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Experimental investigation of green brick Using vechellia tree dust

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Abstract: experiments have been carried out by several materials such as red soil, wood dust, adhesive cement for the manufacturing of the brick. The combinations of wood dust have different percentage of adding such as 0.2%, 0.4%, 0.6%, 0.8% and 1.0% and in percentage of wood dust and also increase the value of the testing of the brick there are main two type of the testing is done compressive strength test and water absorption test after 7, 14, 21days. The brick is increase a compressive strength and water absorption is decrease.

I. INTRODUCTION

The history of civilization is synonymous to the history of masonry. Man's first civilization, which started about 6000 years ago, was evident from the remains of the Mesopotamians masonry building units. During earlier days, the masonry units were constructed from any available material. The Mesopotamians used bricks, made from alluvial deposits of the nearby Rivers to build their cities.

The provision of good quality housing is recognized as an important responsibility for the welfare of people in many countries. For this reason, the building materials based on natural resources are often used. Earth can be used for construction of walls in various manners. But there are some undesirable properties such as reduction in strength when saturated with the water, wind erosion or driving out rain and poor dimensional stability.

These problems can be eliminated by stabilizing the soil with a chemical agent such as red soil, saw dust, cement etc. These compressed earth bricks are unfired, uniform building blocks compressed from clay-retaining earth. It is suitable for application of load-bearing and non-load bearing walls. The standard size of our compressed earth brick was adopted as 190mm x 90mm x 90mm.

A. Materials

1) *RED SOIL:* Red colours in soils are due to the presence of various oxides of iron. They are either formed in situ or from products of decomposition of rocks washed to a lower level. They generally include soils locally known as red sandy soils and red alluvium. They are mostly formed under sub-humid climate from an assorted rock formation. Their main features are light texture, porous structure, absence of lime and organic matter. In the upper part of a typical soil deposit silt red soils are found. With depth the clay fraction increases with the presence of granular particles of morrum or stones. These types of soil are suitable for brick making with a deep cherry red fired colour. However due to possible high presence of silt and sand particles, in some red soils desired strength might not develop. Caution should be exercised in selecting these kinds of soils since at depths they might contain coarser particles.
2) *VECHELLIA:* The species name nilotica was given by Linnaeus from this tree's best-known range along the all over India. For the ongoing reclassification of this and other species historically classified under genus Acacia, see the Acacia. Description Spring blossoms at District of Haryana state , India Vachellia nilotica is a tree 5–20 m high with a denses pheric crown, stems and branches usually dark to black colored, fissured bark, grey-pinkish slash, exuding a reddish low quality gum. The tree has thin, straight, light, grey spines in auxiliary pairs, usually in 3 to 12 pairs, 5 to 7.5 cm (3 in) long in young trees, mature trees commonly without thorns.

The leaves are bipinnate, with 3–6 pairs of pinnulae and 10–30 pairs of leaflets each, tomatoes, rachis with a gland at the bottom of the last pair of pinnulae. Flowers in globule's heads 1.2–1.5 cm in diameter of a bright golden-yellow colour set up either auxiliary or whorls on peduncles 2–3 cm long located at the end of the branches. Pods are strongly constricted, hairy, white-grey, thick and

softly tomatoes. Its seeds number approximately 8000/kg.

II. PRODUCTION PROCESS

In this section the process involved in the production of brick is described, which involves compression method.

A. The earth brick can be produced by the processes like manual presses, thermal presses & solar presses. We adopted manual presses that need 15 tons of compression load to manufacture single material

B. Usually for compressed earth block requires impact load for making the material as solid one. But we choose gradual loading for making bricks.

C. We have prepared a metal type of mould for earth brick manufacturing that weigh around 30 kg and it consumes less cost for that preparation.We can easily dismantle the mould after the application of load and so preparation is precise.

III. TEST ON SOIL

There are different types of soil test conducted to study the nature of soil and its characteristics

A. Specific Gravity Test

Specific gravity test is used to determine the soil properties like void ratio, degree of saturation. Specific gravity G is defined as the ratio of the weight of a given volume of material to the weight of an equal volume of water (at 20o C). From the specific gravity of soil using pycnometer, the value of G is 2.40. So it comes under the organic type of soil.

S.NO	SAMPLE DISCRIPTION	TRAIL-I	TRAIL-II	AVERAGE VALUE
1	Wt. of empty bottle (W_1)	0.659	0.659	0.659
2	Wt. of bottle + soil (W2)	1.127	1.163	1.145
3	Wt. of bottle + soil + water (W3)	1.648	1.687	1.69
4	Wt. of bottle + bottle	1.404	1.404	1.404
5	Specific gravity G = (W2-W1)/((W2-W1)- (W3-W4)) = (1.145-0.659)/((1.145-0.659)- (1.69-1.404))			2.40(no unit)

B. Sieve Analysis Test

Fineness modulus of fine aggregate = cumulative weight retained/100 = 2.

