

EXPERIMENTAL STUDY ON BAMBOO AS REPLACEMENT MATERIAL FOR STEEL REINFORCEMENT

Vishwas Walimbe

Research Scholar, Civil Engineering Department, SSJCET, Asangaon, Thane

Abstract- As human being food, cloth & shelter are fundamental need. In today era high rocketing prise of home is not afford by many person. but everyone have dream to live in his own home. So how can we fulfill their dream so need to focus on construction of such house that is affordable to them? With affordability it not residue any negative impact to environment not compromise any quality. Should sustained long life span .there is very less maintains cost. So this thesis topic entitled with affordable housing through sustainable construction.

To find out solution literature review was done on various research papers. Based on this we find out bamboo as alternative for reinforcement. To carryout various tests on bamboo like compressive strength, split tensile strength, tensile strength different percentage of bamboo reinforced. After completion of curing period specimen will test& based on result obtained affordable housing will design.

Index Terms- affordable, sustainable, bamboo reinforcement, tensile strength, flexural strength...

1. INTRODUCTION

EVERYONE HAVE SKY, WHEN FEEL TO FLY
EVERYONE HAVE HOUSE, BACK TO EVENING

India is my country, my country all people should be live with happily most positively wealthy& healthy is everyone responsibility, may some have dream. To make our country wealthy & healthy we need to focus on basic need of (fundamental requirements) of human being. There are three basic needs of human being first one food cloth& shelter. So as civil engineering student I like to focus on shelter.

Housing is a basic need of man. In importance, it is third after food and clothing. A house is the place where one can take rest, sleep and cook food. . In developed countries the top most executives bring their work home in their own briefcases and get it done in the home at night. As per the available information man spends a good part of his lifetime in his house. This clearly indicates the fact that a house is a part and parcel of a man's life. Man in today's world is food,

clothing and shelter. So house construction is a dream of every person in world. Whether he/she is a farmer, peon, labour or private employee whatever.

If we see today's high rocketing prise of housing cannot afford to people to buy their own dream house.

Table No: 01

City Name	Buy Rates	
	Avg price per sqft	Price rise
Ahmadabad	59,998.25 / sqft	84.30%
Bangalore	75,30.49 / sqft	90.10%
Chennai	87,508.78 / sqft	64.80%
Delhi	1,35,952.5 / sqft	64.50%
Gurgaon	1,16,410.6 / sqft	25.10%
Kolkata	45,901.74 / sqft	4.70%
Mumbai	1,83,254.27 / sqft	95.50%

1.3 Aim of Research:

To design a low cost housing using bamboo as reinforcement.

1.4 Objective of Research:

The objectives of this thesis listed as follows.

1. To check the strength of beam, concrete& slab with bamboo as partial replacement for steel.
2. To conduct experiment to check the strength of various specimen.
- 3 To design low cost housing through sustainable construction based on results.

1.5 Methodology and chapter scheme

This thesis has adopted technology approach in reaching different objectives. In total there are four chapters.

In the first part describe brief idea of research and second chapter outlined the review of various research papers. Third chapter highlighting experimental program carried out in research & last fourth chapter end with detailed summary of research

2. LITERATURE REVIEW

To find out one of the best sustainable construction technique we have done literature review of some paper that mentioned in this chapter.

Anurag Nayak¹, Arehant S Bajaj (2013): In this paper cost-wise comparison of steel reinforcement vs. bamboo reinforcement done. Author designs on the basis of shearing and bending. Based on this study cost vs. strength results have been discussed in the paper. author conducted test on one way slab of size 3000 x 7000 sq-mm with providing beam of 7000 mm length and 250 x 250 sq-mm bamboo as finally author find out bamboo reinforcement is cheaper than that of with Steel reinforcement.

Ranendra Nath Bhowmik, Joyanta Pal, Partha Pratim Sarkar(2017): In this study, splint of Bambusa Balcooa species used as reinforcing material in the brick aggregate concrete for making concrete beam using different percentage of bamboo reinforcement ultimate load carrying capacity of bamboo reinforced beam done. In this study bamboo average tensile strength 287.69 MPa.

