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Investigation on Strength Properties of Concrete by Partially Replacing Cement with Sugar cane Bagase ash

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Abstract – *With expanding demand utilization of cement, researchers are looking for creating exchange covers that are eco-accommodating and contribute towards waste management administration. The use of modern and horticultural waste delivered by mechanical procedures has been the attention on wastes lreduction. One of the agro waste sugar cane bagasse ash (SCBA) which is a waste item acquired from sugar processes as result. Juice is separated from sugar stick at that point ash debris delivered by consuming bagasse in uncontrolled condition and at high temperature. In this paper SCBA has been artificially and physically portrayed and partiallyreplaced in the proportion of 0%, 10%, 15%, 20%by weight of cement in concrete. The properties for concrete are tried and for harden cement for strength at 7,28,56 and 90 days. The test outcome show that the strength of concrete increments up to 15% SCBA Replaced in cement.*

Key words : *cement, concrete, sugar cane bagase ash, compressive strength etc…*

INTRODUCTION

Concrete is a mix of cement, sand, coarse agggregate and water. Its prosperity lies in its flexibility as can be intended to withstand harshest situations while going up against the most persuasive structures. Designers and researchers are further endeavoring to build its cutoff points with the assistance of imaginative compound admixtures and different supplementary cementitious materials. The supplementary cementitious materials can be partitioned in two classes in light of their kind of response : pressure driven and pozzolanic. Pressure driven materials respond specifically with water to frame cementitious compound like GGBS. Pozzolanic materials don't have any cementitious property however when utilized with bond or lime respond with calcium hydroxide to shape items having cementitious properities.

Industrialisation in creating nations has brought about an expansion in rural out resulting gathering of unmanageable agro squander. The waste materials that can be utilized as a part of making concrete are numerous, for example, impact heater slag, squander concrete, pelletised slag like frothed slag, evaluated wood particles, plastic particles, for example, polystyrene, sintered pounded fuel fiery remains, sugarcane bagasse powder and others. Some of these have been attempted with some achievement while others are yet to be taken a stab at in regards to the possibility of utilizing them in concrete.

A significant part of the crude mass of sugarcane ends up plainly squander amid the refining procedure. Since refineries are ordinarily worked in areas where business control is inaccessible, the plants produce their own particular power by consuming bagasse to give steam to back weight steam turbine generators and also process warming. The subsequent bagasse powder speaks to around 0.62% of the sugarcane weights. The primary organization of bagasse fiery debris is siliceous oxide sio2 that respond with free lime from bond hydration.Sugarcane bagasse powder contains silica which give pozzolanic property. This silicate under goes a pozzolanic

Bagasse is the stringy issue that outstanding parts after sugarcane or sorghum stalks are crushed to remove their juice. It is dry thick store left after the extraction of juice from sugar stick. Bagasse is used as a biofuel and in the manufacture of squash and building materials. "sugar bagasse" is a similar material that includes the tissue of the blue agave after extraction of the sap. Bagasse can in like manner be greatly useful to make control. Dry bagasse is singed to make steam. The steam is used to swing turbines to make control.

2. MATERILAS

2.1.1 Cement

In this experimental study, Ordinary Portland Cement 53 grade, conforming to IS: 8112-1989 was used. The different laboratory tests were conducted on cement to determine the physical and mechanical properties of the cement used are shown in

Table 1.

Physical properties	Results
Fineness	8%
Normal consistency	31.5%
Vicat initial setting time(minutes)	43mins
Vicat final setting time (minutes)	256min
Specific gravity	3.15
7-days compressive strength	39.65
28-days compressive strength	54.86

2.1.2 Aggregates
Locally available natural sand with 4.75 mm maximum size confirming to class II- IS 383 was used as fine aggregate,

Table 2: Physical Properties of coarse aggregate and fine aggregate

property	Fine aggregate	Coarse aggregate
Specific gravity	2.66	2.95
Fineness modulus	3.1	7.96
Surface texture	Smooth	--
Practical shape	rounded	angular

Table 2.3 Physical properties of Coarse Aggregate

Properties	**Values**
water absorption	**0.2 to 0.4 %**
Fineness modulus	**3.43**
Specific gravity	**4.05**
bulk density (gm/cc)	**2.20**

2.1.3 Water
Ordinary potable water available in the laboratory has been used.

2.1.4 Bagasse is the stringy matter that remaining parts after sugarcane or sorghum stalks are smashed to extricate their juice. It is dry thick deposit left after the extraction of juice from sugar stick. Bagasse is utilized as a biofuel and in the fabricate of mash and building materials. "sugar bagasse" is a comparable material that comprises of the tissue of the blue agave after extraction of the sap. Bagasse can likewise be extremely helpful to create power. Dry bagasse is scorched to create steam. The steam is utilized to turn turbines to create control.

