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EXPERIMENTAL STUDIES ON THE USE OF COCONUT FIBRE AS ENHANCEMENT OF CONCRETE

[1]SARAVANAKUMAR R,[2]SHANMUGARAJ.M,

[1]Lecturer,[2]Lecturer

[1]PLASTIC TECHNOLOGY, [2]CIVIL ENGINEERING

[1]VSVN POLYTECHNIC COLLEGE,VIRUDHUNAGAR,INDIA

Abstract: Concrete is probably the most extensively used construction material in the world. The main ingredient in the conventional concrete is Portland cement. The amount of cement production emits approximately equal amount of carbon dioxide into the atmosphere. Cement production is consuming significant amount of natural resources. That has brought pressures to reduce cement consumption by the use of supplementary materials. Availability of mineral admixtures marked opening of a new era for designing concrete mix of higher and higher strength. coconut fibre is a admixture, whose potential is not fully utilized The study focuses on the compressive strength performance of the coconut fiber reinforced concrete containing different percentage in a weight basis by 0.4%, 0.5%, 0.6%.

***Index Terms* – Concrete, Admixture, Cocuntfibre, compressive strength.**

I. INTRODUCTION

With the quest for affordable housing system for both the rural and urban population in India, various proposals focussing on cutting down conventional building material costs have been put forward. One of the suggestions in the forefront has been the sourcing, development and use of alternative, non-conventional local construction materials including the possibility of using some agricultural wastes as construction materials. Mostly these coconut fibres are dumped as agricultural waste, so that it is easily available in large quantity and also cheap. The purpose of this is to conduct experimental studies for enhancement of properties of concrete by reinforcing with coconut fibres determined by compressive strength.

II. MATERIALS AND PROPERTIES

2.1 Materials

2.1.1. Cement

OPC 53 grade which is available in the market is used. The coarse aggregates of 20mm and 12mm from the nearby quarry and the fine aggregate of zone-II are used. Ceraplast - 300 super plasticizer is used.

Table 1 Properties of Cement

Sl.No	Property	Value
1	Specific gravity of cement	3.15
2	Fineness of cement	8.55 %
3	Initial setting time	180 mm
4	Final setting time	240 mm

2.1.2. Coarse Aggregate

Locally available stonework, sieved with a 20 mm sieve, was used as coarse aggregate. It was then washed to clear dirt and dust and kept under dry surface conditions. Coarse aggregates are tested as per IS: 383-1970. Table no.2 illustrates the properties of the coarse aggregate used.

Table 2 Properties of Coarse aggregate

Sl.No	Property	Value
1	Specific gravity	2.60
2	Water absorption	0.5%
3	Fineness modulus	7.3

2.1.3. Fine Aggregate

Sand which is locally available and conforming to zone -2 of IS 383-1970 was used as fine aggregate. Fine aggregate taken was clean, inert and free from organic matter, silt and clay. Properties are tabulated in the below Table no.3.

Table 3 Properties of fine aggregate

Sl.No	Property	Value
1	Specific gravity	2.60
2	Water absorption	1.0%
3	Fineness modulus	2.70

2.1.4. Chemical Admixture

Super Plasticizer Ceraplast -300 was used to obtain better workability for the mix.

2.1.5. Coconut fibre

For this study, locally available Coconut fibre is used

III.MIX DESIGN

As per IS 456-2000 the mix proportioning was done coconut fibres are added to the concrete in a weight basis by adding the coconut fibre in to the concrete by 0.4%, 0.5%, 0.6%.

Table 4Mix design

Water	Cement	Fine aggregate	Coarse aggregate
191.6 litre	383 kg	546 kg	1188 kg
0.5	1	1.425	3.10

3.1 Compressive Strength

Compressive strength is defined as resistance of concrete to axial loading. Cubes were placed in Universal Testing Machine (U.T.M), and load was applied. The readings were recorded and compressive strength was calculated.

Calculations:

Compressive Strength = Maximum load/Cross Sectional Area = P/A

3.2 Testing Procedure

Compressive strength of concrete is checked in our laboratory using universal testing machine. First concrete cube of 150 * 150 mm was made. Also concrete cube with various mixture of coconut fibre in the ratio of 0.4%, 0.5% and 0.6% were made and allowed for 28 days curing and tested in UTM. The readings were tabulated and compressive strength was calculated.

