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"STRENGTH CHARACTERISTICS OF CONCRETE USING M-SAND AND SUGARCANE BAGASSE FIBRE"

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ABSTRACT

In this study the strength characteristics of sugar cane Bagasse fiber incorporated into concrete. The Using of fiber in concrete mixture not only solves the problem of disposing this solid waste but helps conserve natural resources also. A concrete mix has been designed to achieve the grade of M30 as required. To identify the effects on mechanical strength properties due to the addition of this fiber the mechanical strength tests on standard specimens such as compressive strength, split tensile strength and flexural strength are conducted. Totally 72 cubes 12 cylinders and 12 prisms specimens were cast and tested. Based on the experimental results mechanical strength studies, a different percentages such as 0%, 0.5%, 1% and 1.5 % are chosen for further studies. Utilization of these fibers in concrete leads to an effective solid waste management .The concrete with no fiber served as control. BASF master solution was used as superplasticizer to reduce the water. Water-cement ratio of 0.38<0.5 was maintained for all mixes. The design mix obtained was1:1.7:2.5. Compressive strength, were determined at 3, 7, and 28 days of curing. Splitting tensile strength, flexural strength test were determined at 28 days curing.

Keywords: *Concrete Strength,M-Sand,Sugarcane Bagasse fiber,superplasticizer, Workability.*

I. INTRODUCTION

Cement has high compressive quality, consumption and enduring impact are insignificant. Concrete has low tensile and effectively can be split due its highlights which is hard. Presently, a developing interest of concrete in the industries, agents and technologist are finding another covers that are eco-friendly and give to squander the executives basically for rural waste, for example, sugarcane. There have numerous past trial have been directed by utilizing diverse volume of sugarcane bagasse fibre. Sugarcane can expand the poor rigidity of cement because of its constrained elasticity. Sugarcane bagasse fibre slightly affect the compressive quality of concrete. The developing of volume of cement was diminished the compressive quality of the concrete. The sugarcane bagasse fibre concrete had high compressive quality contrast with the no sugarcane bagasse fibre concrete. Bagasse fibre is a result of sugar stick industry whose work is sugar, rum or biofuel production. This industry is arranged in the hot and cold locales of the reality where sugarcane is developed. Sugar stick bagasse is the left in the wake of pulverizing of the stalk to expel the sugar stick juice from which sugar is gotten by dissipation, crystallization. Concrete has an exceptionally high compressive quality however less tensile and to conquer these needs there is requirement for an extra material called reinforcement to help improve the poor tensile of concrete.

MANUFACTURED SAND-Cement is prepared with stream sand as fine total. Deficiency of waterway sand

because of decrease of normal properties and restrains because of ecological considerations prepared solid makers to search for reasonable another material. One such another is "M-Sand". Sand is the squashed rock stone that is sieved and prepared in reasonable molecule estimate as of stream sand to be utilized as fine total. It is additionally called as Manufactured-sand. There isn't important to contrast m-sand and traditional sand .on the grounds that many research and studies demonstrates that m-sand gives more quality contrast with typical cement. M- Sand contain element like Al, Ca, Mg, Fe etc.

II. OBJECTIVES OF THE STUDY

Themain goal of this test examination is to study the addition of sugarcane bagasse fiber of 0.5%, 1%, and 1.5% in fully M- sand used concrete.

- Basic test completed to know the essential properties of material. Testing on new material slump test, compaction factor and Vee-bee consistometer test do. What's more, in hard concrete compressive, split tensile, flexural, and durability test.
- To find the possible application of sugarcane bagasse fiber in rigid pavements.
- To study the sugarcane bagasse fiber as a retarder by slump test.
- To study the behave roof sugarcane bagasse fiber inFresh & hardened concrete.
- Increasing demand of concrete and cost, so need to determine the alternative fiber material and material should be ecofriendly.
- And also study the water absorption and durability.

