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Mechanical and Dynamical Properties of High Performance Concrete Using Arecaceae Fiber

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Abstract: ***The purpose of this endeavor is to acquire learning for arranging the working with negligible exertion material (arecaceae fiber) using normal fibre.Because trademark fiber can be one possible material which are trashy and locally available.Among all regular fiber coir fiber are picked because of its most important malleability quality. The static direct of arecaceae fiber stronghold concrete essential part is in every practical sense cloud .In this work the effect of fiber content on properties of AFRC is considered. To survey the capability of coir fiber in improving the properties of the strong the first class of plain cement is used as reference. The mechanical properties, for instance, compressive quality , part rigidity, modulus of break and quick chloride entrance test were resolved for all ARFC and Plain Cement models. Likewise the fiber in appropriate sum should be selected.(i.e.,) fiber substance of 2% and 3% by weight of bond and having a length of 6.5cm are used to design AFRC.***

Key words : Arecaceae fiber, Coir fiber.

I. ARECACEAE FIBRE :

Coconut fiber is isolated from the outer shell of the coconut.
Basic Name - Coir
Logical Name - Cocos Nucifera
Plant Name - Arecaceae (Palm)
There are two sorts of coconut fiber dim hued fiber expelled from created coconut and white fiber from energetic coconut.Brown fiber are thick, strong and high bendable quality yet white fiber are smoother and better yet additionally weaker. So in building dark colored fiber are generally utilized.

II SCOPE OF THE STUDY

The key purpose of the endeavor is to upgrade the versatile property of bond by including arecaceae fiber. To convey a viable "Green strong material "using typical fiber (arecacea) will assemble the flexible quality and reduction the existence cost of the structure. This endeavor will make others to extend the energy for look at ordinary fiber and addition the use of ordinarily available materials.

III. INGREDIENTS USED IN CONCRETE

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A.CEMENT:

Bonding is the most fundamental fixing in cement. One of the basic criteria for the decision of bond is its ability to make improved microstructure in cement.
Properties of cement :

Specimen	:OPC 43 GRADE
Normal consistency	: 31.7%
Initial setting time	: 1 hr 10 min
Final setting time	: 10 hr 38 min
Specific gravity	: 3.09

B.FINE AGGREGATE:

The sand got from stream beds is utilized as fine total. The fine total alongside the hydrated concrete glue fill the space between the coarse total. Waterway sand was utilized as the common fine total. Its properties were tried according to May be: 2386.The test aftereffects of sifter investigation is exhibited in beneath tables

Table I Sieve Analysis of fine aggregate

IS Sieve Size (mm)	Percentage of Passing	Requirement as per zone II (IS 383-1970)
10mm	100	100
4.75mm	98	90-100
2.36mm	83.27	75-100
1.18mm	67.1	55-90
600 microns	39.7	35-59
300 microns	15	8-30
150 microns	3.4	0-10
75 microns	2.10	

Properties of river sand : The physical properties fine aggregate of were done according to IS 2386-1963.

Bulk density	: 1.760 Kg/lit
Specific gravity	: 2.53

C. COURSE AGGREGATE:

The Coarse Aggregate of size 60% of 20mm and 40% of 10mm aggregate for the preparation of concrete.
Properties of coarse aggregate: For 20mm
Bulk density : 1.7 kg/lit
Specific gravity : 2.89 (Surface Saturated Dry Condition Method)

Specific gravity : 2.64 (Pycnometer method)
By using Sieve Analysis we confirm the 20mm aggregate as per code IS 383-1970

D.WATER

Water conforming to the requirements is found to be suitable for making concrete.

Water Absorption Results:

For fine aggregate -2.420%
For 20mm coarse aggregate-1.240%
For 10mm coarse aggregate-1.586%

E. ADMIXTURE

Table II Properties of Admixture

Name	CONPLAST 230
Type	Water reducing agent
Base	Napthalene
Workability	Produce high workable flowing concrete mix

Fig (A) Arecaceae Fiber

IV.TEST DONE FOR THE SPECIMENS

- Compression test
- Flexural strength or modulus of rupture
- Split tensile test
- Rapid chloride penetration test (RCPT)

Table III Specimen Details

Sp's	7days			28 days		
	C.S	2% CFRC	3% CFRC	C.S	2% CFRC	3% CFRC
Cube	3	3	3	3	3	3
Cylinder	3	3	3	3	3	3
Beam	3	3	3	3	3	3
Cylinder for RCPT	1	1	1	1	1	1