Fig 1 UNIVERSAL TESTING MACHINE

IV. RESULTS AND DISCUSSION

4.1 Results of Concrete Cube and Coconut Fibre Mix (0.4 % ,0.5% & 0.6%)

Concrete cubes

WEIGHT Kg	LOAD X 1000kg	AREA mm^2	Compressive strength (MPa)
8.5	60	150X150	26.16
8.5	62	150X150	27.03
8.6	60	150X150	26.16
		MEAN VALUE	**26.45**

Cubes with 0.4 % Coconut fibre

WEIGHT Kg	LOAD X 1000kg	AREA mm^2	Compressive strength (MPa)
8.5	60.5	150X150	26.89
8.5	60	150X150	26.16
8.6	61	150X150	27.11
		MEAN VALUE	**26.72**

Cubes with 0.5 % Coconut fibre

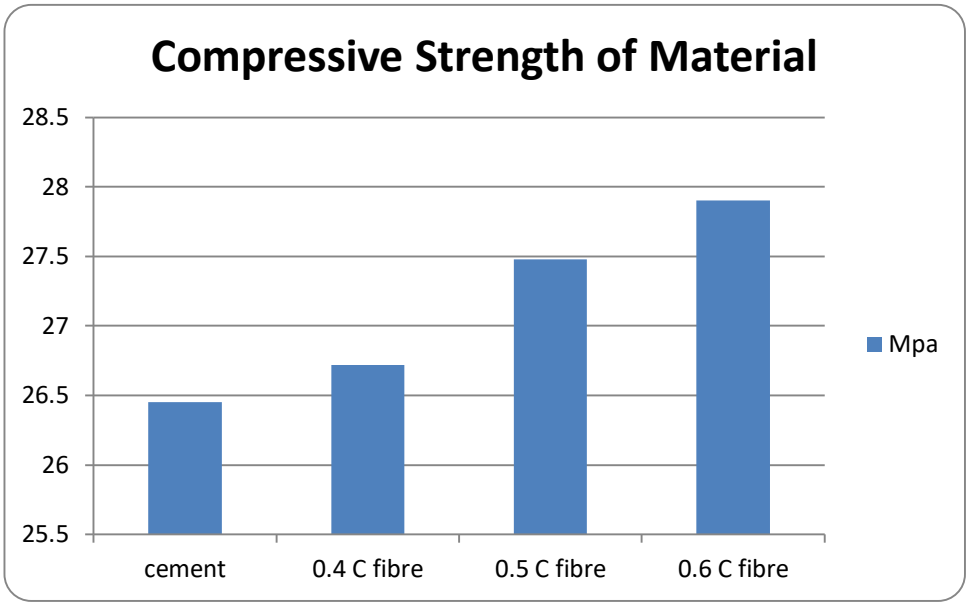
WEIGHT Kg	LOAD X 1000kg	AREA mm^2	Compressive strength (MPa)
8.5	61	150X150	27.11
8.5	62	150X150	27.55
8.6	62.5	150X150	27.80
		MEAN VALUE	**27.48**

Cubes with 0.6 % Coconut fibre

WEIGHT Kg	LOAD X 1000kg	AREA mm^2	Compressive strength (MPa)
8.5	62	150X150	27.50
8.5	62.5	150X150	27.80
8.6	64	150X150	28.40
		MEAN VALUE	**27.90**

After conducting the experimental test in Universal Testing Machine the Concrete material with Coconut fibre is tabulated and graph was drawn and strength was compared.

Material	Compressive Strength Mpa
Cement	**26.45**
0.4 % Coconut fibre	**26.72**
0.5% Coconut fibre	**27.48**
0.6 % Coconut fibre	**27.9**



For Coconut fibre in various percentage reinforcement, increases strength of concrete increased with, increased in fibre dosage up to 0.6 % as compared to concrete, gives more compressive strength, whereas when comparing to 0.4% & 0.5% coconut fibre. 0.6 % of Coconut fibre reinforced concrete produce massive compressive strength.

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AUTHOR

Mr. R.Saravanakumar woking as a Lecturer in Plastic Technology Department in VSVN Polytechnic College, Virudhunagar.with more than 20 years of experience. Chairman and Member in Board of Studies of Plastic Technology branch. Question paper setter and Valuer for many Autonomous Polytechnic Colleges in Tamilnadu. Life Member in Indian Society for Technical Engineering(LM 35049 / 2006).Life Member in International Association of Engineers Membership Number : 144855.Annual Member in All India Plastics Manufacturers Association. He is a REVIEWER in International Journal of Creative Research Thoughts (IJCRT) Member ID : 114311. He published more number of papers in many international Journal. Guided more than 100 students in Polytechnic projects

Mr M.Shanmugaraj working as aLecturer in Civil Engineering in VSVN Polytechnic College, Virudhunagar.with more than 17 years of experience. Member in Board of Studies of Civil Engineering branch. Question paper setter and Valuer for many Autonomous Polytechnic Colleges in Tamilnadu. Life Member in Indian Society for Technical Engineering LM 35045