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A comparision study on sandcrete blocks WTH partial replacement of fine aggregate using agro-waste

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1) *ABSTRACT:*

This paper presents the experimental study on sandcrete blocks prepared by partially replacing sand with saw dust, ash, rice husk ash. Influence on compressive strength, water absorption capacity and density characteristics are studied by partial replacement percentage of sand with sawdust, ash, rice husk ash. This project with of saw dust, ash, rice husk on solid block ratio of 1:3:8 cement: fine aggregate: coarse aggregate. The result of the various tests are sufficiently encouraging and author suggest to manufacture sandcrete block prepared in proportion of (80% sand+20% saw dust)since compressive strength for this ratio is found to be 4.5 N/MM2 under curing condition and provides optimum & desired result.It also resulted in reduction of heat transfer of sawdust concrete. In the designed concrete the sand was admixture with 20% of saw dust, ash, rice husk. The mechanical properties such as compressive strength were tested for conventional block.

Key words

Ash, Cement, Coarse aggregate, Fine aggregate(M- sand), Saw dust, Rice husk.

1. INTODUCTION

According to the environmentalist removal of sand from river may create environmental problems in now a day. Similarly sand is naturally occurring granular material composed of finely divided rock and minerals particles obtained from Perennial River. Huge consumption of sand in concrete structures also facing a acute shortage of sand. This may be reduced very little by using the agro waste with partial replacement of sand and achieving the higher strength than normal strength. The agro waste are like saw dust, ash, rice husk are partially replaced in our experiment in same ratio of 20%. The size of block is 300mm*150mm*200mm.

Saw dust is industrial waste material which is obtained from sawdust refuse dump from timber shade & saw mills, in various shapes and sizes. This main by product of saw mills, unless reprocessed in to particle board, are burned in a saw dust burner and are use to make heat for other milling operation, saw dust may collect in pipes and add harmful leachates in to local water systems, creating an environmental hazard. In India proper utilization of saw mill waste has not been given due attention. This saw dust there by constitutes an environmental nuisance as they form refuse heaps in the premises of saw mills and shades.

Rice husks are the hard protecting coverings of grains to protect rice at the ripening period. A large number of ashes is produced at the burning time which is used as a waste and pollute environment and it is also a great environment threat causing damage to land and stored/dumped area. On average 20% of the rice paddy is husk, giving an annual total production of 120 million tonnes. Because of its low density, it is very difficult to transfer from one place to another place for cleaning residential area.

Wood ash is generated as a by-product of combustion in wood fired power plants, paper mills, and wood burning factories. Since wood is a potential source of energy and environmentally benign friendly material, there will be increased usage of wood in energy production in the future.

As a result the quantity of ash generated will also increased and concurrently raising the issues of disposal. Incorporation of wood ash as a partial replacement of cement material in blended cement and concrete will be beneficial from both the environmental and economic point of views. This will give a solution to the waste management problem while minimizing the consumption of energy intensive hydraulic cement.

2. MATERIALPROPERTIES

MATERIAL USED

2.1 Cement

2.2 Coarse aggregate

2.3 Fine aggregate

2.4 Saw dust, ash, rice husk

2.5 Water

2.1. CEMENT

Locally available Ordinary Portland cement (OPC) of 53 grade has been used physical properties are mentioned table in below.

2.2. COARSE AGGREGATE

Locally available crushed stone aggregate are used which have the size of below 12mm used for the project. The properties of coarse aggregate are tabulated below Table (1) compared to demolished concrete aggregate.

2.3. FINE AGGREGATE

Manufactured sand is used as fine aggregate is passed through the sieve of 90 micron. IS 383 (1970) is followed for fine aggregate. The various properties of sand are tabulated in Table (2).