A.REQUIREMENT FOR 1m^3 OF CONCRETE

Cement : F.A : C.A : Water
1 : 1.62 : 2.72 : 0.6

Fig(B) Curing Of Specimens

V. RESULT AND DISCUSSIONS

A. COMPRESSIVE STRENGTH

Solid shape of size 150mm x 150mm x 150mm were thrown for M40 review of cement. The plain concrete, 2% of CFRC and 3% of CFRC were tried for 7days and 28th days compressive strength.The7 days and 28 days comes about were looked at in beneath graphs

Table IV Compressive Strength Results

SPECIMEN	7 DAYS		28 DAYS	
	FAILURE LOAD (KN)	STRESS (N/mm^2)	FAILURE LOAD (KN)	STRESS (N/mm^2)
CONTROL	1044	46.4	1192.27	52.99
2% CFRC	963.9	42.84	1071.45	47.62
3% CFRC	1065.37	47.35	1234.35	54.86

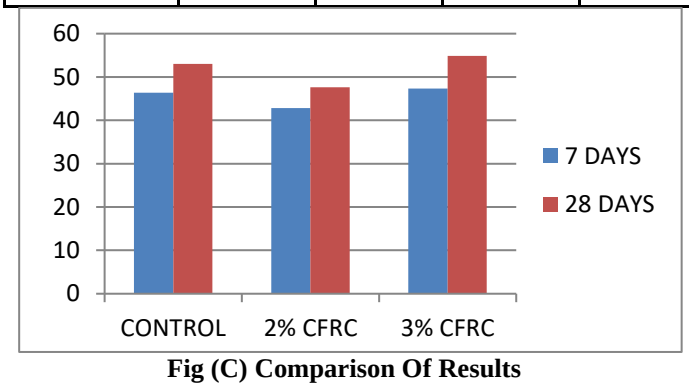
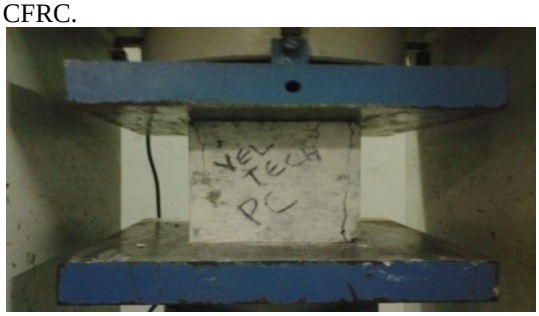


Fig (C) Comparison Of Results

The above diagrams demonstrates the consequences of compressive quality for the examples on both 7 days and 28 days. From the outcome the 3%CFRC achieve more compressive quality when contrasted with control and 2% CFRC.



Fig(D) Failure of control specimen having stress of 46.40 (N/mm^2)

Fig (E) Failure of 2%CFRC specimen having stress of 42.84 (N/mm^2)

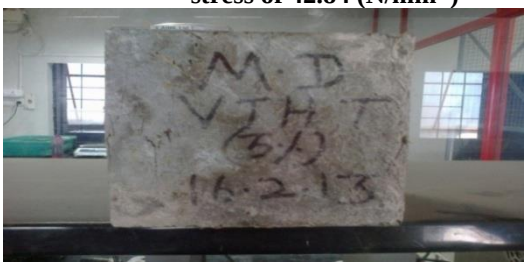


Fig (F) Failure of 3%CFRC specimen having stress of 47.37 (N/mm^2)

Fig 7(G) Failure of control specimen having stress of 52.99 (N/mm^2)

Fig 8(H) Failure of 2% CFRC specimen having stress of 47.62 (N/mm^2)

Fig (I) Failure of 3% CFRC specimen having stress of 54.86 (N/mm^2)

B.FLEXURAL STRENGTH

Solid light emissions 150mm x 150mm x 700mm were thrown for M40 review of cement. The plain concrete, 2% of CFRC and 3% of CFRC were tried for 7days and 28th days flexural quality. The7 days and 28 days comes about were looked at in beneath outlines

Table V Flexural Strength Result

SPECIMEN	7 DAYS		28 DAYS	
	FAILURE LOAD (KN)	STRESS (N/mm^2)	FAILURE LOAD (KN)	STRESS (N/mm^2)
C.S	25.25	4.49	30.99	5.51
2% CFRC	24.07	4.28	27.73	4.93
3% CFRC	29.75	5.29	36.84	6.55