III. MATERIALS,METHODOLOGY AND MIX DESIGN

(A) Materials Used:

1. **Cement:** Utilizing Ordinary Portland concrete, 53grade,.Cement has been tested as per IS 12269: 2013,Table-3 and the different properties are listed in the table below table-1.
2. **Fine Aggregate:**
   Manufactured sand was using as a fine aggregates-sand is made from rock by artificial method, usually for construction purpose in cement.it is different from natural sand in shape as well as in properties.
3. **Coarse Aggregate:**
   Crushed stones obtain from local crushers were used as coarse aggregate. 20mm was the max size of aggregate. Aggregates for concrete should be selected from normal sources. The aggregate shall be free from chert, flint, silica etc.
4. **sugarcane bagasse fiber:**
   The sugarcane bagasse fiber was dry openly in sun rays till it becomes dry, then it will be cut in to small uniform strips with an approx. size 6cm in length and width 1-2cm aspect ratio is 30.
5. **Super plasticizer:** Superplasticizer is also called as a high range water reducer. Plasticizers are chemical composites that enable the manufacture of concrete with 15% less water content. Superplasticizers allow reduction in water content by 30% or more. We are using master builder solution BASF brand name super plasticizer.

IV. METHODOLOGY

To reach the object of this examination, there are various methodologies used. Strategies of work, for example, writing audit, techniques for blending and testing in the research center is noteworthy to get right examination results. The weight of sugarcane bagasse fiber are 0%, 0.5%, 1.0% and 1.5% of their Cementous material and compare normal concrete to the fiber methodologies added concrete mix.

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Fig-1 Normal SCBF

Sugarcane bagasse fiber is dry in sunrays until totally dried out for 3 days. At that point the fiber will cut into little uniform strips with estimation 6cm long and 2 cm of width angle proportion is 30. Sugarcane bagasse fiber need to treat at first with Sodium Hydroxide NaOH Solution N10 Diluted for 24 hours as in Fig.2 Point of this work is to take out the polluting influences and affirm the sugarcane fiber oppose the climate impacts for longer to use in cement. At that point, the treated sugarcane bagasse fiber should be dry in the sun beams to affirm it completely got dried out before expansion into concrete blend. The mass of sugarcane bagasse fiber are 0.5%, 1.0% and 1.5% of their Cementous material.

Fig-2 SCBF Dipped In NAOH

Fig-3 NAOH

V. RESULTS AND DISCUSSION

(A) Tests on Materials

1. Cement:

Table-1: Tests on Cement

Sl. No	Properties	Obtained Value
1	Fineness test	4.2%
2	NormalConsistency	32%
3	a)Initial setting time b)Final Setting time	38min 512min
4	Sp. Gravity	3.12

2. Fine Aggregate:

Table-2 Tests on Fine Aggregates

Sl.No	Properties	M-sand	River Sand
1	FinenessModulus	3.10	2.8
2	SpecificGravity of sand	2.61	2.63
3	Silt content	3.3<5%	4.5<5%
4	Water absorption	1.89%	1.65%
5	Density compacted (Kg/m$^{3)}$	1630	1609

3. Coarse Aggregates:

Table-3: Tests on Coarse Aggregates

Sl. No	Properties	Value
1	Crushingvalue	22.10%
2	Impact Value	18.42%
3	Abrasion value	13.5%
4	Specificgravity	2.7
5	Fineness modulus	5.07
6	Water absorption	0.58

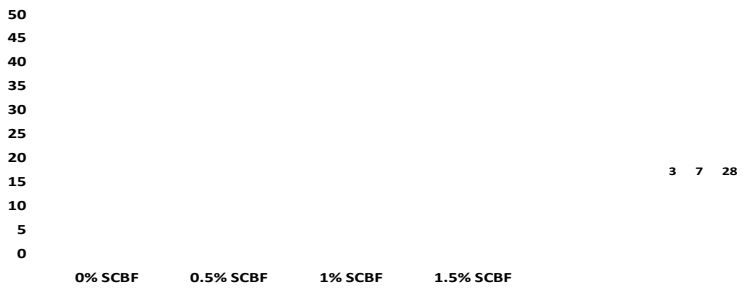
4. CompressiveStrengthTest:

