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Experimental Investigation Paver Block Natural Fiber

T.Subramani[1], J.Karthick Rajan[2]

[1]Professor & Dean, Department of Civil Engineering, VMKV Engineering College, Vinayaka Missions Research Foundation (Deemed to be University), Salem, India

[2] Research Scholar, Department of Civil Engineering, VMKV Engineering College, Vinayaka Missions Research Foundation (Deemed to be University), Salem, India

ABSTRACT

In this study the compressive strength, water absorption and flexural of paver squares were controlled by including coconut fiber in the best 20mm thickness. Coconut filaments were included extent of 0.5% in volume of cement. The compressive strength, flexural strength and water absorption were resolved toward the finish of 7, 14 and 28 days.

Keywords: Experimental, Investigation, Paver block and Natural fiber.

1. INTRODUCTION

Concrete fails abruptly under strain and breaks exorbitantly when un reinforced. Steel rebar is ordinarily used to reinforced concrete. In any case, it is extremely costly. In tropical areas, regular fibers are liberally accessible which when used will diminish the cost of reinforced concrete and enhance its performance. From investigation, Concrete paver block with characteristic fibers accomplish higher strength, sturdiness and decrease of splits thought about customary paver blocks. Compared to ordinary paver block versus fiber utilized paver block, proposed fiber block have higher compressive strength and flexural strength at the season of substantial activity territory, additionally higher rate of surface resistance. By utilizing fibers in concrete paver block it expands resistance to affect/scraped area and incredibly enhances nature of development. Along these lines, paver blocks with fibers don't effortlessly split, break or clasp like pouring black-top or poured concrete.

2. METHODOLOGY

Figure 1 shows the methodology.

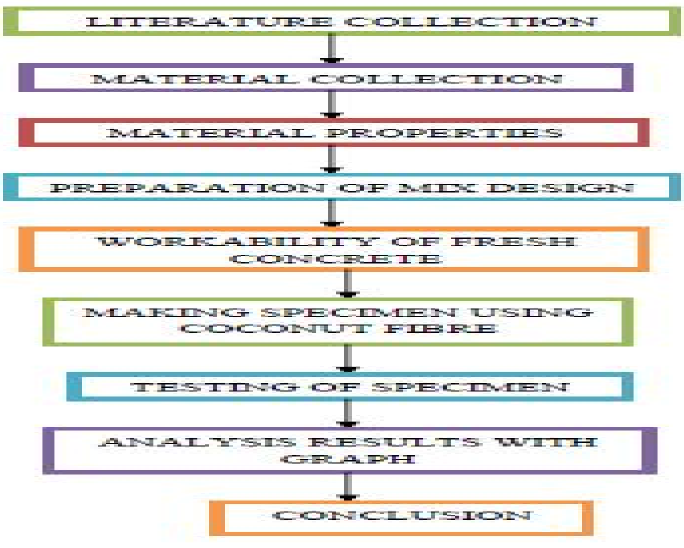

Figure 1 Methodology

3. MATERIAL COLLECTION

3.1 Cement

Cement is a binder, a substance utilized for improvement that sets, solidifies and sticks to different materials, restricting them together. Cement is only from time to time utilized alone, yet rather to tie sand and rock (total) together.

3.2 Coarse Aggregate

Aggregates are inactive granular materials, for example, sand, rock, or smashed stone that, alongside water and Portland cement, are an essential part in concrete.

3.3 Fine Aggregate

Fine aggregates for the most part comprise of common sand or squashed stone with most particles going through a 9.5mm sieve.

3.4 Coconut Fibre

Coconut dietary fiber, produced using finely ground, dried and defatted coconut, gives a helpful method to build your day by day fiber consumption without drinking a gelled or abrasive beverage. Figure 2 shows the coconut fibre.

Figure 2 Coconut fibre

4. MATERIAL PROPERTIES

Table 1 shows the properties of coarse aggregates.