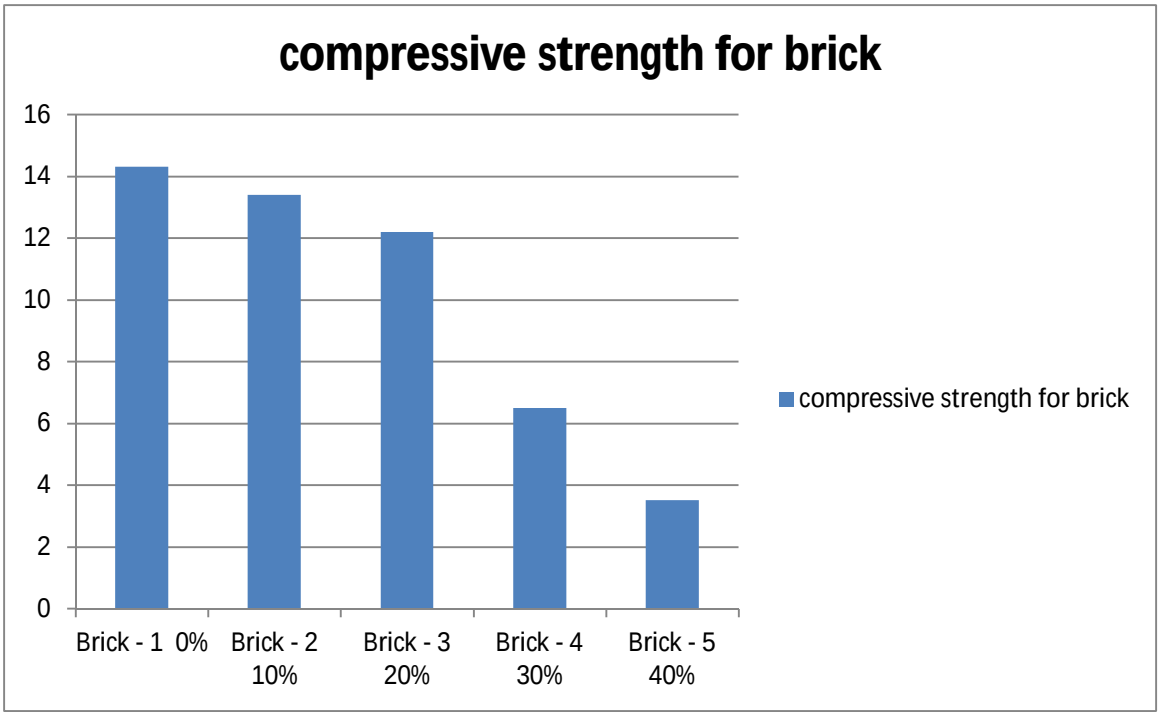
From the sieve analysis test, fineness modulus is found to be 2.0 and it is a fine aggregate (fine clay soil)

Table 2: Finess modulus test result

IS SIEVE SIZE	WT.OF SOIL RETAI NED	% WT. RETAINED	CUMUL ATIVE PERCENTEGE	% FINE R
4.75 mm	0	0	0	100
2.36 mm	0	0	0	100
1.18 mm	0	0	0	100
600	0.079	15.8	15.8	84.2
300	0.182	36.4	52.2	47.8
180	0.103	20.6	72.8	27.2
150	0.034	6.8	79.6	20.4
75	0.060	12	91.6	8.4
Pan	0.032	6.4	98	2
Fineness modulus of fine aggregate = cumulative weight retained/100 = 2. From the sieve analysis test, fineness modulus is found to be 2.0 and it is a fine aggregate (fine clay soil)				

IV. COMPRESSION STRENGTH TEST ON BRICK

Compression strength on compressed earth brick material can be tested by using same CTM (Compression Testing Machine). As per literature, generally it must have a maximum compression strength of 2 N/mm2. We have obtained several strength for brick which were more or less equal to the previous value (2 N/mm2). The different values of all the bricks are displayed below**.**



A. Analysis of Earth Brick

Based on grain size We have made total of 20 bricks within short period and for each brick we have used different admixtures at different proportion depends on our strength requirement. We have also faced problem like failure brick while demoulding and two bricks were failed. The graph mentioned below explains the strength comparison of compressed earth brick based on grain size of sieves . Compressive strength based on different grain size .Experiments were done on all the three sieves and several bricks were made using the above sieves. But the compression strength of each bricks varied depends on the grain size. The different values are obtained for each bricks and maximum compression strength value is noted and plotted as shown above. From the value got through the above graph we can conclude that the soil that passes through 600µ sieve has the higher strength than 1.18mm & 300µ sieves. Hence compression strength of earth brick can attain a maximum values by using 600µ sieve.

