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Study of Combined Effect of Rice Husk and Sugarcane Bagasse on Concrete by Replacement of Cement & Coarse Aggregates

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ABSTRACT

In this paper, the detailed experimental disquisition is done to study the effect of partial relief of cement by Sugarcane bagasse (SCB) and Rice cocoon (RH) in combined proportion started from 30 SCB and 0 RH blend together in concrete by relief of cement with the gradational increase of RH by2.5 and contemporaneously gradational drop of SCB by2.5. The last proportion was taken 15SCB and 15 RH. The tests on hardened concrete were destructive which includes a compressive test on the cell for size (150 x 150 x 150 mm) at and 28 days of curing as per IS 516 1959. The work presented in this paper reports the goods on the geste of concrete produced from cement with a combination of SCB and RH at different proportions on the mechanical parcels of concrete similar as compressive strength and split tensile strength. The disquisition reported that compressive strength increases by 30.15 compared with targeted strength and reduces by 8.73 compared with control concrete at 28 days. Partial relief of SCB and RH reduces the environmental goods, produces provident and eco-friendly concrete.

Keywords: Sugarcane bagasse, Rice husk, Amalgamation/Admixture, Compressive Strength.

1. INTRODUCTION

Concrete is well known is a miscellaneous blend of cement, water and summations. The admixtures may be added in concrete in order to enhance some of the properties desired specially. In its simplest form, concrete is a mixture of paste and aggregates. In its simplest form, concrete is a mixture of paste and aggregates. Various materials are added such as Sugarcane bagasse, rice husk, and admixture to obtain concrete of desired property the character of the concrete is determined by the quality of the paste. The key to achieving strong, durable concrete rests in the careful proportioning, mixing and compacting of the constituents. In the ancient period, construction work was substantially carried out with help of mudstone from the assiduity. Bagasse is a derivate created during the process of rooting juice from sugarcane. During this process, sugarcane is crushed and the juice is collected, leaving stalks behind that can be fluently turned into bagasse. Since bagasse is basically sugarcane fibre, it can also be used rather of other fibres like wood or straw as paper pulp in the paper product- making process and the rice cocoon, also called rice housing, is the coating on a seed or grain of rice. Over the past years, there has been an increasing number of papers on the use and utilization of industrial, agricultural and thermoelectric plants residue in the production of concrete. Different materials with pozzolanic properties such as rice husk, condensed silica fume, blast-furnace slag and rice sugarcane bagasse have played an important part in the production of high performance concrete. Currently to ameliorate the mechanical parcels of concrete Considerable researches are being taken worldwide to use natural waste and bye products as supplementary bonding accoutrements to ameliorate the parcels of cement concrete.

(1). Substantial energy and cost savings can result when industrial by-products are used as a partial replacement for the energy intensive Portland cement. Among the different existing residues and by products, the possibility of using rice husk in the production of structural concrete is very important for India. India is the second largest rice paddy cultivating country in the world. Both the technical advantages offered by structural concrete containing Sugarcane bagasse and the social benefits related to the decrease in number of problems of waste disposal in the environment have simulated the development of research into the potentialities of this material.

(2). A large quantum of agrarian waste was disposed of in utmost tropical countries especially in Asia for countries like India, Thailand, the Philippines and Malaysia. If the waste cannot be disposed of duly it'll lead to social and environmental problems. Recycling the inclined of material is one system of treating agrarian waste. The use of Rice cocoon material in the conformation of a compound material that can be used for construction. Rice cocoon is dangerous to the terrain if not disposed of duly.

(3) This exploration paper deals with the study of goods on the Teste of concrete produced from the partial relief of cement with a combination of SCB and RH at different proportions.

2. Materials and Methods

The work presented in this paper reports a disquisition on the test of concrete produced from the partial relief of cement with RH and SCB. The physical and chemical parcels of RH, SCB and OPC were first delved. Admixture proportioning was performed to produce high plasticity concrete with target strength of 32.1 Mpa (M20) for the control blend. The goods of RH and SCB on concrete parcels were studied through the mechanical parcels of concrete i.e. compressive strength, resolve tensile strength, and flexural strength. Cement the cement used was Ordinary Portland cement (43 Grade) with a specific gravity of 3.15. The original and final setting time of the cement was 23 min and 365 min, independently, conforming to I.S-8112-1989. Good quality river sand was used as a fine aggregate. The fineness modulus, specific gravity and dry density are 2.32, 2.68 and 1690 kg/m3. Coarse aggregate passing through 20mm and retained 10mm sieve was used. Its specific gravity and dry density was 2.7

and 1550 kg/m3. Rice cocoon Rice cocoon used was attained from Ellora Paper Plant located in Sanjay Grain Products Private Limited, Vidhan Sabha Road, Village Sakari, Raipur, and Chhattisgarh (492002) India. Rice cocoon is the dry external covering of rice grain, which is always removed during the milling of rice. It's of no direct nutritive value to man and in utmost manufactories; it's frequently discarded or allowed to rot down. In some areas, still, it may be collected and used as waste material or used in fire- timber. Sugarcane bagasse is a derivate created during the process of rooting juice from sugarcane. During this process, sugarcane is crushed and the juice is collected, leaving stalks behind that can be fluently turned into bagasse. Since bagasse is basically sugarcane fibre, it can also be used rather of other fibers like wood or straw as paper pulp in the paper product- making process.

2.1 Chemical Admixture

The main aim of the used amalgamation was to maintain the plasticity of concrete with constant w/ c by partial relief of cement combination of SCB and RH. Due to the high specific face SCB area of RH which would increase the water demand, the experimental work needs the addition of super plasticizers. The Super plasticizer was 1 to 1.5 by weight of cement of the binder content of concrete. This amalgamation benefits in adding the plasticity without adding the water/ cement rate perfecting the cohesiveness and thereby reducing isolation or bleeding. The experimental programme comprises tests on cement, RH, SCB, concrete with partial relief of cement with RH and SCB.

