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Experimental Study on Traditional Clay Bricks by adding Bagasse Ash and Fly Ash

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ABSTRACT

Bagasse is the fibrous matter that remains after sugarcane or sorghum stalks are crushed to extract their juice. The dry pulpy residue left after the extraction of juice from sugarcane. It is used as a bio fuel and in the manufacture of pulp and building materials. For each 10 tons of sugarcane crushed, a sugar factory produces nearly 3 tones of wet bagasse. Bagasse is an extremely inhomogeneous material comprising around 30-40% of "pith" fiber, which is derived from the core of the plant and is mainly parenchyma material, and "bast", "rind", or "stem" fiber, which comprises the balance and is largely derived from sclerenchyma material. Nowadays, it is commonplace to reutilize sugarcane bagasse as a biomass fuel in boilers for vapor and power generation in sugar factories. Depending on the incinerating conditions, the resulting sugarcane bagasse ash (SCBA) may contain high levels of SiO2 and Al203, enabling its use as a supplementary cementious material (SCM) in blended cement systems. Uses of Sugarcane bagasse waste in brick can save the sugarcane industry disposal costs and produce a 'greener' bricks for construction.

Keywords: Bagasse ash, Fly ash, clay bricks, compressive strength, water absorption

1. INTRODUCTION

Nowadays, alternative raw materials are being experimented with in concrete due to their potential advantages in reducing pollution and construction costs. Concrete, which typically consists of water, coarse aggregate, and fine aggregate, can be partially or completely replaced with supplementary cementitious materials to improve its characteristics. By reusing ashes from industries, factories, and fields rather than dumping them into nearby water bodies or land, pollution can be reduced. Fly ash, silica fume, metakaolin, rice husk ash, bagasse ash, and palm oil ash are among the most commonly used admixtures. These materials can provide additional strength to concrete due to their similar characteristics with cement after respective treatments.

India is the second-largest producer of sugarcane after Brazil, and it produces 44,000 tonnes of Bagasse ash per day. This waste material is used in co-generation plants due to its high calorific value, in paper and pulp making due to its fibrous nature, and in electricity production. Extensive research has been conducted to use it as a filler

material in concrete, where it has demonstrated additional strength, reduced heat of hydration, good workability, and high durability characteristics.

The use of Sugarcane Bagasse Ash (SCBA) in concrete has been extended to self-compacting, self-consolidating, foaming, high-strength, and ultra-high-strength concrete. Research has proven the efficacy of SCBA as a good pozzolanic admixture in concrete.

2. LITERATURE REVIEW

[1] An Experimental Investigation of Rice Hask Ash and Sugercane Bagasse ash Clay Bricks (2017)

Rice husk ash and bagasse ash bricks can be extensively used in all building constructional activities similar to that of common burnt clay bricks. The rice husk ash and bagasse ash bricks are comparatively lighter in weight and stronger than common clay bricks. The object of this investigation regarding rice husk ash and bagasse ash bricks, properties. Laboratory experiments were carried out on clay bricks with replacement of rice husk ash and bagasse ash. Rice husk and bagasse ash bricks are lighter in weight and more compressive strength at 10 % replacement. An agreement diagram is plotted where the variation of actual vs. predicted values of compressive strength lies between + 5 % error.

[2] An Experimental Investigation on the Combine Effect of Bagasse Ash and Rubber Tyre in Production of Bricks (2018)

This work carried out partial replacement of fly ash by bagasse ash with waste rubber tyre in order to reduce industrial waste. The effective use of these waste products is challenging task for researcher through environmental impact. Bagasse is often used as a primary fuel source for sugar mills. When burned in quantity, it produces sufficient heat energy to supply all the needs of a typical sugar mill, with energy to spare. This sugar manufacturing industries produces a lot of sugarcane bagasse ash which is disposed of in an open land. Huge quantity of ash which is a waste product, available at very negligible rate. This sugarcane bagasse ash is a fibrous waste product and has pozzolanic properties which can be made use in construction industry. Pozzolanic materials can be used as a partial replacement in the production of low cost fly ash bricks. Bagasse ash is utilized by replacing it with fly ash in bricks. Trial bricks were tested with different proportions of 10%, 20%, 30%, 40% and 50% with replacement of BA. These bricks were tested in Compression test and Water absorption test as per Indian Standards. The aim of this research was to make economical and green bricks to maintain environmental balance, and avoid problem of ash disposal.