R. Pandi¹, B.V. Samuel Melbon-Apr 2018: In this paper researcher have deigned 100 KN load taking beams 750mm x 150mm x 150mm @ cover of 20mm. reinforcement according to the provisions adopted in SP34. resercher carried out test like Tensile, Double Shear and Flexural Strength./he find out, tensile and double shear results were low for bamboo (almost 50%). Bamboo shows high flexibility in nature and it deflection more as compared to steel

Mark Adom-Asamoah-December 2011: In this study researcher considered web material bamboo, rattan cane and steel. Sixteen beams were tested to failure under four point bend tests. Researcher developed performance model to find out most economical stirrups. Author recommended that bamboo reinforced concrete beams are reinforced with steel stirrups to improve its load carrying capacity.

N. Ganesana, P.V. Indirab and P.R. Himasree (December 13, 2017): In this paper researcher have studied strength and behaviour of three prototype bamboo reinforced concrete wall panel specimens varying aspect ratio & thickness ratio under two-way in-plane. Author developed empirical formula after considering the geometrical parameters of bamboo reinforced concrete wall panels for predicting its ultimate strength under two way in-plane actions. The study shows that bamboo reinforced concrete wall panels of aspect ratio varying from 1.667 to 2 and thinness ratio varying from 12.5 to 15 could sustain loads as high as 530 to 630 KN. With increasing aspect ratio, the ultimate load of wall panels was found to decrease whereas it increases with increase in thinness ratio.

Ogunbiyi, Moses A. Olawale, Simon O., Tudjegbe, Oke E. Akinola, S. (November 2015): In this paper researcher have studied tensile strength-behaviour with different size of steel & same compare with bamboo reinforcement study concludes that due to the minimal breaking force (FB) of bamboo, it cannot be employed as a main structural member in building and other engineering works but can be used as partitioning wall, ceiling, roof and other areas of engineering construction that is not heavy load-bearing. Like partition wall,

Masakazu TERAJ & Koichi MINAMI (2012): This researcher investigates the mechanical properties of bamboo reinforced concrete structure & compares these experimental results of bamboo reinforced concrete members with reinforced concrete members. Author suggested to study the following conditions: A] Design of the structure with bamboo, B] Combinations o.

3. EXPERIMENTAL STUDY

In this section to carryout various test like compressive strength, flexural strength & split tension test respectively of bamboo reinforced concrete columns, slab & wall panel required testing specimen are casted. It includes column design, concrete mix design, bamboo preparation, reinforcement preparation, shuttering preparation, concrete casting, and the test conduction. The column test set-up and instrumentation are described in detail. Finally, the loading history and testing procedure are present

Major Steps The project is carried out in four major steps & they are 1) Designing M20 mix as per IS 10262:2009 & fixing the mix proportion. 2) Making of bamboo reinforcement 3) Casting of concrete column, beams & wall panels as per IS for various percentage of reinforcing & testing it for compressive strength, flexural strength & split tension test respectively. 4) Comparing the results

Laboratory Mix design of M20 concrete: Various material tests are taken as Specific gravity and water absorption of coarse aggregate, Specific gravity and moisture content of fine aggregate (sand), Silt content of fine aggregate Sieve analysis of sand for grading zone, moisture content .with the help of IS 10262:2009 mix design done.

Bamboo reinforcement: From my village Alyani three months before solid bamboo (mesa) culms take &with proper treatment made it water free .that bamboo culms then cut in various size as per experimental requirement. In green concrete, bamboo splints absorb water and swell. To avoid swelling it's coated with black japan.



Fig no: 1 dry solid bamboo culms (mesa)

Fig no:2 Black japan treatment

Fig no:3 bamboo splints of various size

Fig no:4 reinforcing of bamboo for wall

Casting of various specimens:

It includes making proper shuttering formwork column ,wall panel as well slab for column reinforcement bind with straw bell of bamboo with black japan treated& for wall& slab its directly fix with the help of nails



Fig no:5 casting of wall

Fig no:6 casting of slab

SUMMARY& CONCLUSION

In this research paper bamboo is used as an alternatively reinforcement for casting of Slab, column, beam wall specimen.

The literature review shows that the cost of structure can be reduced by innovative used of bamboo. Bamboo is ecofriendly viable material also easily available .This will help in house construction. This reduces cost of homes.

The testing of specimen will be carryout after 28 days &affordable housing will be design on based on the test result

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