2.1.4 Physical property of SBA

S. no.	TESTS	RESULT
1.	Fineness	8%
2.	Unit weight	$0.89gm/m^3$
3.	Specific gravity	2.4

3. Testing Procedures.
3.1Compression Strength Test
A standout amongst the most essential properties of cement is the estimation of its capacity to withstand compressive burdens. This is alluded to as a compressive quality and is communicated as load per unit range. One technique for deciding the compressive quality of cement is to apply a heap at a steady rate on a block (150×150×150 mm), until the point that the specimen

comes up short. The pressure tests performed in this venture were finished as per IS standard 516 "Strategies for Tests for Strength of Concrete". The device used to decide the compressive strength of cements in this exploratory work was an all inclusive testing machine (UTM). For this investigation tests were tried for pressure testing at 28, 56,90 days of curing. The compressive quality of the solid regarding weight was then ascertained utilizing the Equation

fc=P/A

Where,

fc = Compressive Strength of Concrete, (Kpa or psi)

P = Maximum load applied (KN or lb), and

A = The cross-sectional area of sample (mm2 or in2)

3.2 FLEXURE TEST ON CONCRETE:

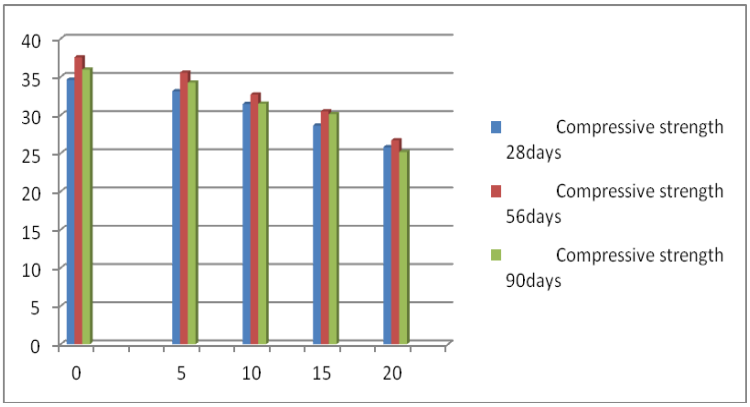
Flexure in general is nothing but bending. In reinforced concrete members, little dependence is on the tensile strength of concrete since steel bars are provided to resist all the tensile force. However, tensile stresses are likely to develop in concrete due to shrinkage, temperature variation and many other reasons.

TEST PROCEDURE:

At the season of testing the cured barrel shaped examples are surface dried. It is then set along its length over the lower plate of the all inclusive testing machine (UTM) for flexure. The best plate is brought down till it touches the best surface of the example. The example is subjected to a 2 point stack by working the flexure testing machine at expanding rate.The dial gage perusing is noted when the example yields. From the quantity of divisions acquired from the dial gage understanding, we see the diagram gave by the producer to get the power connected in kgf. – "P"Flexure strength: ($P \times l/bd^2$).

RESULTS

Compressive strength of concrete in N/mm^2at different curing periods



SBA	Compressive strength		
	28days	56days	90days
0	35.31	37.56	36.43
5	34.51	36.71	36.04
10	32.70	34.30	35.84
15	30.49	34.49	32.33
20	27.68	26.68	25.72

SBA	flexural strength
	28days
0	7.35
5	7.05
10	6.88
15	6.35
20	6.10

CONCLUSIONS

1. From the consequences of the compressive strength the 5 % substitution level gives the more surmised esteems for the concrete when contrasted and the ostensible (0%) replacement concrete. from this we can infer that the substitution level is protected.

2. The workability of cement containing SBA diminishes as the SBA content expands which is because of the higher water retention of bagasse slag.

3. The compressive strength of mortar arranged with SBA as halfway supplanting of cement diminishes with increment in level of SBA.

4. The consequences of concrete work uncovered that, the compressive strength, flexural strength and thickness of cement containing SBA have indicated decrease. As the water concrete proportion builds, they diminishes marginally

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