Experimental Investigation on Composite Bricks with Partial Replacement of Weeds Ash

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ABSTRACT

In India, are usually made up of clay, and are generally produced in traditional, unorganized small-scale industries. Brick making consumes larger amount of clay which leads to top soil removal and land degradation. To avoid all these environmental threats an attempt was made to study the behavior of bricks manufactured using, composite brick. An experimental investigation has been carried out to study the feasibility of producing bricks from weeds ash and materials such as cement and fine aggregate. In order to study the various engineering properties of bricks, a total of 15 numbers of brick specimens of 230x 100 x 90 mm size were prepared in different proportions.Test results obtained in the present investigation indicate that it is possible to manufacture good quality bricks using locally available by suitably adding either weeds Ash, bricks can be used in pressed type water cured cement bricks presently in use for various construction activities across the country. The weed ash limited to the grain size of less than 75 micrometer is added to cement by weight percentage of 10%, 20%, 30%, and 40% by the method of replacement by weight.

Keywords — *prosopis juliflora ash, cement, sand*

I. INTRODUCTION

1.1 GENERAL

Degradability, light weight, high specific strength. One such fiber is prosopis juliflora ash. This fiber which is abundantly available in nature and having high strength has paved way to its usage as natural fiber of the fabrication of a composite. This paper involves in the fabrication of a natural composite and this fabricated natural composite's compressive strengths are found using a UTM (universal testing machine). Environment in nowadays get polluted due to various reasons. Among these reasons a great impact that have been made by construction and usage of construction materials. Even the demolition of construction waste can also pollute environment. Natural fibers are attractive over manmade fiber due to their advantages.

1.2 SCOPE

To promote the use of waste from weeds ash useful products. To encourage the weeds products as eco-friendly materials. 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.

1.3 OBJECTIVE

To avoid the large amount of ground water,consume. To save the bio diversity in many parts of the world. To give the more strength to brick than normal brick. To reduce the cost than normal brick. This composite brick can be used instead of concrete wall panels without compromising the strength.

II. LITERATURE REVIEW

1) **George amal anik.s and parthiban kathirvel, Effect of utilizing prosopis juliflora ash as cementitious material**

Wood ash limited to the grain size of less than 75 micrometer is added to cement by weight percentage of 10%, 20% and 30% by the method of replacement by weight.

2) **Praveena.S Sowmiya.S, Effect on strength properties of concrete by using prosopis juliflora wood powder as partial replacement of sand**

The research was conducted to investigate the potential of Prosopis juliflora charcoal as energy mix in cement industries. Proximate analysis and calorific value of Prosopis juliflora wood and laboratory scale carbonized Prosopis juliflora were done by standard procedure and compared with traditionally produced Prosopis juliflora charcoal .

3) **Compressive strength of unfired composite bricks made of sand clay and natural fiber of Tanzania, HEAVY GEOFREY NJAU, EUGENE PARK (09 DEC 2015)**

Compressive strength is important parameter when considering the design bricks. The unfired cement bricks has reported as one of the alternative of energy consumption reduction. The quality of bricks depends on the compression strength of which brick can withstand load applied on it.

4) **Strength characteristics of bricks using composite materials, SASIKUMAR.K, MINNALKODI.G, DHANALAKSHMI.G (03 Mar 2018)**

Composite bricks gives 8.5 % higher strength than the conventional bricks. Water absorption of a composite bricks is 1.5% higher than the conventional Bricks with replacement of bottom ash gives 6.5 % higher strength than the conventional bricks. Composite bricks having fly ash and bottom ash sludge ash are tested for the compressive strength. Bricks with 10% replacement of fly ash gives a higher strength than the conventional bricks. Strength of fly ash bricks increase up to 8% composed with conventional bricks.

5) **Vidya.v Praveenraj.y, Experimental investigation on partial replacement of cement by prosopis juliflora ash and coarse aggregate by sea shells**

Replacing of weeds ash is equal compressive strength with that of conventional bricks.

6) **Sasikumar.k Minnalkodi.g, Strength characteristics of bricks using composite materials**

The use of Weeds ash from production as partial replaced the cement as the percentage by weight of cement.

