International Journal of Recent Trends in Engineering & Research
ISSN (ONLINE) : 2455 – 1457
IMPACT FACTOR : 4.101

ICNSCET20- International Conference on New Scientific Creations in Engineering and Technology

EXPERIMENTAL INVESTIGATION ON CONCRETE WITH NATURAL FIBRES

A. Anandh Raj[1], S. Karthikeyan[2]

[1]PG student, Department of Structural Engineering, M.I.E.T Engineering College, Tiruchirappalli, Tamil Nadu, India

[2]Assistant professor, Department of Civil Engineering, M.I.E.T Engineering College, Tiruchirappalli, Tamil Nadu, India

Abstract- This project describes experimental studies on the use of bamboo fibre and banana fibre to enhance the strength and application of concrete. The natural fibres has excellent physical and mechanical properties and it can be utilized more effectively. The natural fibres are the one at which it has been easily available on the environmentally, recently there has been rapid growth in research and innovation on it. . Concrete cubes were casted with BAMBUSA and MUSA fibres.. When the BAMBUSA fibres are added up to 1% on concrete, it increases strength When the MUSA fibres are added up to 0.3% on concrete, it increases 1% gives the desired results respectively.

Key Words: Bamboo fibre, Banana fibre, BAMBUSA, MUSA, Compressive strength.

I. INTRODUCTION

The natural fibres are the one at which they are in many types in that the bamboo fibres and the banana fibres are most cost efficient. Bamboo is a natural perennial grass-like composite and contains lingo-cellulosic-based natural fibres. Generally, it occurs in the natural vegetation of many parts of tropical, subtropical and mild temperature regions, with about 1250 species identified throughout the world. It reaches its full growth in just few months and reaches its maximum mechanical resistance in just few years. Bamboo is one of the oldest building materials used by mankind. The bamboo has been made into an extended diversity of products ranging from domestic household products to industrial applications. In Asia, bamboo is quite common for bridges, scaffolding and housing, but it is usually a temporary exterior structural material. The fusion of concrete with fibres is a conventional technique. Natural fibres have the potential to be used as reinforcement to overcome the inherent deficiencies in concrete material composites. Though, nowadays, glass, steel and synthetic fibres like polypropylene plays an important role in concrete industry But the most sustainable type of fibre which can be used in concrete with the least harmful effects on nature is natural fibre. These are extracted from various animals and vegetables with the help of modern technology. The cost effective and sustainable building construction is possible with the use of natural fibres. It is found that natural fibres of different form can be used to alter conventional steel rebar as reinforcement of concrete structures.

1.1. OBJECTIVES

- To determine the strength of concrete by adding different proportions of admixture (MUSA fiber) such as 0.3, 0.6 and 1% of cement.
- To concentrate on the strength test of composite members made accompanied by BAMBUSA fiber.

@IJRTER-2020, All Rights Reserved

- It determines the compressive strength of cubes made of bamboo and banana fiber concrete.
- Different mixing ratios are used for conducting this study.

II. MATERIALS

1. CEMENT

Cement is the most important ingredient in concrete. One of the important ingredients for the selection of cement is its ability to produce improved micro structure in concrete Conventional concrete FCC), the effect of characteristics of cement on water demand is more noticeable

2. FINE AGGREGATE:

Fine aggregate used for Conventional Concrete (CC) should be properly graded 10 give minimum void ratio and be free from deleterious materials like clay, silt content and chloride contamination etc. The specific gravity of fine aggregate is 2.6, Fineness modulus is 2.52.

3. COARSE AGGREGATE

Aggregate are the important constituent in concrete. They give body to the Concrete reduce shrinkage and elect economy. The more fact that the aggregate Occupy 70-80 percent volume of concrete, their impact on various characteristics and properties is undoubtedly considered. The Coarse aggregate that is to be used in concrete is to be of perfect in size and shape to form a strong bond between the other materials in the concrete. Normal size of course aggregates 20mm. various tests are also considered for the coarse aggregate to calculate the strength of the aggregate.