Table 1: Properties of coarse aggregate

PROPERTIES	VALUE
Specific weight (g/cm^3)	**2.70**
Sieve 200	**1.29%**
H2O absorption	**1.15**
Fineness modulus	**3.24**
Specific gravity	**2.66**
Size	**Passing through 4.75mm sieve**

Table 2 shows the properties of fine aggregates.

Table 2: Properties of Fine aggregates

PROPERTIES	VALUE
Specific weight (g/cm^3)	**2.85**
Fineness modulus	**2.58**
H_2O absorption	**1%**
Density	**1754.3kg/m^3**
Surface Texture	**Smooth**

4.1 Coconut Fibre

It is the normal fiber of the coconut husk where it is a thick and coarse however sturdy fiber. Those that are no less than 8 in (20 cm) long are called bristle fiber. Shorter fibers, which are likewise better in surface, are called sleeping pad fiber. Table 3 shows the physical properties of coconut fibre.

Table 3: Physical properties of coconut Fibre

PROPERTIES	VALUE
Ultimate length	**0.6mm**
Diameter/width	**16micron**
Length	**6 to 8 inches**
Density	**1.4g/cc**
Tenacity	**10g/Tex**
Breaking elongation	**30%**
Swelling in water (diameter)	**5%**

5. MIX DESIGN

5.1 Design Stipulations

Grade Designation M-35
Type of cement O.P.C 53grade
Sp. Gravity Cement 3.15
Sp. Gravity Fine Aggregate 2.85
Sp. Gravity Coarse Aggregate 2.7

5.1.1 Target Mean Strength

F_{ck} = fck+(Sxt)
= 30 + (6.3 X 1.65)
= 40.395MPa

5.1.2 Mix Proportion

Table 4 shows the mix proportion.

Table 4: Mix proportion

Cement (kg)/m^3	FA(kg/m^3)	CA(kg/m^3)	Water litre/m^3
563.34	**628.3**	**1101.29**	**197.17**

5.1.3 Adding Material Ratio

Coconut fiber Adding of 0.5 %

Total volume of concrete = 2490.1
= 2490.1 x (0.5/100) =12.45

6. TESTING RESULT

6.1 Compressive Strength of Cube

Table 5 shows the Compressive Strength Test Result

Table 5: Compressive strength test result

Mix design	% of replacement	Compressive strength N/mm²		
		7 days	14 days	28 days
M35	0	28.6	32.54	39.9
	0.5	29.6	33.89	41.3

6.1.1 Model calculation

Strength = Load/Area N/mm^2
= 643500/150 x150
= 28.6 N/mm^2

Figure 3 shows the compressive test graph results.

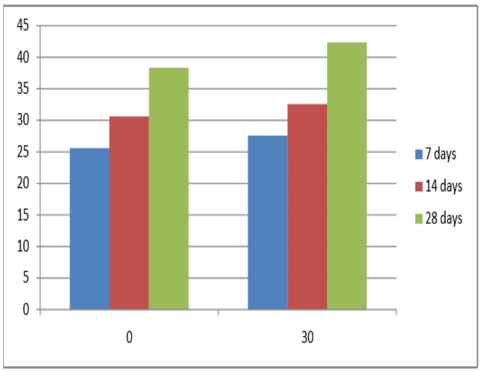

Figure 3 Compression Test Graph Result

6.2 Flexural Strength Test for Cylinder

Table 6 shows the flexural strength test results.

Table 6: Flexural strength test results

Mix design	% of replacement	Flexural Strength N/mm²		
		7 days	14 days	28 days
M35	0	3.1	3.86	4.63
	0.5	3.39	4.1	5.08

Figure 4shows the flexural strength graph results.

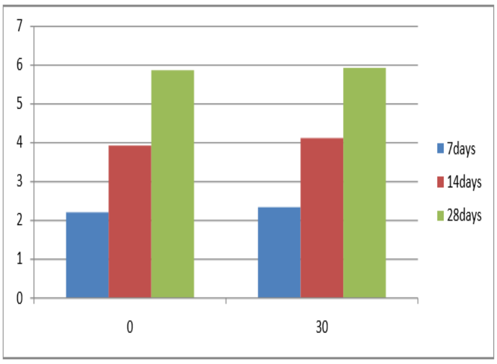

Figure 4 Flexural strength graph result

6.3 Water Absorption

Table 7 shows the water absorption results.

