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Strength study on Comparative of Banana Fibre Reinforced Concrete with Normal Cconcrete

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Abstract: ***In order to increase the strength and practices of concrete, this study examines the strength behaviour of concrete reinforced with banana fibres. The banana plant, scientifically known as Musa acuminate, not only yields the delectable fruit but also the textile fibre. This essay mostly examines the ccomposites made from banana fibre have several uses in building. The fibres from bananas possess good mechanical and physical qualities and can be used more effectively. Banana leaves are affordable, sustainable, and perishable. Six different banana content percentages were examined in this study.40mm-long fibres (1%, 2%, 3%, 4%, 5%, and 6%) were utilized. Common Portland cement is made of Concrete of grades M30. The banana fibre strengthened the fabric at different ages. Concrete is evaluated for split tensile and compressive strength.***
Keywords: Normal concrete, Banana fibre, compressive strength, split tensile strength.

I. INTRODUCTION

Today, concrete's strength and durability have been improved by numerous studies and trials in construction technology. Natural and artificial fibres are the two main categories for materials used in concrete. Vegetables, animals, and fungi are the sources of natural fibres Source of minerals. On the other hand, synthetic materials, steel, and other metals are used to make artificial fibres organic polymers. There are numerous types of fibres, including those made from Musa fibres made of acuminate (banana), steel, AR glass, jute, and other natural and synthetic materials. It provides resistance to suddenly applied stresses, reduces shrinkage cracks, and decreasing water bleeding by increasing permeability.

II. OBJECTIVES

1) Musa acuminate (banana) fibre in various ratios and ages was used to test the concrete's split tensile and compressive strengths.
2) Concrete with varied percentages of banana fibre reinforcement and concrete with a constant age are compared
3) To determine the ideal proportion of Musa acuminate (banana) fibres.

III. MATERIALS

A. *Banana Fibres*

S.No	Composition	Percentage
1	Cellulose	56%
2	Lignin	17%
3	Extractives	7%
4	Moisture	11%
5	Ashes	9%

Table1: Composition of Banana fibres

IV. EXPERIMENTAL DETAILS

In the present investigation, the following materials were used.
1) Ordinary Portland cement of 53 Grade.
2) Fine aggregate
3) Coarse aggregate
4) Banana fibres
5) Water

A. Cement

53 Grade Ordinary Portland cement of Raasi gold brand is used for the experimental work.
The properties of cement tested have been listed below.
Normal Consistency - 31 mm
Initial Setting time - 120 min
Final Setting time - 300 min
Fineness test (90 micron sieve) - 7 %
Specific gravity - 3.15

B. Fine Aggregate

The local available river sand from River Krishna is used for the experimental investigation.
The obtained values of the fine aggregate are as shown below:
Specific Gravity – 2.60
Water absorption – 1.65 %
Fineness modulus – 2.5

C. Coarse Aggregate

In order to withstand the design loads and effects of weathering, aggregates must be better than the hardened cement.
The tested properties of the coarse aggregates are tabulated below.
Specific Gravity – 2.7
Water absorption – 1.4 %
Bulk density – 1490 kg/m^3

D. Water

Drinking water used in laboratory was used for mixing the concrete and curing the specimens.

E. Banana Fibre

Banana fibre is a very good replacement for synthetic fibre. The Banana used for this work is from the local village, Cherukupalli. Uniform length of fibers of 40mm was obtained by using cutting machine. Salient physical and mechanical properties of Banana were determined in their natural form.
Banana fibre properties
Density (kg/m3) – 1350
Moisture content (%) – 11
Tensile strength (M Pa) - 56
Elongation at Break (%) - 2.6
Young's modulus (M Pa) – 3.5
Fineness – 17.15

F. Compressive Strength Results

Compressive strength results of marble dust and addition of banana fibre

% of banana fiber	Compressive strength results,N/mm^2		
	28 days	56 days	90 days
0%	40.80	44.40	47.72
1%	43.49	47.03	50.87
2%	49.47	53.85	57.85
3%	55.10	59.75	64.32
4%	52.92	57.51	61.80
5%	49.29	53.71	57.56
6%	47.17	51.36	55.18

Table 2: Results of compressive strength test of concrete reinforced with banana fibre

G. Split Tensile Strength Result

Split tensile strength results of marble dust and addition of banana fibre

% of banana fiber	Split tensile strength results,N/mm^2		
	28 days	56 days	90 days
0%	4.03	4.39	4.71
1%	4.19	4.55	4.89
2%	5.07	5.52	5.92
3%	5.87	6.39	6.86
4%	5.64	6.13	6.54
5%	4.76	5.16	5.53
6%	4.65	5.06	5.42