4. WATER

Water is used for mixing and curing. Water free from impurities and salt used for casting and curing the concrete block as per IS: 456-2000.

5. NATURAL FIBRES

Banana fibres are generally lignocelluloses material, consisting of helically wound cellulose micro-fibrils in amorphous matrix of lignin and hemicelluloses. The cellulose content serves as a deciding factor for mechanical properties along with micro- fibril angle. A high cellulose content low micro fibril angle impart desirable mechanical properties for banana fibres. The composition of banana trunk obtained by elemental analysis.

Fig 1. BAMBUSA, MUSA Fibre

III. MIX DESIGN

The mix proportion of M25 grade concrete was designed based on the recommendation of IS 10262-2009 is 1: 1: 2 Mix contains part of cement, 1 parts of fine aggregate and 2 parts of coarse Aggregate for M25 grade. Volume of concrete = 1 m^3

Volume of cement = 0.1312 m^3

Volume of water = 0.186 m^3

Volume of all in aggregate = 0.6828 m^3

Mass of coarse aggregate = 1166.76 kg/ m^3 Mass of fine aggregate = 644.017 kg/ m^3

Fig 2. Casting and curing

IV. PREPERATION OF TEST SPECIMENS

The ingredients for the various mixes were weighed and prepared the mixes by tilting drum type concrete mixture machines. Precautions were taken to ensure uniform mixing of ingredients. The specimen were cast in steel mould and compacted by a tamping rod.

The specimens of 150mm ×150mm × 150mm size of cubes and 150mm diameter 300mm high cylinder specimens were casted for the determination of compressive strength and split tensile strength at different ages respectively.

V. RESULT AND DISCUSSION

A. VARIOUS ADMIXTURE FOR WORKABILITY TEST

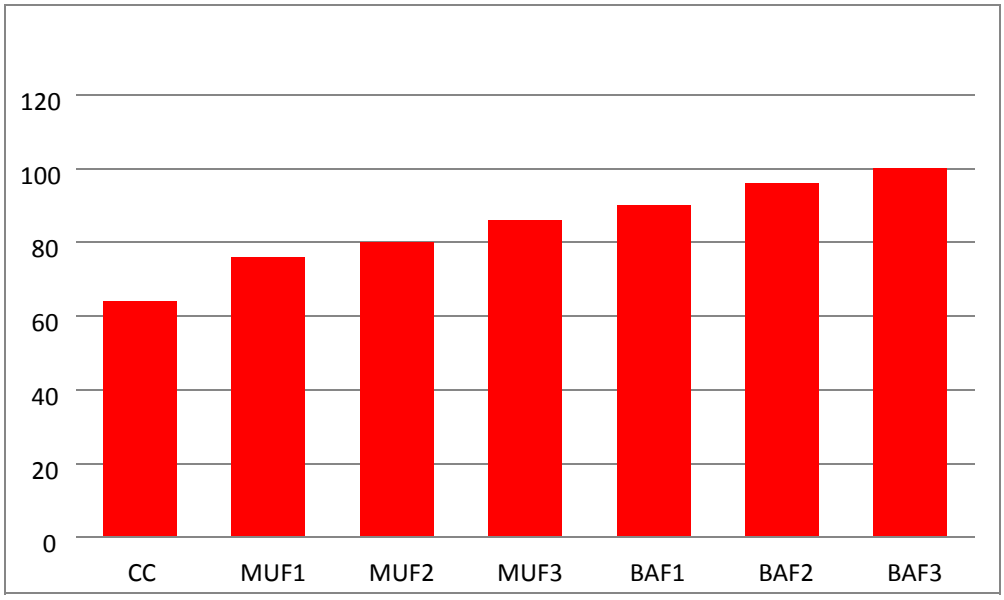
Slump test is used to determine the workability of fresh concrete. The test was followed as per IS 1199-1959. The result of the slump test was represented in table.

