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TRIPLE BLENDING OF CEMENT CONCRETE WITH FLY ASH, RICE HUSK ASH, SUGARCANE BAGASSE ASH

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ABSTRACT

Bagasse ash (BA), the residue obtained after the burning of sugarcane bagasse as a fuel, has nearly pozzolanic properties with the potential to use as a supplementary cementations material (SCM). Use of Bagasse ash (BA) as a mineral admixture needs to be established, especially in India, where sugarcane cultivation is widespread, to reduce land required for its disposal and cement consumption in construction industry. Hence, to encourage commercial use of BA with minimum processing, an evaluation of the physical, chemical and morphological characteristics of a locally available BA and its effect, as SCM on properties of structural concrete was taken up. This research work describes the feasibility of using the Fly Ash (FA) Rice Husk Ash (RHA) and Sugarcane Biogases Ash (SCBA) waste in concrete production as a partial replacement of cement. Present work deals with the effect on strength and mechanical properties of concrete using triple blending of cement concrete using FA, RHA and SCBA instead of cement. The cement has been replaced by rice husk ash, accordingly in the range with 0%, 10%, 20% and 30% by weight. Concrete mixture of M20 and M25 and M30, were produced, tested and compared in terms of compressive strengths with the Conventional concrete. These tests were carried out to evaluate the mechanical properties for the test results of7, 14, 28, 56 and 90 days for Compressive strengths and Tensile & Flexural Strengths at 28 days. The durability aspect of the samples for Acid attack, alkaline attack and Sulphate attack was also tested. The result indicates that the FA, RHA and SCBA improve the Compressive Strength and durability of triple blended concrete.

Keywords: compressive strength, triple blending, M20, M25, M30, Durability, FA, RHA, SCBA etc.

I. INTRODUCTION

Concrete making materials come from the earth's crust. Thus, it depletes the natural resources every year creating ecological strains. On the other hand, human activities on earth produce solid wastes such as industrial wastes, agricultural wastes, and wastes from rural and urban societies in considerable quantities of over 2500 million tons per year. Among the solid wastes, the most prominent materials are fly ash, blast furnace slag, rice husk (converted into ash), silica fume and materials from construction demolition. Substantial energy and cost savings can possible when industrial by-products are used as a partial replacement for the energy-intensive Portland cement. Disposal of large quantities byproduct generated from industries can possible environmental-friendly way otherwise this material pollute land, water, and air. By reducing the use of Portland cement, CO2 emission may be controlled. Due to growing environmental concerns and the need to conserve energy and resources, efforts have been made to utilize the waste material of industrial and agro products in the construction industry as a pozzolanic mineral admixture to replace ordinary Portland cement.

The increasing scarcity of raw material these days has lead to the exploration of replacement of ingredients of concrete with newer materials. Large

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quantities of waste materials and by-products are generated from manufacturing processes, service industries and municipal solid wastes, etc. Also disposing of industrial waste these days is a major challenge as they pose serious environmental threats to all the countries across the world.

In civil engineering projects, now-a-days, the construction of buildings, industries, residential complexes etc. are more essential and building these entail high cost. For this, no. of techniques have been tried to reduce the cost of construction in all aspects. Economically, it is very useful to replace conventional material with waste material to reduce the construction cost. Replacing of cement, coarse aggregates or fine aggregates with other material makes construction economical.

Fly ash: Fly ash is a byproduct obtained from pulverized coal burnt in electric generation power plants. It is in the form of fine powder which has some sort of pozzolanic properties due to presence of luminous and siliceous materials that behaves like cement in the presence of water. Fly ash is an economical material and used as a partial replacement for Portland cement in concrete. Usage of Fly ash improves strength, segregation, and ease of pumping concrete.

Table-1.1 Test Results of FA

S.No	Parameters	FA
1	Sp. Gravity	2.3
2	% passing 45micron sieve	3.9
3	Fineness, m2/kg	461

***RICE HUSK ASH*:** Rice husk is a farming buildup which represents 20% of the 649.7 million tons of rice delivered yearly around the world. The consumed side-effect buildup of Rice Husk in the processing plants makes a risk environment and contaminates the natural air.