7) **Experimental investigation on concrete using hypo sludge and prosopis juliflora ash PACKIALAKSHMI. P.M, AASHA JYOTHI.R (2016)** Wood is potential sources of energy and environmentally being friendly material there will be increase usage of wood in energy production in future. Wood ash obtained from combustion of wood. Wood ash prepared from uncontrolled burning of wood ash. During the decade it has been recognised with growing wood ash waste of large volume and that it is increasing year in the household. The utilisation of these waste material can be an economical and eco-friendly alternative in nearby area for rural road construction.

III. MATERIAL TESTING RESULTS

TABLE I
Test result of cement

S.No.	Properties	Value
1.	Finess	5%
2.	Specific Gravity	3.167
3.	Initial Setting time	20 minutes
4.	Final Setting time	600 minutes

TABLE II
Test result of prosopis juliflora ash

S.No.	Properties	Value
1.	Fineness	6%
2.	Specific Gravity	2.20

TABLE III
Test results for sieve analysis of fine aggregate

S.NO	Sieve size IS in (mm)	Weight of sand In (Kg)	Cumulative Weight retained In (Kg)	Cumulative Percentage of weight retained	Cumulative Percentage of Weight passing
1	4.75	14	0.014	0.2	99.98
2	2.36	32	0.032	3	97
3	1.18	86	0.083	8.6	91.4
4	850µ	192	0.192	19.2	80.8
5	425 µ	508	0.508	50.8	49.2
6	300	42	0.042	4.2	95.8
7	150	58	0.058	5.8	94.2
8	PAN	68	0.068	6.8	93.20

TABLE IV
Test results for specific gravity of fine aggregate

SI:NO	DESCRIPTION	TRIAL I	TRIAL II	TRIAL III
1	Weight of pycnometer (W1) gm	645	645	645
2	Weight of pycnometer+ sand (W2)gm	845	860	878
3	Weight of pycnometer+ sand Water(W3) gm	1700	1655	1667
4	Weight of pycnometer +sand (W4) gm	1430	1245	1528
5	Specific gravity(G)	2.86	2.26	2.478
6	Average specific gravity (G)			**2.532**

IV. MIX DESIGN

Bricks are manufactured by using the mould of size 23 X 10 X 9

Size of mould = 23 X 10 X 9

0.230 × 0.100 × 0.090 = 0.0020meter cube
Cement = 1 / (1 + 7) × 0.0020 × 1440= 36 kg
Volume of weed ash = 0.040 kg / meter cube
Volume of cement = 0.960kg / meter cube
Fine aggregate = 0.36 × 7 = 2.56kg / meter cube

MIX RATIO

Ratio = 1: 7

V. TEST RESULTS AND DISCUSSIONS

8.1 WATER ABSORPTION TEST

Water absorption, % by mass, after 24 hours immersion in cold water is given by the formula

$$W = \frac{W2 - W1}{W1} \times 100$$

W = ((3.620 – 3.520) / (3.520)) ×100

W = 2.84 %

Water absorption of the given bricks = 2.84 %

8.2. COMPRESSIVE STRENGTH TEST

SAMPLE	7 DAYS	14 DAYS	28 DAYS
S1(10% PJA)	92	118	158
S2(20% PJA)	86	111	142
S3(30% PJA)	80	102	131
S4(40% PJA)	71	98	124

Table 8.2.1 compressive load testing result in (KN)

SAMPLES	7 DAYS	14 DAYS	28 DAYS
S1(10% PJA)	3.8	4.8	6.5
S2(20% PJA)	3.5	4.5	5.8
S3(30% PJA)	3.3	4.2	5.4
S4(40% PJA)	3.1	4	5.1

Table 8.2.2 compressive strength testing result in (N/mm²)

