A Limited Review on the feasibility of using rice huskAsh in various application

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Abstract - *Modern construction material is obtained from non-renewable sources. Further, it requires the expenditure of a large amount of energy to obtain them. The potential of Rice Husk Ash to serve as a probable supplement is assessed.* ***RHA*** *(Rice Husk Ash) is more eco-friendly and is available in abundance in regions of India that grow paddy. It is discarded as agricultural waste and is also used to a limited extent in the production of Rice Bran Oil. Burnt Rice Husk Ash is Siliceous in nature and is also having refractory properties. The present study involves assessments of variety of Rice Husk Ash as a propitious construction material similar to Brick.*

Key Words**: rice husk ash, brick, adhesive, convectional brick.**

1. INTRODUCTION

To optimize the capital sector in a genuinely reasonable way, we use the agriculturally thrown away material called Rice Husk from the paddy milling industries. Further, it has no use on the environment but waste that has similar properties to construction material. The husk is the outermost layer of the seed of rice. The process begins with the burning of the Rice Husk which then becomes Rice Husk Ash (RHA), following the ash is ground using a proper ball milling setup or any other fine-grain crushing methods and sieved properly making sure it doesn't have any unwanted particulates. The seed of the Rice Husk is protected by the combination of lignin and silica which is present. In addition, the Rice Husk is used for burning purposes in the power plants which is used in very small proportions. We overcome the situation of excess burning of Rice Husk contributes Carbonization**,** rich in minerals and used as fertilizers The enormous waste Rice Husk is available in almost every rice-producing country, which contains organic C, cellulose, lignin, silica, and moisture. 20% in weight of the rice is Rice Husk. The Rice Husk is used in different ways in various locations of our country. In Kerala, it is used for brushing teeth in modern times as well as now, but more making this as a suitable oil for cooking and helps in all purposes which is good for health, this oil is called Rice Bran Oil.

2. LITERATURE REVIEW

Production of rice husk ash

- Rice Husk is a plentiful material available throughout all the rice-producing nations. A rice plant is converted into 78% Rice, 28% Rice Husk and 2% excess waste. RHA includes Cellulose in 50%, Lignin in 30% and 20%Silica. Following the burning process only quarter of the husk will be converted to ash.

CLAY BRICK

These are the first made ever brick which is in very best and economical form introduced by humanity for construction which stands in good strength, last, and a very tough material which could bear any climatic circumstances and much more. The bricks are made from the combination of clay and water alone. Clay bricks are hardened by oven from industries and from solar(sunlight). But due to several factors the continuation of production didn't sustain mainly because of lack of resources and materials. Meanwhile this generations manufacturing of bricks leads to pollution as wellas very poor longevity of bricks leads to failure of construction

3. Chemical and physical property of rice husk ash

COMPOSITIONS	CEMENT	CBP
SiO2	38.06%	41.47%
Al2O3	8.88%	39.05%
CaO	40.92%	0.63%
Fe2O3	2.83%	12.73%
SO3	2.33%	1.59%
MgO	1.59%	-
Na2O	1.75%	-
K2O	1.62%	2.81%
TiO2	-	1.03%
CuO	-	0.70%
Density	2688 kg/m3	2660 kg/m3
Blaine Surface Area	4688 m2/kg	6485 kg

4. Additive used in manufacturing of brick

- Generally additives are used to enhance the properties of clay mass such as , surface characteristics, fire behavior, anddryness of the mass.
- Some of the additives used here implies a protection towards the farmland and consumption of water resources.
- Here it is made sure that the additives used have particular physical and chemical properties which will not cause anadverse effect in performance and characteristics of the brick for a period.

Following are additive used for green brick

- Internal Fuel - The use of internal fuel enhances the quality of the brick, in certain cases burning in eco-friendly andcost-effective manner.
- Anti-shrinkage material – Such materials are used to avoid deformation like cracks and pores which will generateflexible soils for the making of bricks.
- Structure opening material – In the conditions of low humidity, high temperature a structure receiving material is usedin making of the green brick to avoid deformation. Such materials are rice husk, saw dust and mustard dust.