Table-1.2 Test Results of RHA

S.No	Parameters	RHA
1	Sp. Gravity	2.0
2	% passing 45micron sieve	2.5
3	Fineness in cm2/gm	18700
4	Moisture content % by mass	1.37

SUGARCANE BAGASSE ASH: Sugarcane Bagasse, a liberally created horticultural waste, is the deposit of sugarcane that is obtained after extraction of juice. The sugarcane Bagasse comprises of around 45-half of cellulose, 26% of hemicelluloses and 23% of lignin alongside hints of different mixes.

Table-1.3 Test Results of SCBA

S. No	Parameters	SCBA
1	Sp.Gravity	2.2
2	% passing 75micron, sieve	3.6
3	Moisture content at 250+, - , 27 Deg C	1.8

SUGARCANE BAGASSE ASH (SCBA)

Biogases ash produced from the various sugarcane industries is not only hazardous in causing air pollution but also creates troubles in land disposal. Mostly the industrial and agricultural wastes are dumped in the nearby land and this affects the natural fertility of the soil. So to minimize the CO2 emission, the partial replacement of cement by using bagasse ash in the concrete production becomes most essential in the modern days and this also plays a positive role in reducing the cost of concrete to some extent by Fairbairn et al. (2010).

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Ash Of Sugarcane Bagasse

Table1 1.4 Chemical Composition Of Scba

SL No	Component	Mass %
1	Silica (SiO_2)	66.89
2	Alumina (Al_2O_3)	29.18
	Ferric Oxide (Fe_2O_3)	
3	Calcium Oxide (CaO)	1.92
4	Magnesium Oxide (MgO)	0.83
5	Sulphur Tri Oxide (SO_3)	0.56
6	Loss of Ignition	0.72
7	Chloride	-

SCOPE

A new kind of pozzolanic from agricultural wastes as such Sugarcane Bagasse Ash and Rice Husk Ash is made. The production of bricks by using SCBA and RHA ash having some cement properties is done. A number of 4 bricks are to be cast for each replacement levels (0%, 5%, 10%, 15%) with combination of SCBA and RHA ash is done . The beams are to be cured and crushed at 7, 28 days. The results are compared with the conventional bar chart and graphs.

OBJECTIVE

Depending on the suitability of Bagasse ash, it can be used as resource material in the following applications:

➢ Silica source as it contains high amount of silica in it.

➢ Brick production as BA used as additive in making bricks that have high compressive strength and low water absorption bricks.

➢ Farm fertilizer as it contains traces of potassium and phosphorus compounds etc.

➢ To compare the tests results of fly ash, rice husk ash, and sugarcane Bagasse ash with the normal concrete.

➢ To find the optimum usage of the percentage replacement of the fly ash, rice husk ash, baggage ash to the concrete.

➢ To find the properties of clay including initial setting time, final setting time and normal consistency and specific gravity.

➢ To find the mechanical and physical properties of SCBA and RHA ash including sieve analysis, water absorption and specific gravity.

PURPOSE OF THE STUDY

The main purpose of this study is to determine the strength and properties of concrete with partial replacement of cement by using bagasse ash as cement substitute at replacement levels of 0%, 10%, 20% and 30% by weight of cement with and without addition of steel fiber. This also causes improvement in strength and properties of concrete and reduces environmental pollution.

II. LITERATURE REVIEW

Rice husk ash, rice straw ash, peanut shell ash have been individually proved to be an effective partial replacement to cement. They all have different chemical compositions individually. Their combination with cement achieved higher compressive strength at early stages used individually.

TONY SUMAN KANTH D[1], K U MUTHU[2]. The analysts are contemplating distinctive agro-based waste materials in the present days. The significant amounts of waste created from agrarian sources incorporate sugarcane bagasse, rice husk, and coconut husk. In the present situation, the most difficult issue of mankind on this planet is the earth tainting which causes ecological cumbersomeness. There are various reasons which convey normal pollution. In the improvement business the essential material/settling used for the production of value in concrete will be bond. There will be package of release of carbon dioxide in the midst of the age of

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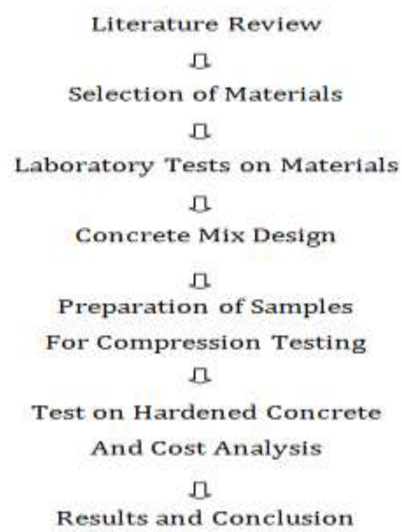
bond. The crucial tried and true industry for the spread of carbon dioxide is the bond business, because the age of one ton of Portland concrete releases plus or minus one ton of CO2 into the earth There are two one of a kind wellsprings of carbon dioxide release in the midst of the production of bond, the greatest source to work turning oven is the Combustion of fossils. The main problem world confronting today is the earth sullying. In development field principally by bond generation which releases poisons realize condition tainting. Utilization of modern waste we can diminish the pollution affect.