s.no	TYPE OF CONCRETE	SLUMP (mm) VALUE
1	CC	64
2	MUF1	76
3	MUF2	80
4	MUF3	86
5	BAF1	90
6	BAF2	96
7	BAF3	100

Table 1. Slump value

Where,
CC- Conventional concrete
For MAF1 concrete Admixture of 0.3% added on concrete
For MAF2 concrete Admixture of 0.6% added on concrete
For BAF1 concrete Admixture of 1% added on concrete
For BAF2 concrete Admixture of 2% added on concrete

@IJRTER-2020, All Rights Reserved



SLUMP VALUE

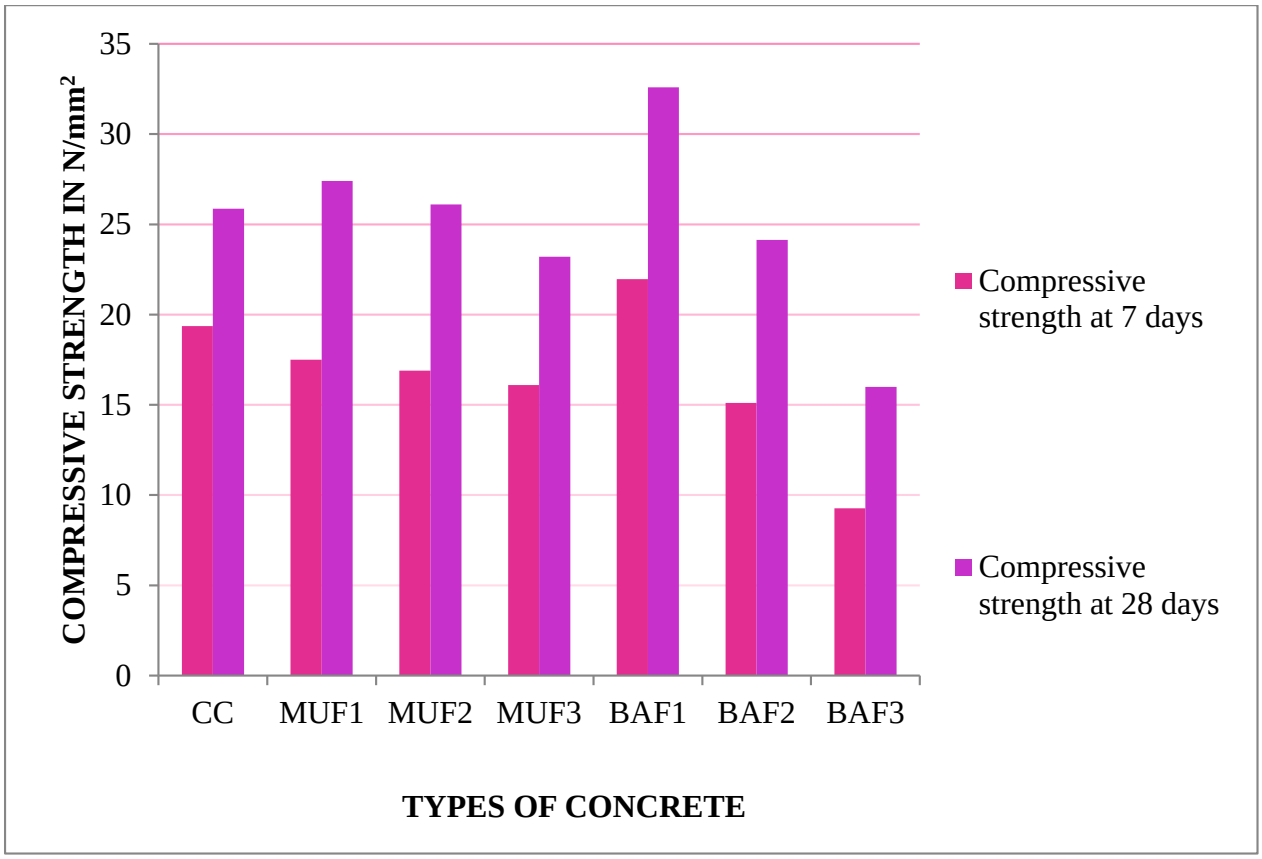
B. COMPRESSIVE STRENGTH TEST

Average compressive strength for 7 and 28 days obtained by taking average of specimen for each day are compiled below.