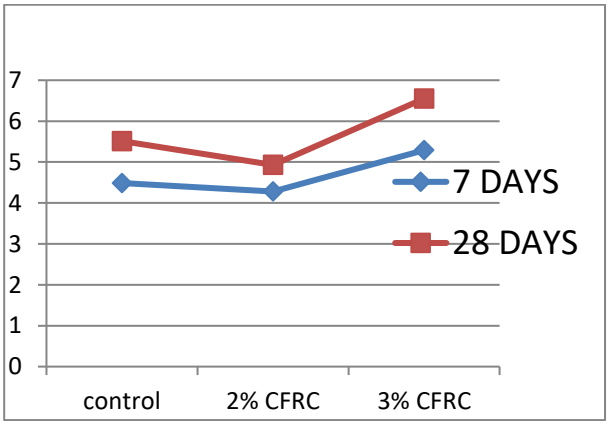


Fig (J) Comparison Of Results

The above outlines demonstrates the consequences of flexural quality for the examples on both 7 days and 28 days. From the outcome the 3%CFRC achieve more flexural quality when contrasted with control and 2% CFRC Flexural Strength For Control Specimen The Failure Load Is 27.55 Kn In 7 Days

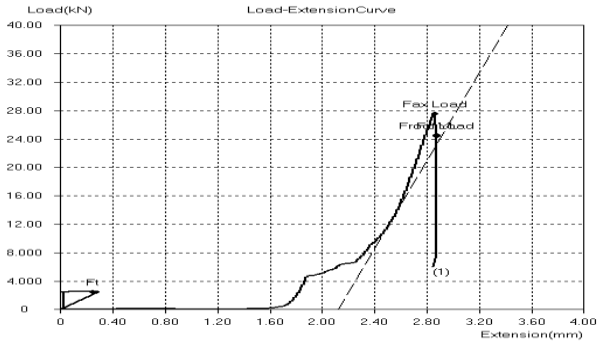


Fig (K) Flexural Strength For Control Specimen The Failure Load Is 29.5 Kn In 28 Days

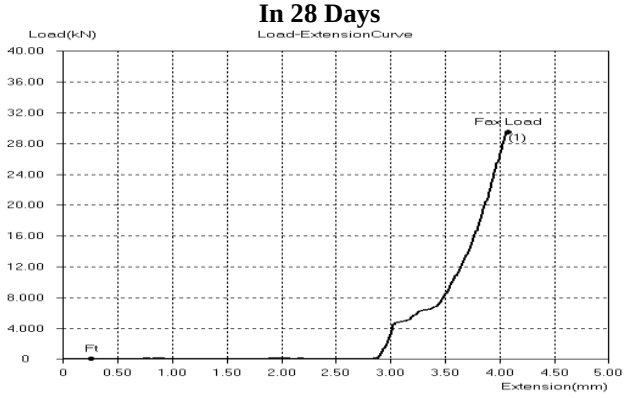


Fig (L) Flexural Strength For 2%Cfrc Specimen The Failure Load Is 23.75 Kn In 7 Days

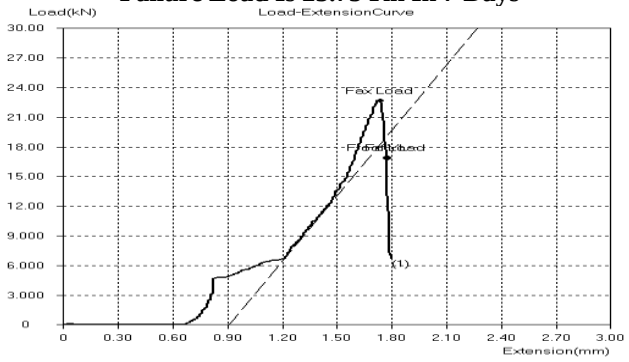


Fig (M) Flexural Strength For 2%Cfrc Specimen The Failure Load Is 27.5 Kn In 28 Days

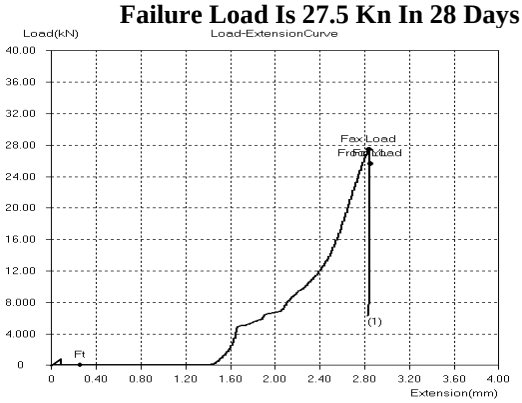


Fig (N) Flexural Strength For 3%Cfrc Specimen The Failure Load Is 30.50 Kn In 7 Days

