

Coconut Coir & Polypropylene Reinforced Concrete

Salwick Kumar Verma
Department of civil engineering
Institute of technology aisect university
Raisen (M.P.) india

Prof. Amit Kumar Ahirwar
Assistant professor department of civil engineering
Institute of technology aisect university
Raisen (M.P.) India

Abstract - This paper briefly discusses the effects of addition of synthetic fiber and natural fiber on the properties of mortar concrete mix of M25 at 28 days five concrete mix with fiber dosages 0%, 0.5%, 1.5%, 2.5%, 3.5%, 4.5%, of the weight concrete mix. Cement packing bags pieces of 1 to 2 cm of length is used as synthetic polypropylene fiber and coconut coir with the length of 2cm.to 3cm.used as of natural fiber. Combination of these fibers will used as dosages of mix fiber .Cubes of size 15x15x15 cm. to check the compressive strength. The result of fiber reinforced concrete for 7 days, 28days, curing of concrete. The testing of concrete according to Indian standard specification to identify the effect of workability and mechanical strength properties due to doses of combined fiber.

Keywords: concrete, synthetic and natural fiber, drying shrinkage, compressive strength, compaction factor, workability test such slump cone test, compaction.

INTRODUCTION

The addition of combination fiber in concrete will control cracking due to shrinkage, thermal insulation, bleeding of water. The use of fiber is the awareness of environment is growing day by day. Worldwide researchers utilize materials which are ecofriendly.

When we compared to synthetic fibers and manmade fibers, natural fibers become best alternative and it is cheaper and more economic then other composite material. These are environmental friendly composite material. In this experiment coconut coir fiber is the natural fiber. Fibers were mixed separately with polypropylene matrix and by using hand lay –up technique these reinforced composite material is molded .use of this fiber is as an alternative to controlling shrinkage, settlement cracking and temperature cracking. The flexural strength of concrete is greatly improved with the addition of this fiber, and provides an excellent replacement

OBJECTIVES AND SCOPE

The aim of this study is to investigate the effect of polypropylene fiber and coir fiber on physical properties of concrete the objectives of this works

1. To find out variation in compressive, tensile and flexural strengths of CFRC using processed fiber strands and raw fiber meshes at varying fiber contents and to compare it with that of conventional concrete
2. To determine the influence of shape of fibers on strength of concrete

The **scope** of this research is limited to residential constructions. Light weight pavement, low cost of construction composition material, thermal insulation and chemical storage tanks and pipes ETC.

LITERATURE REVIEW

(1)Nandish S C et al (june 2015)

This study describes the enhancement in the strength of the conventional concrete by the addition of fibres. Coconut fibres and polypropylene fibres are used to increase the strength of the concrete.. Slump test was carried on fresh concrete while compressive strength, split tensile strength and flexural strength were carried on hardened concrete. These tests are carried out to determine the mechanical properties of concrete up to 7, 28, 56 and 90 days for compressive strength, 28 days for split tensile strength and flexural strength. A notable increase in the flexural and tensile strength was found

(2)Roohollah ET. Al [2012]

We're investigating that Fiber addition was seen to enhance the physical and mechanical properties of lightweight concrete (LWC). Compared to Unreinforced LWC, polypropylene (PP) reinforced LWC with fiber proportioning 0.35% and12 mm fiber length, caused30.1% increase in the flexural strength. Increased fiber availability in the LWC matrix, in addition to the ability of longer Polypropylene fibers to bridge on the micro cracks, is suggested as the reasons for the enhancement in mechanical properties.

(3)Praveen ET. Al [2013]

Were the effects of variation of polypropylene fibers ranging from 0.1% to 0.4%along with 0.8% fibers on the behavior of fibrous concrete? The mechanical properties of the concrete such as Compressive and tensile strength have been founded . The result the addition of polypropylene fiber has a little effect on the Compressive strength, but there was increase in the tensile strength with increase in fiber volume fraction. As per investigation increase of 47%of split tensile strength and 50% of flexural strength is the result were ultimate load mainly depended on percentage volume fraction of fiber.

(4)Parbhane ET. Al [2014]

There were investigated that the workability and tensile strength of concrete increased to some extent as the coir increased. Concrete cubes produced by 1%, 2%, 3%, 4% &5% addition attained 28 days tensile strength of 2.68, 2.90,3.11, 3.25, 2.33 respectively.

TEST RESULTS AND ANALYSIS
 SLUMP TEST

Fibre %	W/C Ratio	Slump value (MM)	Remark
0%	0.4	180 mm	Slump >100
0.5%	0.43	210 mm	Slump >100
1.5%	0.47	225 mm	Slump >100
2.5%	0.51	246 mm	Slump >100
3.5%	0.59	215 mm	Slump >100
4.5%	0.62	190 mm	Slump >100

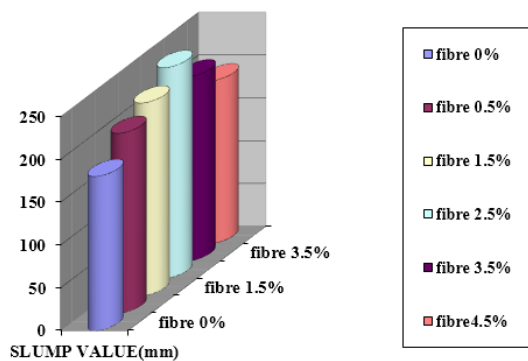


Chart 1

INFERENCE

From the table it is observed that the desired slump value is obtained for trial 3 at water cement ratio = 0.55. Hence we fix it as the design ratio. Trial 1 and 2 yielded very low slump values which may be either due to inadequate paste available for binding the mix or due to improper mixing procedure.