C BATVEERA[1], P. NTMJTYONGLKUL[2]. This examination is directed to grow new sorts of pozzolanic materials from other horticultural squanders separated from rice husk and rice straw. The examination researched the utilization of coconut husk, Corn cob and nut shell fiery remains as pozzolanic. The properties of CHA, CCA and PSA to be specific particular gravity, fineness, compound synthesis and the quality action record with Portland bond were resolved.

MANGESH V MADURWAR, SACHIN A MANDAVGANE, PH.D. ET AL (2014)

SBA-QD-L bricks are up to 40% lighter than the conventional locally available bricks and hence support in lightweight construction projects with larger design loads. Observations during the tests showed that SBA-QD-L brick composition with SBA (50% by weight), quarry dust (30% by weight), and lime (20% by weight) exhibits the water absorption of 19.70% (less than 20%) and the compressive strength of 6.59 MPa, which is almost double the conventional commercially available clay bricks (3.5 MPa) and satisfies the requirements in IS: 2185 (Part-I) (BIS 1979) and SP: 21 (BIS 1983) for a building material

III. METHODOLOGY



IV COLLECTION OF MATERIALS

MATERIALS

➢ In this project cement used was Ordinary Portland cement of ultratech make conforming to IS 8112:1989.

➢ Fine aggregate corresponding to zone-III and procured locally was used for this research study.

➢ Coarse aggregates used were 20mm and 10mm and was mixed in the proportion of 2.5:1 to make it well graded as per the requirements of mix design as per BIS: 10262.

CEMENT: Bond is a folio, a substance utilized as a part of development that sets and solidifies and can tie different materials together. The customary Portland bond of 53 Grade is utilized as a part of agreement with IS: 12269-1987. Properties of this concrete were tried and recorded here. Fineness of concrete = 5%, Specific gravity if bond = 3.15, Standard Consistency of bond = 33% Initial setting time = 30 minutes, Final setting time = Not over 10 hours.

AGGREGATES

The aggregates are the essential constituents of concrete. The aggregates occupy almost 85 per cent of the volume of concrete. So, their effect on various properties such as compressive strength, shrinkage, creep etc. is undoubtedly considerable. Without the study of

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aggregates in depth and range, the study of the concrete is incomplete.

COARSE AGGREGATES:

Smashed stone total of 20mm size is brought from close-by quarry. Totals of size in excess of 20mm size are isolated by sieving. Tests are conveyed keeping in mind the end goal to discover the Specific gravity = 2.9 Fineness modulus = 7.5.

FINE AGGREGATES:

Locally available fresh sand, free from organic matter is used. The result of sieve analysis confirms it to Zone-II (according to IS: 383-1970).The tests conducted and results plotted below. Specific gravity = 2.3. Fineness modulus = 3.06.

FLY ASH:

Fly fiery remains are a fine powder which is a side-effect from consuming pummeled coal in electric age control plants. At the point when blended with lime and water it shapes a compound like Portland concrete.

RICE HUSK ASH:

Rice husk fiery remains (RHA) are the cinder which is acquired from consuming the secured external front of Rice called husk. It comprises of non-crystalline silicon dioxide (SiO_2) with high particular surface zone and high pozzolanic reactivity.

SUGAR CANE BAGASSE ASH:

The sugarcane bagasse comprises of around half of cellulose, 25% of hemicelluloses and 25% of lignin. Every ton of sugarcane produces around 26% of bagasse (at a dampness substance of half) and 0.62% of lingering fiery debris. Despite being a material of hard corruption and that presents couple of supplements, the fiery debris is utilized on the ranches as manure in the sugarcane harvests.

Sugarcane bagasse ash

WATER:

By and large consumable water ought to be utilized. This is to guarantee that the water is sensible free from such polluting influences as suspended solids, natural issue and disintegrated salts, which may antagonistically influence the properties of the solid, particularly the setting, solidifying, quality, strength, pit esteem, and so forth.