Table 7: Water absorption results

% of Adding Coconut fiber	% of Water Absorption
0	**5.35**
0.5	**4.87**

Figure 5 shows the water absorption results.

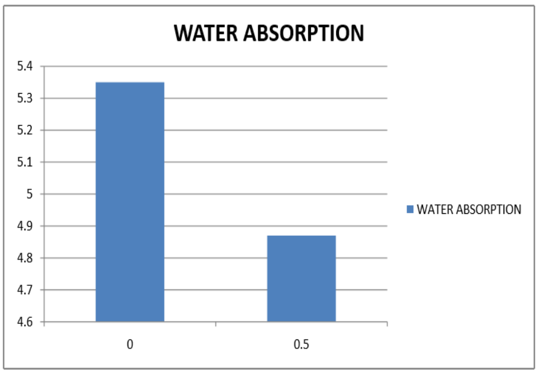

Figure 5 Water absorption results

7. CONCLUSION

- Compressive Strength enhancement ranges from 0.5% when % of fiber increases the compressive strength value at 41.32 N/mm^2 at 28 days compared to conventional mix.
- By changing the layer thickness and utilizing coconut filaments the properties of the paver block are enhancing altogether and further more it is observed to be economical.
- Flexural strength is significantly improving from the increasing 0.5% of coconut fibre 5.08 N/mm^2 at 28 days when compared to conventional concrete paver block.

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AUTHOR

Prof. Dr. T. Subramani Working as Professor and Dean of Civil Engineering in Vinayaka Missions Kirupananda Variyar Engineering College, Vinayaka Missions Research Foundation (Deemed to be University), Salem, Tamilnadu, India. Having more than 28 years of Teaching experience in Various Engineering Colleges. He is serving as reviewer for many International Journals and also published 250 papers in International Journals. He has presented more than 107 papers in conferences, especially 77 in International and 30 National Level. He has authored 07 books. Guided more than 259 students in PG projects. Currently he is guiding 03 Ph.D., Research Scholars. He is serving as examiner and Valuer for B.E & M.E Degree Theory and Practical Examinations for Madras University, Periyar University, Anna University, Annamalai University and Vinayaka Missions Research Foundation [Deemed to be University]. He is Question paper setter and Valuer for UG and PG Courses of Civil Engineering in number of Universities. He is serving as Chairman of Board Of Studies (Civil Engineering), Vinayaka Missions Research Foundation [Deemed to be University], also a member of Board of studies in Periyar University. He is Life Fellow in Institution of Engineers (India) and Institution of Valuers. Life member in number of Technical Societies and Educational bodies like MISTE, MIGS, MIRC,ISRMTT, UWA, Salem District Small and Tiny Association (SADISSTIA), SPC – Salem Productivity Council. He has delivered much technical talk in various field. He is a Chartered Civil Engineer and Approved Valuer for many banks. He is a Licensed Building Surveyor in Salem City Municipal Corporation-Salem, and Licensed Civil Engineer in Salem Local Planning Authority- Salem. He is the recipient of many prestigious awards.

J.Karthick Rajan did his B.E.Degree in the branch of Civil Engineering in VMKV Engineering College, Vinayaka Missions Research Foundation (Deemed to be University),Salem,TamilNadu, India. He did his M.E Degree in the branch of Structural Engineering in Anna University. He worked as a Design Engineer in Priyanka Associates, Civil Engineers & Valuers, Salem, TamilNadu for Four Months. He published 9 International Journal Publications. Currently he is working as a Assistant Professor in Department of Civil Engineering, V.M.K.V.Engineering College, Salem, TamilNadu. Currently he is Research Scholar in the Department of Civil Engineering.