Table-4: Average Compressive Strength of cubes (150mm) for 3, 7 & 28 days in N/mm^2

Curing Age	0% SCBF	0.5% SCBF	1% SCBF	1.5% SCBF
3 days	26.2	26.88	21.42	18.38
7 days	37.7	38.32	31.84	25.39
28 days	44.43	45.92	38.84	33.03

Curing Age	0% SCBF	0.5% SCBF	1% SCBF	1.5% SCBF
28 days	3.81	3.52	2.45	1.9

GRAPH-I



Compressive Strength bar chart

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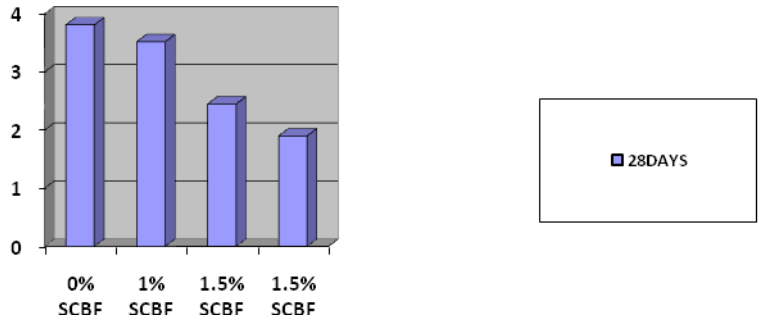
5. Split Tensile Strength Test:

Table-5 Average Split Tensile Strength of cylinders (150mmx300mm) for 28 days in N/mm^2.

GRAPH-II



Split Tensile Strength bar chart.

6. Flexural strength Test:

Table-6 Average Flexural Strength of prisms (100mmx100mmx500mm) for 28 days in N/mm^2.

Curing Age	0% SCBF	0.5% SCBF	1% SCBF	1.5% SCBF
28 days	6.78	4.93	4.4	3.46

GRAPH-III

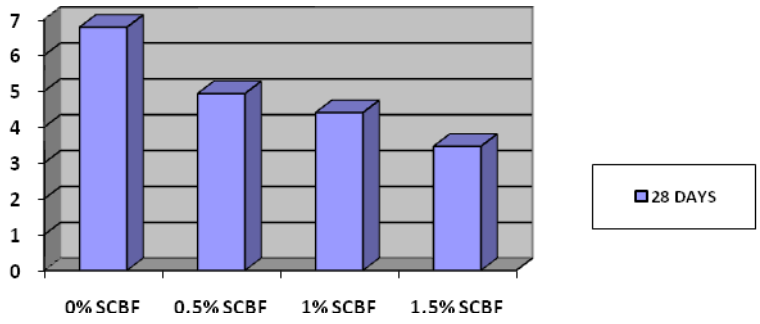


Figure-6 Flexural Strength bar chart.

VI. CONCLUSION

- Sugar cane bagasse fibers have impact on the compressive strength of concrete. The compressive strength of plain or normal concrete was less than sugar cane bagasse fiber added concrete.
- The flexural strength and splitting tensile strengths of concrete were significantly reduced by the addition of sugar cane bagasse fiber. Concrete containing 0% sugar cane bagasse fiber produced more flexural strength and splitting tensile strength.
- The optimum value of 0.5% of sugarcane bagasse fiber only increasing the compressive strength but reduces the split tensile and flexural strength. Increasing of fiber percentage decreases the strength.
- Sugarcane bagasse fiber can be used than no need to commercial concrete retarder. The results of the research describe the reaction between the sugarcane bagasse and the cement to make the setting time of the concrete becomes longer.
- Sugar cane bagasse fiber is not suitable for use in concrete since it does not improve the concrete compressive, flexural and splitting tensile strengths.

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