Mix Design

Concrete of grade M25 was designed as per BIS: 10262-2009 and design proportion achieved has been highlighted under table-2.1.

Table-2.1 Test Results of Concrete

Material	Cement	Fine aggregate	Coarse aggregate
Mix proportion	1	1.74	3.36
Specific gravity	3.15	2.63	2.77

Methods of concrete mix design

The process of selecting suitable ingredients of concrete and determining their relative amounts with the objective of producing a concrete of the required strength, durability and workability as economical as possible, is termed the concrete mix design. In present study mix design was done by BIS mix design method which is based on BIS: 10262- 2009.

The basic steps involved in the concrete mix design can be summarized as follows:

i) Based on the level of quality control the target mean strength is estimated from the specified characteristic strength.

ii) The water cement ratio is selected for the mean target strength and checked for the requirements of durability.

iii) The water content for the required workability is determined

iv) The cement content can be determined from the water cement ratio and water content obtained in step (ii) and (iii) respectively and is checked for the water requirements.

v) The relative proportion of fine and coarse aggregates is selected from the characteristic of coarse and fine aggregates.

vi) The trial mix proportions are determined.

vii) The trial mixes are tested for verifying the compressive strength and suitable adjustments are made to arrive at the final mix composition.

Specific gravity

The specific gravity is a dimensionless defined as the ratio of the density (mass of a unit volume) of a substance to the density (mass of the same unit volume) of a reference substance. The reference substance is water for liquids or air for gases. The specific gravity of the solid is the ratio of its weight in air to the difference between its weight in air and its weight after immersed in water.

Workability

Workability describes the state of fresh concrete. Workability was checked just before placing of the concrete by measuring its slump value. The size of the slump cone used was 20-cm diameter base, 10 cm diameter top and 30 cm height as per IS:456-2000.

Casting

Three sets of cube of size 15X15X15 cm, three sets of Beam of size 10X10X50 cm and three sets of cylinder of size 10 cm diameter and 20 cm height were cast using proportion of 1 : 1.74 : 3.36, M25 grade of concrete as per IS:456-2000.

Curing

Curing was done by using potable tap water. The compressive cubes, flexural beams and split tensile cylinders were cured for testing at different ages of 7 and 28 days as per IS: 456-2000.

V. EXPERIMENTAL WORK

In this experiment our target was to determine the fineness effects of using SCBA, RHA and FA as a partial replacement of Cement in concrete passing through IS sieve sets of 150, 300 and 600 microns. A total of 60 Concrete samples of M 25 were made and cured. Based upon the quantities of an ingredient of the mixes, the quantities of SCBA, RHA and FA 0% and 15% replacement by weight were estimated. The ingredients of concrete were thoroughly mixed in mixer machine uniformly till thorough consistency was achieved. Before casting, machine oil was applied on the inner surfaces of the cast iron mould. Concrete was then poured into the moulds and compacted thoroughly using table vibrator. The top surface was finished by means of a trowel. The specimens were removed from the mould after 24 hours and then cured in water for a period of 7 and 28 days. The specimens were taken out from the curing tank just prior to the test. The tests for compressive strength were conducted using compression testing machine was used. These tests were conducted as per the relevant Indian Standard specifications. Workability-The workability was measured using slump cone apparatus for replacement of cement with different ashes in concrete.

1). Slump Test:

In present study, workability was found by slump test. The test is an empirical test that measures the workability of fresh concrete. The test is popular due to the simplicity of apparatus used and simple procedure. The apparatus consist of slump cone, scale for measurement and temping rod.

The basic steps involved in the slump test can be summarized as follows:

1). The mould for the slump test is a frustum of a cone, 300 mm (12 in) of height. The base is 200 mm (8 in) in diameter and it has a smaller opening at the top of 100 mm (4 in).

2). The base is placed on a smooth surface and the container is filled with concrete, fly ash, Rice Husk Ash, Sugarcane Bagasse Ash in three layers, whose workability is to be tested.

3). Each layer is temped 25 times with a standard 16 mm (5/8 in) diameter steel rod, rounded at the end as shown in Figure (a).

(a)

(b)

(c)

(d)

4). When the mold is completely filled with concrete, Fly Ash, Rice Husk Ash, Sugarcane Bagasse Ash the top surface is struck off (leveled with mould top opening) by means of rolling motion of the trowel as shown in Figure (b).