[3] Experimental Investigation of Bricks Using Bagasse Ash Replacement By Fly Ash (2023)

Many researchers have focused on utilizing industrial and agricultural waste residue for environmental and technical reasons. One such waste product is sugarcane bagasse ash, which is generated from burning sugarcane bagasse. This waste material is available at a minimal rate and in enormous quantities. Its productive utilization can help resolve land pollution problems. In this project, we aim to use sugarcane bagasse ash as a replacement for fly-ash in brick production. The bricks will be tested with varying proportions of sugarcane bagasse ash, namely 30%, 40%, and 100% as a replacement for fly ash. The bricks will undergo various tests, including Indian standards and ASTM, to ensure their quality. The use of sugarcane bagasse ash in the brick production process will not only help in reducing environmental pollution but also promote sustainable development.

[4] Experimental Investigation on Replacement of Bagasse Ash in Bricks (2017)

This document partially replaces fly ash with pulp to reduce waste. Effective use of this waste is a challenge for scientists due to its impact on the environment. Pulp is often used as an essential oil for confectionery. The aim of this study is to create a commercial and environmentally friendly brick in order to have a balanced environment and avoid the waste problem. It is important that these wastes are disposed of safely without affecting human and environmental health. Therefore, reuse is highly desirable and bagasse has also been found to have high silica and pozzolanic properties. Therefore, it can be used instead of household appliances.

[5] Recycling of bagasse and rice husk ash in brick making (2016)

Today, international research has focused on the use of commercial or agricultural waste. materials for the

construction industry. The use of this waste will not only be economical, but also safe and non-toxic. The main purpose of this article is to develop an environmentally friendly and energy efficient brick using pulp ash (SCBA) and rice husk ash (RHA) as raw materials. SCBA and RHA are the main products of the sugar refining industry and rice mills, respectively. The chemical composition and particle size of these waste samples were analyzed by scanning electron microscopy (SEM).In this study, SCBA and RHA were mixed in certain proportions (2.5%, 5%, 10%, 15%, 20%) to modify the clay and produce bricks. Experimental results show that the use of SCBA-RHACLAY composite bricks is lighter, more durable, less hazardous, energy saving, more energy due to pozzolanic material, and reduces impermeability due to pore thinning.

[6] See Comparison Table of Pulp Ash Bricks and Traditional Fly Ash Bricks (2023)

The aim of the current project is to produce fly ash containing waste products, especially bagasse ash. With India's population increasing day by day, many companies and agriculture are generating a lot of waste that threatens health and the waste of this waste has become a major problem. One of them is bagasse made from burning bagasse ash.We produce 10% to 50% pulp and fly ash in order to use the waste material effectively. Make 150*150*150mm test bricks and do water absorption and compressive strength tests according to Indian standards. The aim of this study is to examine the potential of current research to determine whether bagasse ash can be used in brick making. The result of this study shows that the highest compressive strength is obtained with the ideal mixture percentage. Therefore, we can conclude that the incorporation of waste materials into the brickwork process will reduce the environmental impact, making buildings cheaper and more environmentally friendly.Process of recycling pulp ash as a raw material for clay bricks, replacing up to 20% by weight of natural clay. In this article, pulp was used as a good substitute for fly ash bricks and different proportions of pulp were used instead of fly ash, such as 10%, 20%, 30%, 40%, 50%, 60%, 70% and 80%. These bricks are tested for compression and absorption according to Indian Standards. The aim of this study is to produce an economical and environmentally friendly brick and eliminate the problem of ash disposal.

[7] Review on bagasse ash an effective replacement in fly ash bricks (2018)

This paper deals with use of bagasse ash as material. Bagasse is waste formed by burning of sugarcane. Recycling of sugarcane bagasse ash waste for brick bodies, through replacement of natural clay by up 20wt%. In thispaper, bagasse ash as an effective replacement in fly ash bricks with different proportions of 10% to 80% with replacement of fly ash. These bricks were tested in compression and water absorption test as per Indian standards. The aim of this research is to make economic and eco-friendly brick and disposal of ash will become less.