2.4. a) SAW DUST

Saw dust is industrial waste material which is obtained from sawdust refuse dump from timber shade & saw mills, in various shapes and sizes is irregular, This main by product of saw mills, unless reprocessed in to particle board, are burned in a saw dust burner and are use to make heat for other milling operation, saw dust may collect in pipes and add harmful leachates in to local water systems, creating an environmental hazard. In India proper utilization of saw mill waste has not been given due attention. This saw dust there by constitutes an environmental nuisance as they form refuse heaps in the premises of saw mills and shades.

2.4. b) RICE HUSK ASH

Rice hulls (or rice husks) are the hard protecting coverings of grains of rice. In addition to protecting rice during the growing season, rice hulls can be put to use as building material, fertilizer, insulation material, or fuel.

2.4 c) ASH

The mineral component of an organic substance, as assessed from the residue left after burning.

Table (1) PROPERTIES OF SAW DUST, ASH, RICE HUSK

USE	1/BAG YARD CONCRETE
Material	Saw dust, ash, rice husk
Tensile strength	130-140ksi
Modulus (young's)	750ksi
Melt point	435 F (225^{o} C)
Chemical resistance	Good
Alkali resistance	Excellent
Acids &salts Resistance	Good
Electrical conductivity	Low
Thermal conductivity	Low
Ultraviolent resistance	Excellent
Specific gravity	1.16
Fiber length	¾"
Form	Monofilament
Color	White

2.5 WATER

Water cement ratio (w/c) of 0.45 was used in the preparing of concrete and for this purpose portable water used for mixing and curing purpose.

3. EXPERIMENTALMETHODOLOGY

The c mix design was done in accordance IS: 2572(2005). A ratio of 1:3:8 (cement: fine aggregate: coarse aggregate) confers higher strength. By using this proportion value the volume of cement, fine aggregate, and coarse aggregate are estimated. The Ordinary Portland cement (OPC 53 GRADE), Good stone aggregate and sand of was used as coarse aggregate and fine aggregate. For this study of solid block (300×150×200mm) were casted by replacement of fine aggregate by Saw dust, ash, rice husk (20%) Then further tested are conducted such as workability then it will be casted.

4. CURING OF SOLID BLOCK

Casting of block after the completion of 24 hours mould will be removed then cured by using portable water. The specimen is fully immersed in portable water for specific age 7, 14, 28, days. After the completion of curing it will be tested.

5. TESTING OF SOLID BLOCK

Compressive strength test

6. RESULT AND DISCUSSION

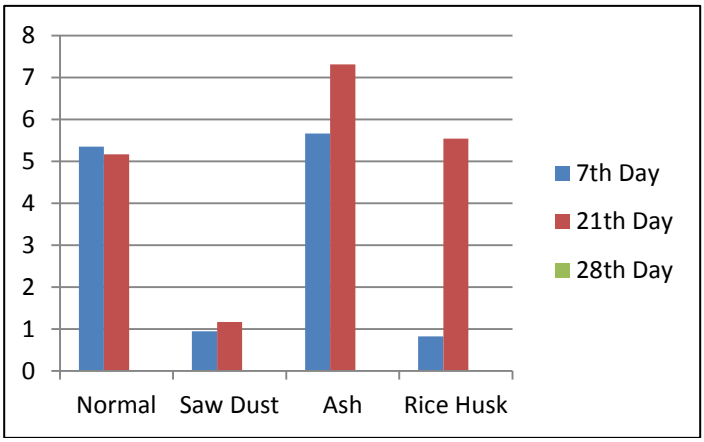
THE COMPRESSIVE STRENGTH

The compressive strength is determined by dividing the maximum of failure load of the specimen during the test by the cross sectional area of the specimen. The normal concrete and the percentage of replacements in special concrete are crushed at different (7, 21, 28 days) are show in table & graph details. Compressive strength = $\frac{P}{A}$(N/mm²)

Table2. Compressive strength test

S.NO	MATERIALS REPLACING OF 20%	Avg. compressive strength (N/mm²)		
		7 days	21 days	28 days
1	Normal	5.349	5.17	
2	Saw Dust	0.947	1.168	
3	Ash	5.664	7.31	
4	Rice Husk	0.827	5.54	

BAR CHART



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