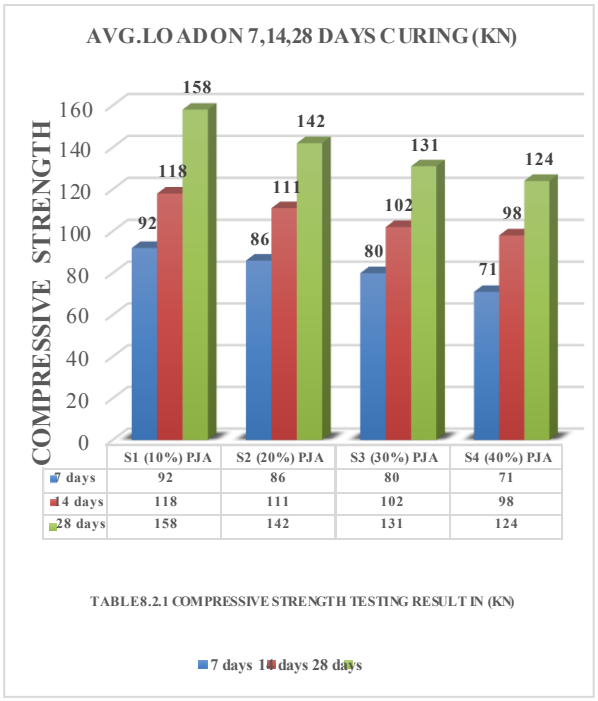

Fig 8.2.2 compressive load testing result in(KN)

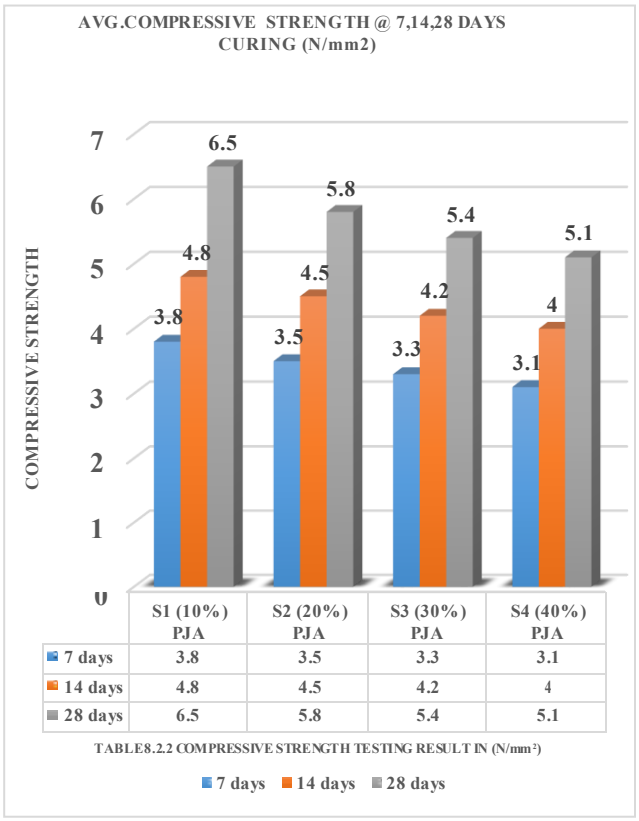

Fig 8.2.3 compressive load testing result in(N/mm²)

8.3 VISUAL INSPECTION TEST

In this test bricks are closely inspected for its shape. The bricks of good quality should be uniform in shape and should have truly rectangular shape with sharp edges.

8.4 SIZE AND SHAPE TEST

Brick are selected at random to check measurement of length, width, height.

8.5. HARDNESS TEST

In this test, a scratch is made on brick surface with the help of finger nail. If no impression is left on the surface, brick is treated as to be sufficiently hard

8.6 SOUNDNESS TEST

Two bricks are taken, one in each hand, and they are struck with each other lightly. A brick of good quality should not break and a clear ringing sound be produced.

8.7 STRUCTURE TEST

A Brick Brocken and its structure is examined. It should be homogeneous, compact and free from any defects such as holes, lumps etc.

CONCLUSION

Based on the above experimental procedure and test, we conclude as;

- Use 0f prosopis juliflora ash and fine aggregate in brick can solve the disposal problem; reduce cost and produce a 'greener' Eco-friendly bricks for construction.
- The crushing strength or compressive strength of bricks named as 7 days is 3.4 N/mm2 and the brick named as 14 days is 4.3 N/mm2 and 28 days is 6.8 N/mm2.
- Hence we strongly recommend brick 5 N/mm2 in curing period on 28 days has a good compressive strength and suitable for construction.
- Environmental effects of wastes and disposal problems of waste can be reduced through this brick manufacturing process.
- This study helps in converting the non-valuable prosopis juliflora ash and cement with fine aggregate into makes it valuable.
- In this research maximum compressive strength can be attained.

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