[8] Development and feasibility analysis of bagasse ash bricks (2015)

Sugarcane Slag ash (SBA), which would otherwise go to landfill, is used to produce materials for waste management and other materials' energy use.SBA, particle size distribution was characterized using scanning electron microscopy (SEM), X-ray fluorescence (XRF), X-ray diffraction (XRD), and thermogravimetric analysis (TGA). The SEM monograph shows a rough surface with many pores. The XRF, XRD and physicochemical properties of SBA indicate that it is suitable as a pozzolanic or cementitious material. TGA confirms thermal stability up to 650 °C. Regarding the suitability of the base material, SBA-quarry powder (QD)-lime (L) bricks are combined with normal lime (20% by weight) and physical conditions (weight, dry density, water absorption, air and compressive strength), performance (thermal conductivity, k), durability (chlorides, sulfates and carbides) and environment [Toxic Characteristics Leakage Protocol (TCLP)], as agreed.Design (SBA-QD-L) brick is evaluated in addition to its performance with sales and well-known masonry materials such as clay and fly ash brick. The test results show that SBA-QD-L composite brick has light weight, durability, trouble-free, energy saving, low k value etc. It shows that it has the features and meets the physical and electronic requirements of the model.

[9] Use of bagasse ash as brick material (2014)

Use of bagasse ash (SBA), a by-product of biofuel, as brick raw material. has been researched.These bricks are made using clay powder (QD) instead of sand and lime

(L) as a binder. XRF confirmed that SBA is a gelling agent. TGA showed good thermal stability up to 650 C, while SEM monographs showed an ash with a rough surface and numerous fine pores. Elemental analysis was also carried out on quarry dust and lime using XRF and conventional wet testing. The physical properties of the hearth and lime were determined using the laboratory method.SBA-QD-L combination brick is designed and produced as a composite material. Research and develop the physical and strength of bricks according to recommended standards. The results of SBA-QD-L bricks were compared with the physical and mechanical properties of products extracted from clay fly ash. SBA-QD-L bricks have been found to be lighter, more durable and meet the compressive strength requirements of IS 1077: 1992. These bricks are also used in waste management and textile new construction paper.These bricks can be used in local construction, especially in non-load bearing walls. 8. Pulp ash for environmentally friendly fly ash brick Author: bhavya rana Issue year: 2013 Agriculture is the most important industry in India with 60% of the rural population and this has led to an increase in agriculture. residue type. Agra scrap has proven to be one of the most versatile and cost-effective alternatives, and its uses have spread to nearly all areas of construction. Effective use of fly ash in the construction industry requires new materials to replace fly ash, and wastes such as bagasse are a potential source of these materials.These factors can also contribute to LEED (Leadership in Energy and Environmental Design) scores. Pulp fly ash brick can also maintain fertile soil utilization in the traditional brick making process. Current research aims to explore the potential of using pulp in the brick process.

[10] Utilization of bagasse ash as a brick material, a review (2016)

It is known that if energy production is not done correctly, it is harmful to the environment and our health. The f ibrous residue of sugar, called "pulp" after pressing and squeezing, is one of the largest agricultural products in t he world. Although the pulp is used as a biomass fuel for boilers, the products obtained from the residue after b urning are not useful and are often released into rivers, harming human health, the environment, fertile soil, wa ter, etc. effects. Under combustion conditions, the resulting pulp ash (SCBA) may contain high levels of SiO2 and Al2O3. Using pulp ash waste in brick making can save the economy in terms of disposal costs and produce "gree ner" bricks for construction.In this study, pulp ash, lime, quarry dust and wastes were used instead of clay and s and in fire clay bricks. Bricks are made from bagasse ash, lime, lime and residues in different proportions. After the entire production process, the bricks were tested in the laboratory and the results were analyzed for water absorption and compressive strength. The aim of this study is to create a commercial and environmentally friendly brick in order to have a balanced environment and avoid the waste problem.

[11] Pulp as a good substitute for fly ash brick (2013)

Use of industrial and agricultural wastes in industrial key technologies in financial, environmental and economi c research. Pulp is a fiber waste from the sugar industry along with ethanol vapor. Most of the ashes are dispose d of at insignificant cost. It specifically causes chronic pulmonary fibrosis known as bagassios. In this article, pul p can be used by replacing fly ash with fly ash and lime. (230x100x75) mm size 0% 10%, 20%, 30%, 40%, 50%, 60% fly ash and 0% 5%, 10%, 15% test bricks Instead of % and 20% lemon. Bricks are tested for compression a nd absorption according to Indian Standards. The aim of this study is to create a commercial and environmental ly friendly brick in order to have a balanced environment and avoid the waste problem.