5). The mould must be firmly held against its base during the entire operation so that it could not move due to the pouring of concrete and this can be done by means of handles or foot - rests brazed to the mould.

6). Immediately after filling is completed and the concrete, Fly Ash, Sugarcane Bagasse is leveled, the cone is slowly and carefully lifted vertically, an unsupported concrete will now slump as shown in Figure (c).

7). The decrease in the height of the center of the slumped concrete is called slump.

8). The slump is measured by placing the scale just besides the slump concrete as shown in Figure (d).

The decrease in height of concrete to that of mould is noted with scale

2) COMPRESSIVE STRENGTH OF CONCRETE

The quantities of cement, coarse aggregates (20 mm and 10 mm), fine aggregates, bagasse ash, Fly ash, Rice Husk Ash, and water for each batch were weighed separately. Firstly, the cement and bagasse ash were mixed dry then after fine aggregates and Rice Husk Ash, Fly ash were mixed uniformly in dry form. The coarse aggregates were mixed to get uniform distribution throughout the batch. Water was added to the mix and then mixed thoroughly for 3 to 4 minutes in mechanical mixer.

(a)

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(b)

Casting of cube specimens

Compressive strength of concrete at elevated temperature

Compressive strength of concrete was also determined at different temperature ranges. The cubes of 10 cm X 10 cm X 10 cm in size were used for this purpose. All the cubes were cured for 28 days prior to heating. The hardened concrete cubes were then transferred to the muffle furnace as shown in Figure (a). They were heated from room temperature to 150°C, 300°C and 600°C for two and half hour to achieve a uniform temperature distribution across them as shown in Figure (b). After that furnace was turned off and samples were cooled to room temperature. All cooled specimens subjected to compression test under UTM.

(a)

(b)

Heating of cube specimens into muffle furnace

3) SPLIT TENSILE STRENGTH TEST PROCEDURE

This property for concrete relates to its tension strength. This is obtained by performing split tensile test on concrete specimen. The concrete specimen in this test is taken as cylindrical in shape. Tensile strength for concrete specimen is defined as the tensile stresses developed due to application of the compressive load at which the concrete specimen may crack.

$$T_{sp} = \frac{2P}{\pi DL}$$

Split tensile strength for concrete is given as below.

$$T_{sp} = 0.7\sqrt{f_{ck}}$$

Concrete is a material, which is weak in tension. So it becomes very important to know tensile strength for concrete used in designing structures. Finding tensile strength for concrete is done by using two methods:

• Direct methods
• Indirect methods

Split test is an indirect method for determining tensile strength for concrete.

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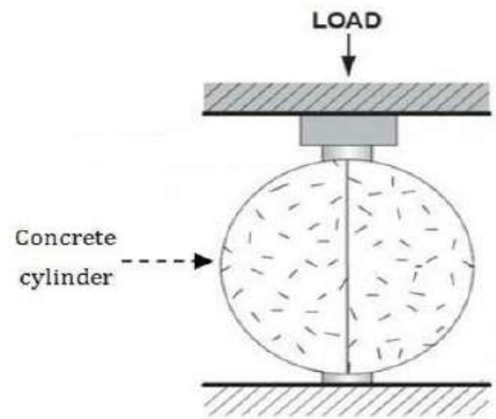
Splitting Tensile Strength of Concrete

One of the important properties of concrete is “tensile strength” as structural loads make concrete vulnerable to tensile cracking. Tensile strength of concrete is much lower than its compressive strength (that’s why steel is used to carry the tension forces). It has been estimated that tensile strength of concrete equals roughly about 10% of compressive strength. To determine the tensile strength, indirect methods are applied due to the difficulty of the direct method. Noting that the values obtained of these methods are higher than those got from the uniaxial tensile test. These indirect techniques are: 1- split cylinder test and 2- flexural test. In this article, the Splitting Tensile Strength test is discussed.