V. CONCLUSION

From the above experimental studies, maximum compression strength of 6.5 N/mm^2 at 0 % . The wood dust gives maximum compression strength of 5.86 N/mm^2 at 10%, 5.3 N/mm^2 at 20%, 4.61 N/mm^2 at 30%. These bricks are very use full for future construction work and its also very low cost and good strength. The wood dust gives maximum compression strength of 3.5 N/mm^2 at 40%.

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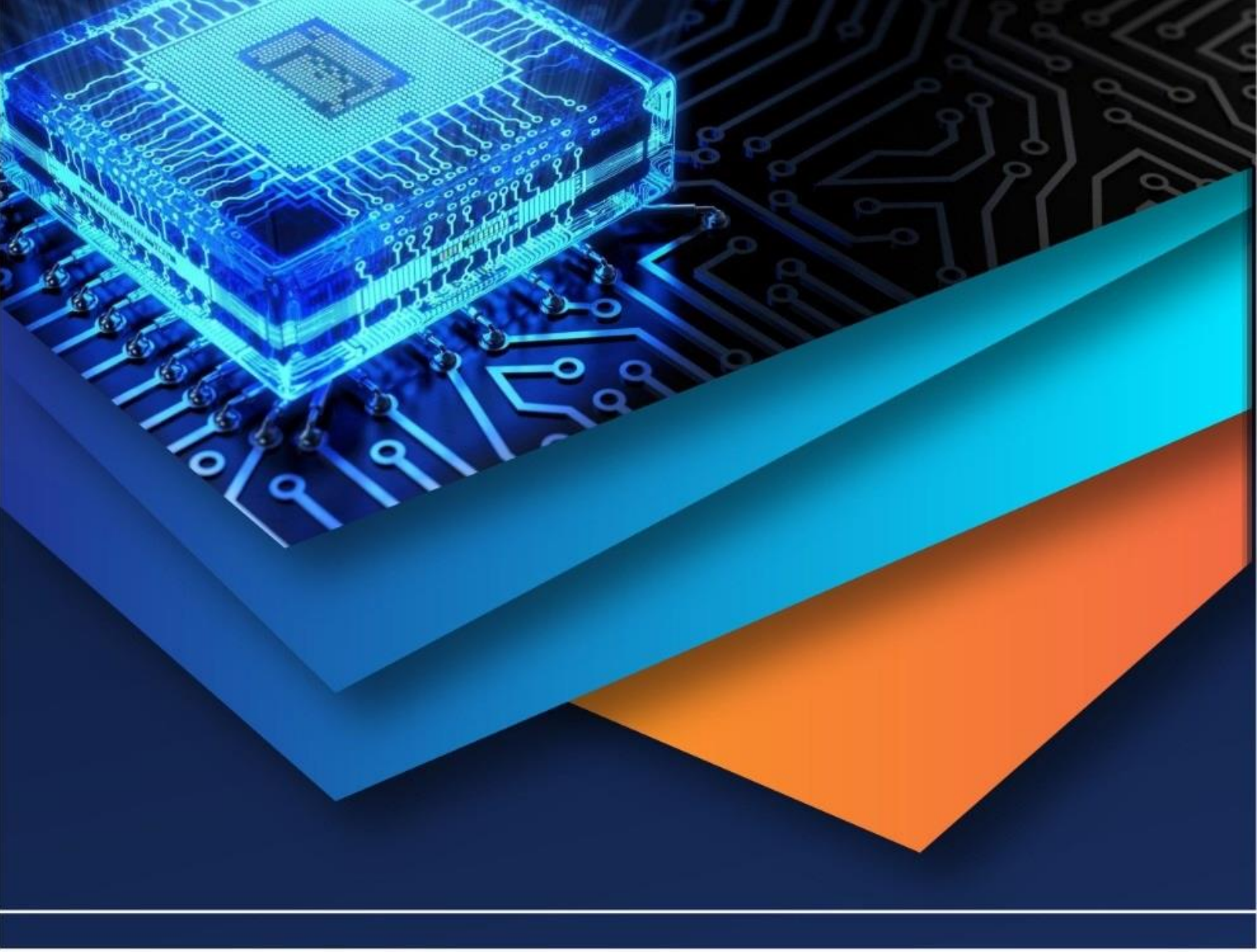

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