[12] Fly Ash and Pulp Bricks (Compressive Strength Bricks with Different Material Composition and Water Absorption Test) (2022)

Demand Flyash is improving in many areas There are many ways, less water starts to cause less energy, fly ash i s often released as waste from power plants, stored or stacked on fertile soils or stored for recycling again, adde d to the target.The results showed that replacing 1.5% of the cement with solid waste retained the flexibility an d high strength of the brick structure. This will reduce the initial cost of household appliances.

[13] A Study on Partial Conversion of Pulp to Cement in Brick (2018)

In India, bricks are usually made of clay and are usually produced in traditional, unorganized small industries. A lot of clay is used in brick making, which leads to soil loss and soil degradation. To avoid all threats to the environment, try to study the behavior of bricks made using waste materials from waste materials. Recycling waste products as substitute raw materials can help reduce natural resources and reduce disposal costs. In this project, we choose pulp ash in brick (SBA) stabilized with Ordinary Portland Cement (OPC). Brick dimensions are 19cm x 9cm x 9cm.Blocks (1:3) are called 20%, 30%, 40%, and 50%; (1:4) 20%, 30%; (1:5) 20%, 30%, and then SBA by dry soil weight is added, then the brick is placed and cured for 28 days. Compressive strength, water absorption test, flame test, sound test, etc. The tests were carried out according to the Bureau of Indian Standards (BIS) specifications and the price was determined.

[14] Comparison of gray pulp brick and traditional fly ash brick making (2018)

The aim of the present study is to produce fly ash containing solids, especially bagasse ash. With India's population increasing day by day, many companies and agriculture are generating a lot of waste that threatens health and the waste of this waste has become a major problem. One of them is bagasse made from burning bagasse ash. We produce 10% to 50% pulp and fly ash in order to use the waste material effectively. Make 150*150*150mm test bricks and do water absorption and compressive strength tests according to Indian standards. The aim of th is study is to examine the potential of current research to determine whether bagasse ash can be used in brick making. The result of this study shows that the highest compressive strength is obtained with the ideal mixture percentage. Therefore, we can conclude that the incorporation of waste materials into the brickwork process will reduce the environmental impact, making buildi ngs cheaper and more environmentally friendly.

[15] "Experimental study of the combination of pulp ash and rubber tires in brick making (2018)

This study uses powdered pulp ash to replace rubber waste with fly ash. reduce industrial waste. Efficient use of waste products is a challenge for scientists due to their impact on the environment. Pulp is often used as an ess ential oil for confectionery. When it burns too much, it produces enough heat to meet all the needs of sugary pro ducts with excess energy. This sugar industry produces a large amount of bagasse ash, which is poured into open fields. A large amount of ash is a waste given at a very insignificant price. Bagas ash is a fibrous waste product with pozzolanic properties used in the construction industry. Pozzolan materials can be used as spare parts in the production of low energy products. Pulp is used by replacing bricks with fly ash. Measure the brick by varying the BA at different levels such as 10%, 20%, 30%, 40% and 50%. These bricks are tested for compression and absorption according to Indian Standards. The aim of this study is to create a commercial and environmentally friendly brick in order to have a balanced environment and avoid the waste problem.

3. PROPOSED METHODOLOGY

3.1 MATERIALS USED

3.1.1 Sugarcane bagasse ash

The burning of bagasse which is a waste of sugarcane produces bagasse ash. Presently in sugar factories bagasse is burnt as a fuel so as to run their boilers. This bagasse ash is generally spread over farms and dump in ash pond which causes environmental problems also research states that Workplace exposure to dusts from the processing of bagasse can cause the chronic lung condition pulmonary fibrosis, more specifically referred to as bagassosis. In this experimental work SCBA was collected from the Manas Agro Industries and Infrastructure Ltd., Umred, Nagpur, Maharashtra, India.

[Fig.3.1: Sugarcane bagasse & sugarcane bagasse ash]

Sugar cane bagasse ash (SCBA) is an abundant by product of the sugar and ethanol industry. SCBA is generally used as a fertilizer or is disposed of in landfills, which has led to intensified environmental concerns.