s.no	Mix name	Compressive strength (N/mm^2)
1	CC	25.86
2	MUF1	27.4
3	MUF2	26.1
4	MUF3	23.2
5	BAF1	32.59
6	BAF2	24.14
7	BAF3	16

Table 2. Compressive strength

@IJRTER-2020, All Rights Reserved



VI. CONCLUSION

From the results and discussion, it was concluded that the natural resources are god to the mankind. But these renewable resource and natural fibre will soon deplete. For maximum potential, utilize the natural fibre for the development of the science and technology. Hence this project is done with MUSA & BAMBUSA FIBRE as admixture.

1. The compressive strength increases by nearly 10% to 15% for 1% addition of BAMBUSA FIBRE when compared to conventional concrete specimen.
2. The compressive strength increases by nearly 2% to 5% for 0.3% addition of MUSA FIBRE, when compared to conventional concrete specimen.
3. It gives good results when the admixture range is up to 1%.
4. It is found that increasing in compressive strength by adding and admixture as BAMBUSA FIBRE and MUSA FIBRE in concrete.

REFERENCES

[1] Ashish Chauhan and Priyanka Chauhan (2013), "Natural Fibre Reinforced Advanced Material"- International Journal of Scientific & Engineering Research, Volume 1.

[2] Dr.Y.P.Joshi and Amit Rai (2014) Volume 3," Application and Properties of fibre Reinforced Concrete" International Journal of Research in Engineering and Technology, Volume 6.

[3] Girisha, C.Sanjeevamurthy; Guntiranga. S(2012)," Effect of alkali treatment, fibre loading and hybridization on tensile properties of sisal fibre, banana empty fruit bunch fibre and bamboo fibre reinforced thermo-set composites"- International Journal of Civil Engineering and Technology, Volume 3.

[4] Jaspal Singh, Manmeet Kaur and Manmeet kaur (2015) "Sustainable Concrete Using Natural fibre"- International Research Journal of Engineering and Technology, Volume 1.

[5] Liu Et Al,(2010), "Properties of Natural Fibre Cement Boards of Building Partion"- Indian Journal of Science and Technology Volume 2.

[6] M.K.Gupta and R.K.Srivastava (2015)" Properties of sisal fibre Reinforced Epoxy Composite" - International Journal of Science and Research, Volume 3

[7] Mohini Saxena Et Al.,(2008) "Plant fibre Indusrial Waste Reinforced Polymer Composites as a work material"- Journal of Scientific & Engineering Research, Volume 2

[8] Prasath, K.A., Krishnan, B.R. and Arun, C.K., 2013. Mechanical properties of woven fabric Basalt/jute fibre reinforced polymer hybrid composites. Int. J. Mech. Eng, 2(4), pp.279-290.

[9] Krishnan, B.R., Ramesh, M., Giridharan, R., Sanjeevi, R. and Srinivasan, D., Design and Analysis of Modified Idler in Drag Chain Conveyor. International Journal of Mechanical Engineering and Technology, 9(1), pp.378-387.

[10] Krishnan, B.R. and Ramesh, M., 2019. Experimental evaluation of Al-Zn-Al2O3 composite on piston analysis by CAE tools. Mechanics and Mechanical Engineering, 23(1), pp.212-217.

[11] KRISHNAN, B.R. and PRASATH, K.A., 2013. Six Sigma concept and DMAIC implementation. International Journal of Business, Management & Research (IJBMR), 3(2), pp.111-114.

@IJRTER-2020, All Rights Reserved