5. Mechanical property of RHA brick as replacement for clay brick

PLANT	PART OF PLANT	ASH (in %)	SILICA (in %)
Sorghum	Leaf sheath epidermis	12.55	88.70
Wheat	Leaf sheath	10.48	90.56
Corn	Leaf blade	12.15	64.20
Bamboo	Nodes (inner portions)	1.49	57.40
Bagasse	-	14.71	73.00
Latane	Leaf and stem	11.24	23.28
Sunflower	Leaf and stem	11.53	25.32
Rice Husk	-	22.15	93.00
Rice Straw	-	14.65	82.00
Breadfruit Tree	Stem	8.64	81.80

- At the time of plant growth, they use different elements from the soil and adds it to their structure. Not just the long- lived trees silicates are present in the plants which are grown yearly. Rice, wheat, and sugar cane are some of the examples for having high silica contents in their plants.

- The above table represents the amount of silicate present in different plants.

6. METHODOLOGY

Sample preparation– The case refers here gathered Rice Husk from the north-eastern part of Malaysia and burned using furnace at a minimal temperature to understand the best burning rate and burning period simultaneously. From the start, the temperature has been maintained exactly around 50 Degree Centigrade per hour. Then according to the results smoldering rice husk ash were produced under controlled settings below 700 Degree Centigrade which is amorphous ash and meantime the temperature above 800 Degree Centigrade produced crystalline ash. The ash obtained is properly heaped and is kept for cooling for the settlement for about 24Hrs(1day). Then the sieving procedure is carried out at a normal size of 75nm, and the collected ashes were in green/white in color. The four basic phases of making a brick are preparation of clay, molding bricks, drying of bricks and at last the burning of bricks

Water absorption test

SAMPLE	(IT) IMMERSION TIME (in min)30	IT60	IT90	IT 120
1	1.43	2.86	8.00	14.86
2	1.45	2.91	4.94	15.70
3	1.47	3.53	5.00	16.18
4	1.50	4.49	6.59	18.56
5	1.55	6.21	9.32	20.81

When Rice Husk Ash is added to the mixture, following every half an hour the water absorption rate increases. From the results obtained initial water absorption rate is 14.80%. Considering each of the samples, there was an increase by 5% of RHA. The addition of 5% of RHA made water absorption rate increase to 15.94%. It is because of the clay's plastic limit the water absorbed is more. Continued with addition of 20% of RHA, there has been an absorbance value recorded as 20.74%.

Compressive strength for RHA brick

SAMPLE	**1**	**2**	**3**	**4**	**4**
Thickness(mm)	68.00	68.00	68.00	68.00	68.00
Width(mm)	112.00	112.00	112.00	112.00	112.00
Compressive Strength at MaxLoad (MPa)	8.34560	7.48650	6.80851	6.39512	5.56391
Time of Rupture(mins)	5.60	4.80	4.50	4.20	3.55

The table above describes samples with different mixtures characterized with strength properties. For the samples with no mixture of RHA resulted that compression rate was up at 0 and 10% as replacement of RHA, even then replacement of 15-20% shows the strength decreased with control brick. Compressive strength obtained is 7.5 MPa at 5% increase in RHA, 6.8 MPa at 15% increase of RHA and 5.6MPa at 20%. From the above results which came to conclude increasing the proportions of Rice Husk Ash eventually reduces the compressive strength. Noted the strength decreased by the addition of RHA from 20% and compressive strength produced was below 5MPa. The clay content produces the binding to be strong, so at lower amount of RHA which leads to cracks and failures. Because the mass drop occurred due to inclusion of RHA, so does the failure of substructure occurs and the weight which falls on the land.

7. CONCLUSION

The use of Rice Husk Ash (RHA) as the lightweight in the mixture of clay has enhanced a lot of properties in the manufacturing of bricks. The results obtained from the test which has been well enough to prove that increase in the RHA leads to inappropriate destruction or deformation of bricks. The sufficient mixture of clay will mix-up in good quality proportionate and it will show a good performance brick. It is because of the weaker bonds which removes the toughness of the brick. Hence due to the refractory properties, it is safe from the fire. The findings for water absorption confirm to the criterion, and it may be utilized in lieu of clay.

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