Table 3.1: Physical properties of Sugar bagasse ash

Material	Density (Kg/cum)	Specific Gravity	Fineness Passing 45 µm	Specific Surface area (cum/Kg)	Mean grain size (µm)
Bagasse ash	0.4	1.8	95	900	5.1

Table 3.2: Chemical properties of sugarcane bagasse ash

Component	Mass %
Silica (SiO2)	66.79
Alumina (Al2O3) Ferric oxide (Fe2O3)	29.20
Calcium oxide (CaO)	1.96
Magnesium oxide (MgO)	0.84
Sulphur tri oxide (SO3)	0.57
Loss of Ignition	0.72
Chloride	-

3.1.2 Fly Ash

Fly ash, otherwise called a flue- ash, is one of the residual substances that is produced during combustion and comprises of the fine particles that are produced by the flue gases. In an industrial context, fly ash generally refers to ash produced during the combustion of coal. Fly ash was collected from SRV Fly Ash Bricks Industries, Plot No. 112, Pravha Suman Apartment, Chota Tajbag Rd, Sakkardharra Road, Somwarpet, Ayodhya nagar, behind Bollywood Centre Point, Nagpur, Maharashtra 440009.

Fly ash is a coal combustion product that is composed of particulates (fine particles of burned fuel) that are driven out of coal-fired boilers together with flue gases. Ash that falls to the bottom of the boilers combustion chamber (commonly called a firebox) is called bottom ash. In modern coal fired power plants, fly ash is generally captured by electrostatic precipitators or other particle filtration equipment before the flue gases reach the chimneys. The minor constituents of fly ash depend upon the specific coal bed composition but may include one or more of the elements or compounds found in trace concentrations (up to 100 ppm) such as chromium , cobalt , lead , manganese , mercury etc. , It also has unburnt carbon.

[Fig.3.2: Fly Ash]

3.1.3 Water

Locally available water has been used in brick manufacturing. The bricks, when tested in accordance with the procedure laid down in IS 3495 (Part 2), after immersion in cold water for 24 hour, shall have average water absorption not more than 20 percent by mass up to class 12.5 and 15 percent by mass for higher classes. Water is important ingredient of brick as it actually used for manufacturing of brick. Since it helps to bind all the raw materials for giving proper mix. Water used for making brick should be free from impurities.

The common specifications regarding quality of mixing water is water should be fit for drinking. Such water should have inorganic solid less than 1000 ppm. This content lead to a solid quantity 0.05% of mass of cement when w/c ratio is provided 0.5 resulting small effect on strength. But some water which are not potable may be used in making concrete with any significant effect. Dark color or bad smell water may be used if they do not posses deleterious substances. PH of water to even 9 is allowed if it not tastes brackish. In coastal areas where local water is saline and have no alternate sources, the chloride concentration up to 1000 ppm is even allowed for drinking. But this excessive amount of alkali carbonates and bicarbonates, in some natural mineral water, may cause alkali-silica reaction. A simple way of determining the suitability of such water is to compare the setting time of cement and the strength of mortar cubes using the water in question with the corresponding results obtained using known suitable or distilled water. About 10% tolerance is generally allowed. Such tests are recommended when water for

which no service record is available containing dissolved solids in excess of 2000 ppm or, in excess of 1000 ppm. When unusual solids are present a test is also advisable.

3.1.4 Clay

Clay is a type of fine-grained natural soil material containing clay minerals Gay Head Cliffs in Martha's Vineyard consist almost entirely of clay. Clay collect from Ghorad village, kalmeshwar, Nagpur, Maharashtra, India. Clay soil is soil that is comprised of very fine mineral particles and not much organic material. The resulting soil is quite sticky since there is not much space between the mineral particles, and it does not drain well at all.

[Fig.3.3: Clay]

3.2 MAKING OF BRICK

In the present study brick contains clay, fly ash and SCBA. Certain amount of the fly ash is substituted with Bagasse ash, this data from the Bagasse ash fly ash brick is than compared with that from a standard fly ash brick without bagasse ash. Four bricks samples of size 19 cm × 9 cm × 8 cm were cast. The industrialized manufacturing procedure of bricks generally involves of three steps:

- Mixing the ingredients
- Placing the mix in the mould

3.3 TEST CONDUCTED ON BRICKS

Following tests shall have conduct on brick sample.