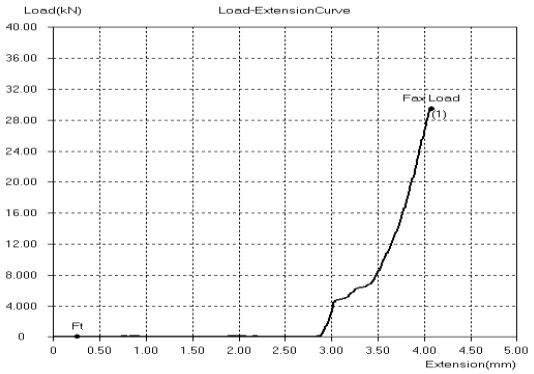


Fig (O) Flexural Strength For 3%Cfrc Specimen The Failure Load Is 33 Kn In 28 Days

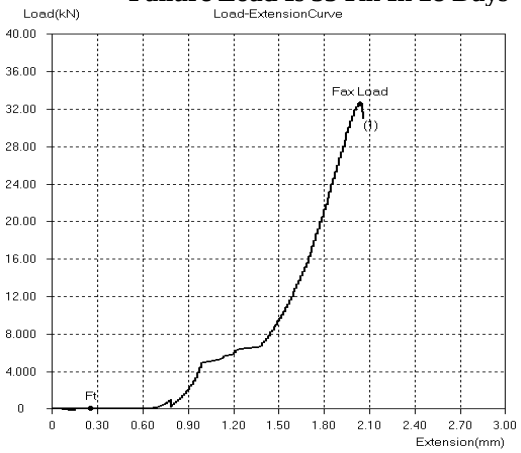


Fig (P) Failure of control specimen having stress of 4.49 (N/mm^2)

Fig (Q) Failure of 2% CFRC specimen having stress of 4.28 (N/mm^2)

Fig (R) Failure of 3% CFRC specimen having stress of 5.29 (N/mm^2)

Fig (S) Failure of control specimen having stress of 5.51 (N/mm^2)

Fig (T) Failure of 2% CFRC specimen having stress of 4.93 (N/mm^2)

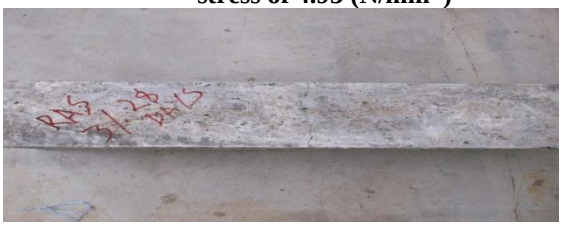


Fig (U) Failure of 3% CFRC specimen having stress of 6.55 (N/mm^2)

C.SPLIT TENSILE STRENGTH

Solid barrels of distance across 100mm Dia x 200mm stature were thrown M40 review of cement .The plain concrete, 2% of CFRC and 3% of CFRC were tried for 7days and 28th days split elasticity. The7 days and 28 days comes about were analyzed in underneath graphs.

Table 6 Results

SPECIME	7 DAYS		28 DAYS	
	FAILURE LOAD (KN)	STRESS (N/mm^2)	FAILURE LOAD (KN)	STRESS (N/mm^2)
CONTROL	120	3.82	130.69	4.16
2% CFRC	116.86	3.72	128.89	4.103
3% CFRC	127.86	4.07	184.41	5.87

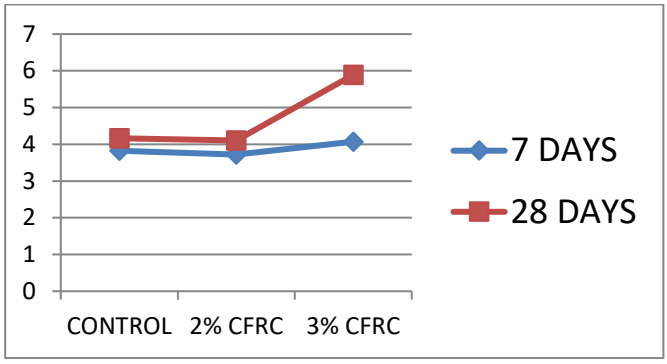


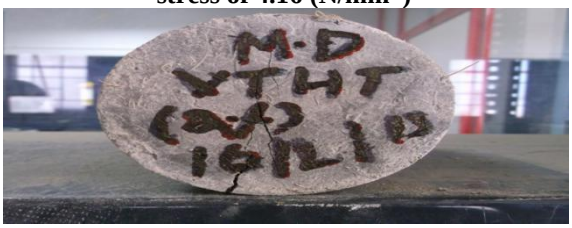
Fig (V) Comparison Of Results

The above outlines demonstrate the aftereffects of split rigidity for the examples on both 7 days and 28 days. From the outcome the 3%CFRC achieve more Split rigidity when contrasted with control and 2% CFRC .