Splitting Tensile Strength Test

Equipment

Compression testing machine, two packing strips of plywood 30 cm long and 12 mm wide, moulds, tamping bar (steel bar of 16 mm diameter, 60 cm long), trowel, glass or metal plate



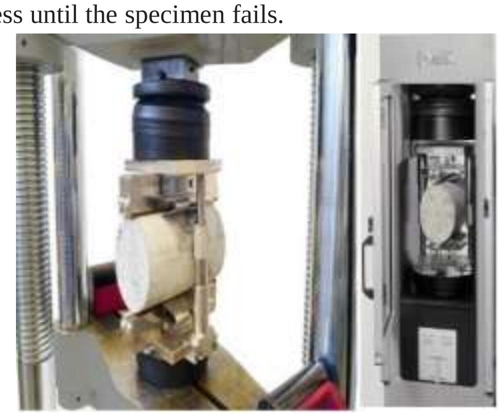
Splitting Tensile Strength Test

Apparatus for Splitting Tensile Test of Concrete

Testing Machine

Testing machine shall meet the following requirements:

- Firstly, it shall conform to the requirements of Test Method C 39/C 39M.
- Secondly, testing machine should be able to apply the load continuously and without shock.
- Thirdly, it should be able to apply loads at a constant rate within the range 0.7 to 1.4 MPa/min (1.2 to 2.4 MPa/min based on IS 5816 1999) splitting tensile stress until the specimen fails.



Split cylinder testing machine

Curing of Specimen

- Casted specimen should be stored in a place at a temperature of 27° +/- 2°C for 24 +/- 0.5 hrs from the time addition of water to the dry ingredients.

- After that, the specimen should be marked and removed from the mould and immediately submerged in clean fresh water or saturated lime solution and kept there until taken out just prior to the test.

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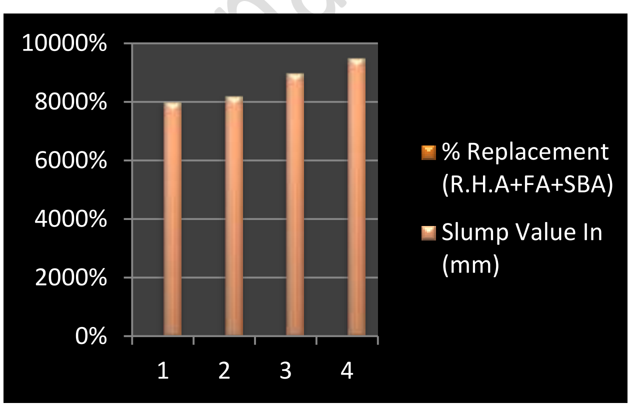
- The water or solution in witch the specimens are kept should be renewed every seven days and should be maintained at a temperature of 27° +/- 2°c.
- For design purpose, the specimen cured for 28 days.
- At last, for each reading, three specimens shall be casted and tested. Then, the average tensile strength will be taken.

Curing concrete specimen

VI RESULTS AND DISCUSSIONS

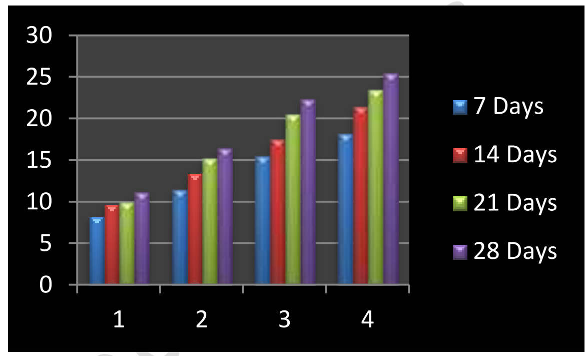
1. M20 GRADE OF CONCRETE RESULTS SLUMP CONE TEST

M20 Results		
S.No.	% Replacement (R.H.A+FA+SBA)	Slump Value In (mm)
1	0%	80
2	10%	82
3	20%	90
4	30%	95



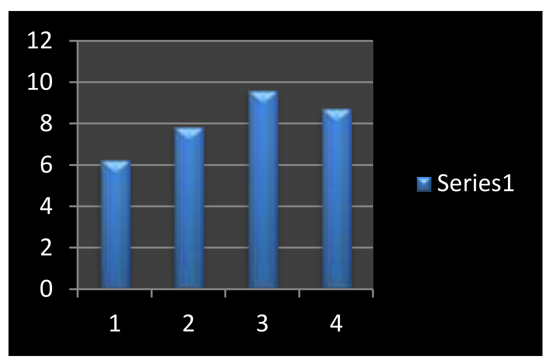
2). Compressive Strength Test

S.No.	Type of mix(R.H.A+FA+SBA)	M20 Compressive Strength in (N/mm²)			
		7 Days	14 Days	21 Days	28 Days
1	0%	8.25	11.5	15.52	18.23
2	10%	9.72	13.5	17.56	21.52
3	20%	10	15.25	20.59	23.56
4	30%	11.2	16.5	22.37	25.5