1. Compressibility test
2. Water absorption test
3. Soundness test
4. Hardness Test

3.3.1 Compressibility test

Compressive strength test was carried out for bricks with different mix proportion of carbon buster. The specimen is placed between two plywood sheets of each having 3mm thick and carefully centred in compression testing machine. The ultimate load is noted. The compressive strength is the ratio of ultimate load to the resisting area of brick loaded. The compressive strength of the brick is obtained by using the formula,

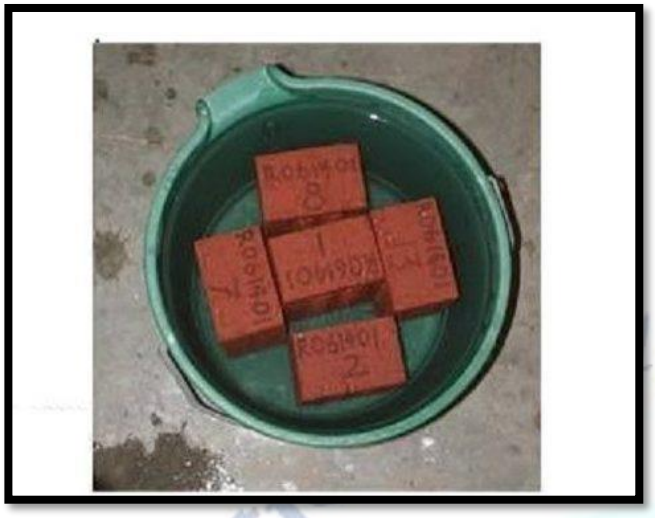
Compressive strength = Ultimate load/ Resisting Area

[Fig.3.4: Compressibility test]

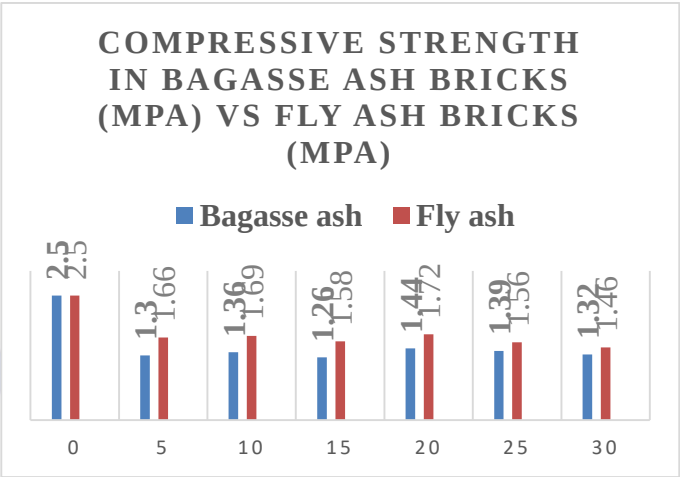
3.3.2 Water absorption test

In water absorption test, the dry weight of brick was noted as weight (M1). Then the dry brick was completely immersed in water at room temperature for 24 hours. After 24 hours bricks were removed from the water and allowed to drain for 3 minutes and wipe out any traces of water with damp cloth. Now the weight was noted as (M2). The water absorption was calculated in percentage and tabulated in table and shown in next table.

Water absorption % = (wet weight – dry weight)/ dry weight



[Fig.3.5: Water absorption test]



[Fig.4.1: Compressive Strength in Bagasse Ash Bricks (MPA) Vs Fly Ash Bricks (MPA)]

4. RESULTS & DISCUSSION

4.1 COMPRESSIVE STRENGTH

Table 4.1: Compressive strength of different proportion of bagasse ash in clay bricks

S.No.	Sample	Amount of Bagasse ash (%)	Compressive Strength (MPa)
1.	Std.	0	2.50
2.	SBA 1	5	1.30
3.	SBA 2	10	1.36
4.	SBA 3	15	1.26
5.	SBA 4	20	1.44
6.	SBA 5	25	1.39
7.	SBA 6	30	1.32

Table 4.2: Compressive Strength of Different Proportion of Fly Ash in Clay bricks

S.No.	Sample	Amount of fly ash (%)	Compressive Strength (MPa)
1.	Std.	0	2.50
2.	FA 1	5	1.66
3.	FA 2	10	1.69
4.	FA 3	15	1.58
5.	FA 4	20	1.72
6.	FA 5	25	1.56
7.	FA 6	30	1.46