Table 3: Results of split tensile strength test of concrete reinforced with banana fibre

V. CONCLUSIONS

A. The compressive strength of normal concrete at 28, 56 and 90 days is 40.80, 44.40 and 47.72 N/mm^2.

B. The split tensile strength of normal concrete at 28, 56 and 90 days is 4.03, 4.39 and 4.71 N/mm^2.

C. The compressive strength results of 3% of banana fibre for 28, 56 and 90 days are 55.10, 59.75 and 64.32 N/mm^2.

D. The split tensile strength results of 3% of banana fibre for 28, 56 and 90 days are 5.87, 6.39 and 6.86 N/mm^2.

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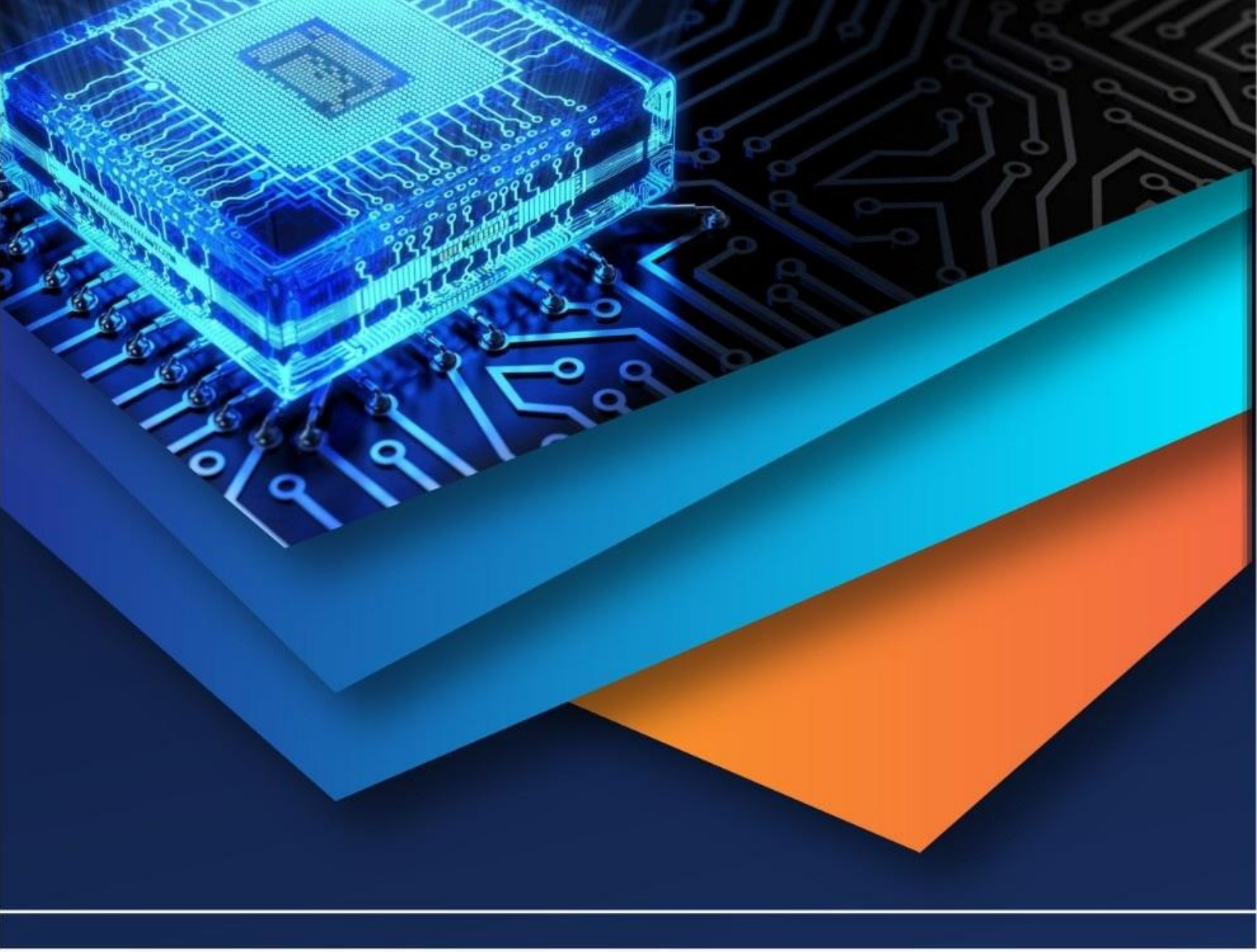

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