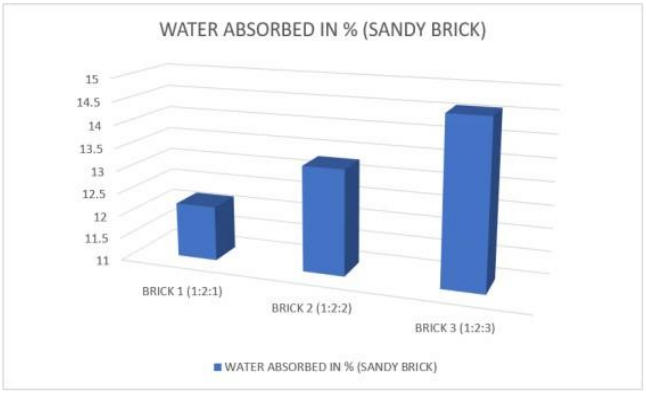


Table -4: Water Absorption Test on Sandy Soil Brick

S.no	Ratio	Dry weight	Wet weight	Water absorbed	% water absorbed
1	1:2:1	2.600kg	2.917kg	0.317kg	12.2%
2	1:2:2	2.460kg	2.787kg	0.327kg	13.3%
3	1:2:3	2.400kg	2.750kg	0.350kg	14.6%



3. CONCLUSIONS

This technology is at a proof of concept stage and need to be upscaled and accelerated and in future it would be one of the leading eco-friendly constructions. These bio-bricks are basically water proof and a good choice for an environment friendly constructions. The bio-bricks can be used in making of green buildings for providing more eco-friendly environment. Thus, the future roadmap for Bio-Bricks is to scale manufacturing and revenue generation by collaborating with appropriate agencies and providing hands-on workshops and training facilities to various stakeholders. Recycling is the best option over disposal. It helps in reducing disposal costs, conserves natural resources. Substitution of conventional materials by recycled waste materials helps in efficient use of waste material and sustainable use of natural resources.

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