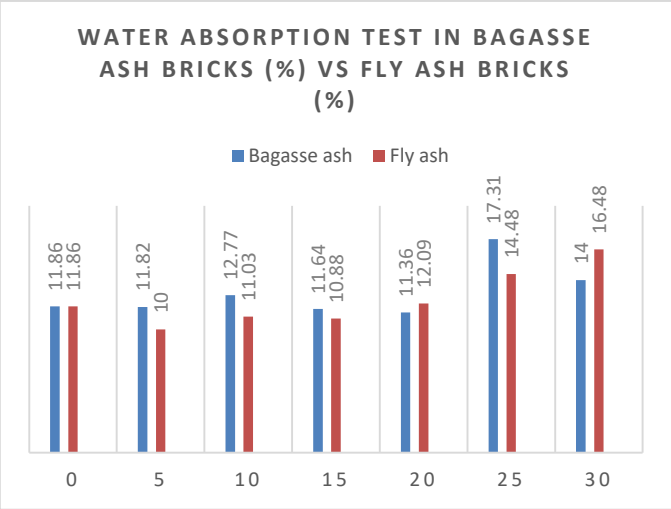
4.2 WATER ABSORPTION TEST

Table 4.3: Dry weight, wet weight and water absorption ratio for various proportions of Bagasse ash in Clay Bricks

S.No.	Sample	Amount of Bagasse ash (%)	Dry Weight (W1) (Kg)	Wet Weight (W2) Kg)	Water Absorption Value %
1.	Std.	0	2.850	3.188	11.86
2.	SBA 1	5	2.505	2.813	11.82
3.	SBA 2	10	2.481	2.798	12.77
4.	SBA 3	15	2.389	2.672	11.64
5.	SBA 4	20	2.250	2.506	11.36
6.	SBA 5	25	2.044	2.398	17.31
7.	SBA 6	30	1.985	2.263	14.00

Table 4.4: Dry weight, wet weight and water absorption ratio for various proportions of Fly ash in Clay Bricks

S.No.	Sample	Amount of fly ash (%)	Dry Weight (W1) (Kg)	Wet Weight (W2) Kg)	Water Absorption Value %
1.	Std.	0	2.850	3.188	11.86
2.	FA 1	5	2.660	2.926	10.00
3.	FA 2	10	2.610	2.898	11.03
4.	FA 3	15	2.590	2.872	10.88
5.	FA 4	20	2.483	2.786	12.09
6.	FA 5	25	2.348	2.688	14.18
7.	FA 6	30	2.185	2.553	16.48



[Fig.4.2: Water absorption test in Bagasse Ash Bricks (%) Vs Fly Ash Bricks (%)]

6. CONCLUSION

The project work has been carried out by adding various % of sugarcane bagasse ash, fly ash for increasing compressive strength of bricks. The results are indicative of satisfactory performance of green bricks based on experimental investigations concerning compressive strength and the following conclusions have been made from this work.

- Compressive strength of brick increases on increase in percentage of both the material i.e. bagasse ash and fly ash (up to 20%each). But after increase in amount of material the compressive strength goes on decreases. With the further increase 30% slight cracks are occurred.
- It is noted that 20% of bagasse ash and 20% fly ash i.e. (total 40%) is replaced sample give maximum strength amongst all the proportions.
- At 20% of replacing bagasse ash it gives 1.45MPa compressive strength and at 20% of using only fly ash it gives 1.71MPa.
- As addition of bagasse ash more than 20% causes more water absorption, reduction in compressive strength, less hardness, under burnt.
- So we recommend that up to 20 to 25% of bagasse ash can be replaced by clay bricks.
- Use of bagasse ah in brick can solve the disposal problem, reduce the cost and produce a 'greener' eco-friendly bricks for construction.
- Environmental effects of waste and disposal problems of waste can be reduced through this research.
- It reduces the cost of material per brick. Green energy bricks deliver the new innovation in building construction. The bricks are structural but also light weight

FUTURE SCOPE

This sugarcane bagasse ash is a fibrous waste product and has pozzolanic properties which can be made use in construction industry. Pozzolanic materials can be used as a partial replacement in the production of low-cost fly ash bricks. The aim of this research was to make economical and green bricks to maintain environmental balance, and avoid problem of ash disposal. It is very essential to dispose these wastes safely without affecting health of human being and environment. So, there is a great need for its reuse, also it is found that bagasse ash in high in silica and found to have pozzolanic property. So it can be used as substitute to construction material.

- To promote the solid waste from the sugar mills as a useful product.
- To manage the disposal of waste product into construction raw material.
- To dispose the waste safety.
- To encourage the waste products as eco-friendly material.
- To make the bricks which are energy efficient which is the only viable solution to the environmental concerns and natural resources conservation for future generations.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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