3). Split Tensile Strength

S.No.	Type of Mix (R.H.A+FA+SBA)	M20 Split Tensile Strength in (N/MM²)
		28 Days
1	0%	6.24
2	10%	7.85
3	20%	9.62
4	30%	8.75



VII. CONCLUSIONS

Below is the list of Observations & Conclusions of the current experimental project undertaken, based on the Materials chosen, Methodology adopted, Procedures followed and Test results obtained: 1. Based on the present experimental results, the physical and chemical composition of the Bagasse

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Ash and Rice Husk Ash is essentially responsible for the later hydration process. Their fineness and specific surface area coverage are highly suitable for the workability of concrete which was more than expected

2. The Slump value is decreasing with grade of concrete due to mineral admixtures which absorb the water content.

3. The compaction Factor is decreasing with increasing in the replacement of cement quantity.

4. Positive results were obtained by subjecting these recommended concrete mixes to additional compressive strength tests, flexural strength tests, tensile strength tests, and durability tests.

5. There is a significant increase in the compressive strength, Split Tensile strength and Flexural Strengths due to the addition of mineral admixtures up to 20% and thereafter it is decreasing.

6. Bagasse Ash and Rice Husk Ash, contributes to useful disposal of these waste materials, and reduces consumption of cement, thus lowering adverse effects on the environment.

7. The Concrete thus obtained by partial replacement of cement with natural admixtures are durable in long term use.

8. At 20 % to 30 % replacement there observed a change in the decreased rate of strengths and in Flexural Strengths and compressive strengths than the rate of change at 10 % to 20%.

9. The Compressive Strength and Durability values are increasing with the age of concrete specimen which is observed in graphs from 56 days to 90 days values.

FUTURE SCOPE OF STUDY

- Increasing the quantity of the replacement of cement with more proportion of Sugarcane Bagasse ash and testing for the better reducing of cement quantity.
- The design mixes with increasing in the quantity of Sugarcane Bagasse ash alone up to 20%, 30% keeping it constant and changing the Rice husk proportionately varying in higher grades M35 and M40 Design mixes.
- With this project, the optimum proportion of mineral admixtures is favorable for strength and Durability at 20% (FA+RHA+SBA). Therefore there can be a future scope to find out the exact proportion in between 20% and 30% at which the strength and durability values are decreasing in various grades of design mixes.
- As fly ash has become the most well popular admixture, Rice Husk Ash and Bagasse Ash are also need to be popularized with its effective usage in the concrete industries.
- More designated tests can be done for the accurate results in Compressive Strength, Flexural Strength and Durability properties.
- More admixtures can be selected along with bagasse ash and hence understanding the test results suitability for our requirements.
- Combination of these mineral admixtures along with other type of admixtures due to their properties abundant availability and easy processing as a constituent of concrete, experiments can be made with higher grade of concretes such as M35 & M40.
- This project with Triple blended concreted can be increased with other mixtures under controlled methods and following IS standards, calling as tertiary blended and poly blended concretes as an experimental projects.
- For smaller constructions if these blended concretes are set to be adapted, then huge quantity of cement utilization can be reduced and thereby cost of the construction is reduced along with ecology balance.

REFERANCES

[1]. Akram, T., Menon, S., Ubaid, H.: Production of low cost self compacting concrete using bagasse ash, Construction and Building Materials, 23 (2009), pp. 703-712,

[2]. Singh, N., Singh, V., Rai, S.: Hydration of bagasse ash-blended Portland cement, Cement and Concrete Research, 30 (2000), pp. 1485-1488, 1/2015 30 GRAĐEVINAR 67 (2015) 1, 23 30 Thirumalai Raja Krishnasamy, MurthiPalanisamy

[3]. Cordeiro, G., Toledo, R., Tavares, L., Fairbairn, E.: Pozzolanic activity and filler effect of sugar cane bagasse ash in Portland cement and lime mortars, Cement and Concrete Composites,30 (2008), pp. 410-418,

[4]. IS 456-2000: Plain and Reinforced Concrete-Code of Practice

[5]. IS 10262-2009: Concrete Mix Proportioning-Guidelines

[6]. IS 12269- 2013: Ordinary Portland Cement.53 Grade – Specification