COMPRESSIVE STRENGTH

Compressive strength of conventional Concrete Cubes

The compressive strength of concrete cube with different water cement ratio was tested. The results are as shown in Table and figure down here



Fig 10 Compressive Strength of Conventional Concrete Cubes

Fibre %	7 days strength(n/mm ²)	28 days strength(n/mm ²)
0	19.20	27.53
0.5	20.39	28.19
1.5	22.21	28.96
2.5	23.96	29.32
3.5	24.81	30.19
4.5	23.59	29.68

FLEXURAL STRENGTH OF CFRC

The result for Split tensile strength of raw fibre reinforced concrete and slump test results are shown in and is shown graphically in The cracking pattern of the beam is shown.

Fibre %	7 days strength(n/mm ²)	28 days strength(n/mm ²)
0	2.38	3.62
0.5	2.52	3.89
1.5	2.95	4.23
2.5	3.36	4.65
3.5	3.89	5.19
4.5	3.55	4.89

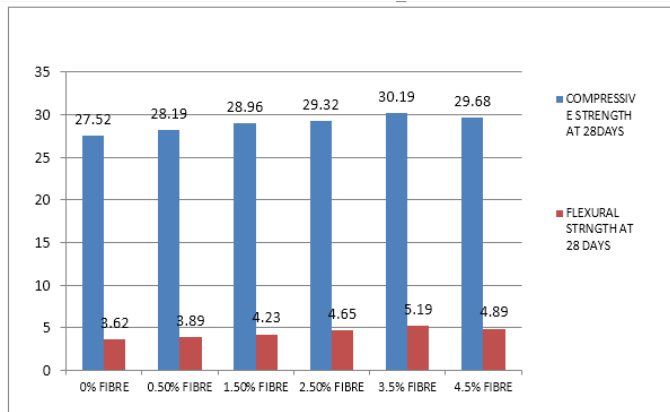


CHART 2

COMBINED CHART OF COMPRESIV AND FLEXURAL STRENGTH AT 28 DAYS

CONCLUSION

Coir fibre and cement bag is available in a at the test site, which makes it quite good as a reinforcement material in concrete. Further, it acts as a source of income for the coconut producer who gets the benefits of the new demand generated by the construction industry. In addition to that fibre mix, it is an efficient method for the disposal of coir mattress waste and polypropylene cements bags which will reduce the demand for additional waste disposal infrastructure and decrease the load on existing landfills and incinerators. Coconut fibres being natural in origin, is ecologically sustainable and cements bags uses is eco-friendly can bring down the global carbon footprint quite effectively.

FUTURE SCOPE

The effect of coconut fibres on high strength concrete should be studied and thus the use of coir and polypropylene fibre can be extended to industrial and commercial buildings. Since the corrosion study is not done, the applicability of CFRC in reinforced constructions could be tested.

Coconut coir fibre is a good insulator in itself and as such it can improve the thermal properties of concrete. This is particularly useful in a tropical country like India where the mercury levels are quite high for most part of the year, so as to maintain the room temperatures within comfort levels of its inhabitants. It can also reduce the load on air conditioning systems thus reducing the power consumption

REFERENCES

- 1) Nandish S , Ajith B , Dr. Chandrashekara G Student, KVG College of Engineering, Sullia, India.2Assistant Professor, KVG College of Engineering, Sullia, India.3HOD, KVG College of Engineering, Sullia, India for Impact of Coconut Fibre and Polypropylene Fibre (Recon 3s) on Concrete Mix Including Admixture
- 2) Roohollah Bag herzadeh, PhD, Hamid Reza Pakravan, Abdol-Hossein Sadeghi, Masoud Latifi, Ali Akbar Merati, "An Investigation on Adding Polypropylene Fibres to Reinforce for making Lightweight Cement Composites "(LWC), Volume 7, Issue 4,[2012]
- 3) Praveen, Ankit Sharma, "Structural Behavior of Fibrous Concrete Using Polypropylene Fibbers", Vol.3, Issue.3, pp-1279-1282, May-June,[2013]
- 4) Parbhane D M Shinde S, "Strength Properties Of Coir Fibre Concrete", International Journal Of Civil Engineering and Technology (IJCIET Volume 5, Issue 2, pp. 20-24, February [2014]
- 5) Okere Chinenye Elizabeth, "Strength Properties Of Coconut Fibre Ash Concrete" Journal of Research in Architecture andCivil Engineer [2013]
- 6) Shubha Khatri, "Impact of Coconut Fibre & Polypropylene Woven Fibre with Concrete Mix", International Journal of Scientific & Engineering Research, Volume 5, Issue 6, June [2014]
- 7) Abhijeet.R.Agrawal, Sanket.S.Dhase, Kautuk.S.Agrawal,"Coconut Fibre in Concrete to Enhance its Strength and making Lightweight Concrete" Volume 9, Issue 8 PP. 64-67,January [2014].
- 8) Majid Ali, Nawawi Chow (2012),"Experimental investigations on coconut-fibre rope tensile flexural strength and pull-out from coconut coir fibre reinforced concrete", Construction and Building Materials, 41, 681–690
- 9) Rakesh kumar, pankaj goel and renu mathur rigid pavement division central road research institute. Delhi 110025 on suitability of concrete reinforcement with synthetic fibre for the construction of pavement(2012
- 10) Divyeshkumar Dparadava prof. jayeshkumar pitroda from B.v.m. engineering college vallabh vidya sagar gujrat india on utilization of artificial fibres in construction industry.(2011)
- 11) kshitija nadgouda assistant professor ,sardar patel college of engineering, andheri Mumbai research at coconut fibre reinforcement concrete(2013)
- 12) deepaa sinha associate professor, structural engineering dept.gujrat india on study of strength o characteristics of hybrid fibre reinforced concrete(2012