3.1 Rice husk: Rice husk was tested for different tests and test results were as follows 1. Normal Thickness = 17 2. Original and Final Setting time = 195 min. and 265 min. 3. Compressive Strength = 11 N/ mm2Specific gravity = 2.14 Page 1 of 2

3.2 Ordinary Portland cement: OPC 43 grade cement is used for this whole experimental study. Ordinary Portland cement of 43 grades was tested for different tests and physical test results on OPC were as follows 1. Normal thickness = 22 2. Original Setting time = 23 min. 3. Final Setting Time = 365 min. 4. Specific gravity = 3.15

3.3 Admixture Proportioning:

The blend proportion was done as per the IS 10262-1982. The target mean strength was 32.1 Mpa (M20) for the OPC control admixture, the total binder content was 435.45 kg/ m3, the fine total was taken 476kg/ m3 and coarse total was taken1242.62 kg/ m3. The water to binder rate was kept constant as 0.44, the Super plasticizer content was varied to maintain a depression for all fusions. The total mixing time was 5 twinkles; the samples were also cast and left for 24 hrs. Before remolding they were also placed in the curing tank until the day of testing Cement, beach, Sugarcane bagasse, Rice cocoon ash and fine and coarse total were duly mixed in rate1:1.5:3 by weight before water was added and was duly mixed to achieve homogenous material. Water immersion capacity and humidity content were taken into consideration and meetly abated from the water/ cement rate used for mixing reported the blending of rice husk (RH) in cement is recommended in utmost transnational structure canons now. Hence, cement was replaced in 30 with Rice cocoon and sugarcane bagasse and Cell used for casting. Contraction of concrete in three layers with 25 strokes of 16 mm rod was carried out for each sub caste. The concrete was left in the mould and allowed to sit for 24 hours before the cells were de moulded and placed in a curing tank. The concrete cells were cured in the tank for 7, 14 and 28 days for contraction test. Mix proportion for M20 grade concrete for tested material as follows

Table 1: Concrete mix proportions

MATERIAL	QUANTITY	PROPORTION
Cement	435.45 Kg/ m^3	1
Sand	476 Kg/ m^3	1.5
Coarse Aggregates	1242.62 Kg/ m^3	3
Water	191.6 Kg/ m^3	0.44
Slump	75-100 mm	------

3.1 Different Proportion of Cement, Rice Husk Ask and Sugarcane bagasse for testing:

In this experimentation, cement was partially replaced by combinations of Rice husk (RH) and Sugarcane bagasse (SCB). The test was started with control concrete of M20 grade. Then, replaced the 30 % cement with RH and SCB, by increasing the 2.5% of RH up to 15% and adding the corresponding percentage of Sugarcane bagasse.

The following table shows the percentage variations of cement, sugarcane bagasse and rice husk.

Table 2: Proportion of Cement, Rice Husk Ask and Sugarcane bagasse for testing

Sr. No	% of Cement	% of SCB	% of RH
1	100%	0%	0%
2	70% 70%	30% 27.5%	0% 2.5%
4	70% 70%	25% 22.5%	5% 7.5%
6	70%	20%	10%
7	70% 70%	17.5% 15%	12.5% 15%

4. Experimental Methodology

Tests on Fresh Concrete

Fresh concrete was tested using slump cone test to find the workability of control concrete and concrete of combination of SCB and RH with partial replacement of cement.

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Fresh concrete was tested using slump cone test to find the workability of control concrete and concrete of combination of SCB and RH with partial replacement of Cement.

Fig. 1. Workability of concrete using slump cone method

Figure 4.1 shows the relative goods of the addition of SCB and RH on the plasticity of concrete. It was observed that SCB increases the plasticity of concrete up to16.92 as compared to control concrete. Gradational increase of RH and gradational drop SCB shows a gradational drop in plasticity up to 29.23 as compared to compared concrete. Addition of SCB increases plasticity because it has a veritably low list property and the addition of RH decreases plasticity due to water-spongy property because it has a high specific face area.

Compressive Strength Test: For the compressive strength test, cell samples of confines 150 x 150 x 150 mm were cast for the M20 grade of concrete. The moulds were filled with different proportions of cement, Rice cocoon and Sugarcane bagasse. The vibration was given to the moulds using a table vibrator. The top face of the instance was leveled and finished. After 24 hours the Samples were demoulded and were transferred to a curing tank wherein they were allowed to cure for and 28 days. After 7, 14 and 28 days of curing, these cells were tested on a digital contraction testing machine as per I.S. 516 1959. The Specimen cargo was noted. In each order, three cells were tested and their average value is reported. The compressive strength was calculated as follows Compressive strength (MPa) = Specimen cargo/ cross sectional area.

Fig 2: Testing of specimen under compression

4.2 Experimental Results and conclusion

Results of M20 grade of OPC concrete filled with various proportions of Rice husk and Sugarcane bagasse for compressive strength are shown in the table below.

Results & conclusion of Compressive Strength

TABLE 3: Results of compressive strength with different % of SCB & RH

SN	MIX PROPORTION			COMPRESSIVE STRENGTH AFTER NO OF DAYS OF CURING IN N/MM^2		
	SCB BY % of cement		RH BY % of cement	7 DAYS	14 DAYS	28 DAYS
1		CONTROL MIX		35.56	39.11	45.78
2	30		0	32.89	33.33	39.11
3	27.5		2.5	31.11	31.33	35.11
4	25		5	31.56	32.44	40.44
5	22.5		7.5	22.67	34.67	41.78

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