Fig 2(W) Failure of control specimen having stress of 3.82 (N/mm^2)

Fig (X) Failure of 2% CFRC specimen having stress of 3.72 (N/mm^2)

Fig (Y) Failure of control specimen having stress of 4.16 (N/mm^2)



Failure of 2% CFRC specimen having stress of 4.103 (N/mm^2)

Failure of 3% CFRC specimen having stress of 5.89 (N/mm^2)

D. RCPT - RAPID CHLORIDE PENETRATION TEST:

- It is one of the strength tests directed in our solid
- This test technique covers the assurance of the electrical conductance of cement to give a quick sign of its protection from the entrance of chloride particles.

Table VII CHLORIDE ION PENETRABILITY BASED ON CHARGE PASSED

CHARGE PASSED (COULOMBS)	CHLORIDE ION PENETRABILITY
>4000	HIGH
2000-4000	MODERATE
1000-2000	LOW
100-1000	VERY LOW
<100	NEGLIGIBLE

From the above table the outcome demonstrates that the control example , 2% CFRC and 3% CFRC accomplish low chloride particle entrance . So the solidness of the coir fiber fortification cement (CFRC) is great in light of consequence of chloride assault in the solid

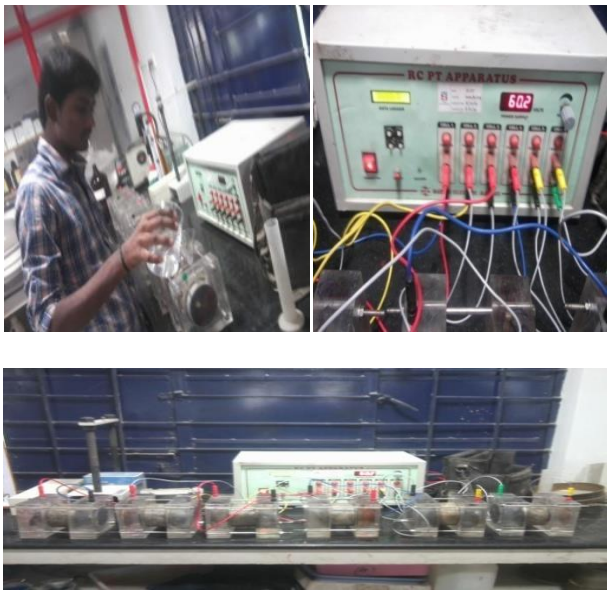


Fig (Z) Exerimental Set Up Of Rcpt

VI. CONCLUSION

The restoring time of 7 days and 28 days comes about exhibits that the 3%CFRC are higher in quality (compressive ,split malleable and flexural) when appeared differently in relation to 2% CFRC and the plain concrete.

The connection exhibited that the volume of 3% coir fiber invigorated concrete had the perfect plan of mechanical properties

Coconut fiber fortified bond has exhibited less number of part progressions . Thusly, it very well may be a conventional choice being a developed area.

The snappy chloride passage test comes about that the quality property for the plain concrete and coir fiber bolster cement were less vulnerable against chloride ambush .

Based on the examination of weight it is assumed that coconut fiber can possibly be used as a piece of the age of helper lightweight concrete.

Table VIII RESULTS OF RCPT

SPECIMENS	RCPT RESULTS (COULOMBS)	CHLORIDE ION PANETRATION ACCORDING TO ASTM C1202-10 (COULOMBS)
CONTROL	1758.60	LOW
2% CFRC	1862.55	LOW
3% CFRC	1884.15	LOW

REFERENCES

1. Satyanarayana, K. G., Sukumaran, K., Mukherjee, P. S., Pavithran, C., And Pillai, S. G. K. 1990. “Natural Fibre Polymer Composites. Cement And Concretecomposites
2. M. Ali, A. Liu, H. Sou & N. Chouw “Effect Of Fibre Content On Dynamic Properties Of Coir Fibre Reinforced Concrete Beams”
3. Concrete Technology By M.S.Shetty
4. Is 456:2000 Plain And Reinforced Concrete
5. Is 2386: Part 1 Method Of Test For Aggregate For Concrete
6. Is 4031:Part 4 -1988 Method Of Physical Test For Hydraulic Cement
7. Is 10262:2009 Concrete Mix Proportioning Guidelines

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Mr.R.M.Saravana Kumar , Completed M.E in structural Engineering field having 4 publications in scopus indexed journals and one publications in non scopus indexed journals. Membership recieved from IAHS,IAENG,IRED. The research area includes shear walls and earthquake resistant structures.

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