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A Review on Bamboo Reinforced Concrete Beam

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Abstract: *Concrete is the artificially produce material in the world. Reinforced concrete is used in general construction work. Cost of steel reinforcement is quite high. So it is necessary to find cheaper alternative to steel reinforcement. Bamboo can used as reinforcement for light weight structures. Large no. of investigators began to find cost effective and energy efficient construction material as reinforcing material. Among the many possibility for such substitution, bamboo is considered. Bamboo grows and develops rapidly and it is quite economical also. Ample tensile strength makes bamboo fit far using as reinforcement alternative to plain steel bars. An important investigation in structural engineering can be done by placing bamboo as reinforcement. In this review paper emphasis is made on tensile strength, compressive strength and flexural strength.*

Key Word: *Concrete, bamboo, bamboo reinforcement, corrosion*

I. INTRODUCTION

As steel reinforcement in the concrete is expensive material, it is important to find cheaper alternative to steel. For developing low cost housing and temporary structure conventional reinforcement can be replaced with other cheaper alternative as to make structure cost effective. Certain investigation on cheaper material are going on for substituting it with steel reinforcement. One of the fastest growing plant is bamboo which shows potential properties due to which it can be replaced with steel reinforcement. Dueto its good tensile strength bamboo can be used in place of steel bar in the structure for temporary and low cost housing. An important research can be carried out in the field of structural engineering by placing bamboo strips as reinforcement. A review of various research carried out on replacing steel bar with the bamboo strips are illustrated in this paper. Different strength capacity of bamboo substituted beam are majorly discussed in this review paper.

Advantages of Bamboo

- Bamboo is good in resisting tension.
- Bamboo is flexural in nature.
- Bamboo in seismic resistant.
- Bamboo is an earthquake resistant capacity.
- The weight of bamboo is light as compare to steel.
- Availability of bamboo is quite good.
- Bamboo is relatively cheaper than steel.
- Due to its good tensile strength bamboo can be used as main reinforcement as well as distribution reinforcement.
- Relatively low energy is required for processing bamboo as compare to concrete and steel.

Disadvantages of Bamboo

- Bamboo has very low fire resistant.
- Age of bamboo is important parameter for deciding for strength of bamboo.
- Strength of bamboo is inversely proportional to its age.
- Moisture content imparts greater influence on the bamboo.
- The bonding between bamboo and concrete is difficult to establish.

- Durability of bamboo is very less.
- Non uniformity in the shape of bamboo.
- No proper design codes are available for bamboo construction.

II. LITERATURE SURVEY

[1] I.K. Khan Bamboo strips of varying cross-section like triangular, circular and square were used as reinforcement. Tensile strength of bamboo came out to be nearly half that of mild steel.

[2] Sanjiv Gill, Dr. Rajiv Kumar Bamboo resembles same behavior as plain steel bar. Strength of bamboo is affected by water absorption. Bamboo possesses good tensile strength.

[3] Anurag nayak, Abhishek jain Steel bar, timber and other material can be replaced by bamboo in construction work. Bamboo swells up when comes in contact with water hence there is need of applying water proof coating on the surface of bamboo. Without coating bamboo cannot be effectively used as reinforcement. Bamboo is some what proves cheaper than conventional mild steel bar.

[4] Dr. Ashok Kumar Gupta, Dr. Rajiv Ganguly Bamboo is light material due to its low density. Water absorption is directly proportional to the no. of nodes. No. of nodes increases tensile stress.

[5] Chandra Sabnani, Utpal Sharma Bamboo having particular brown colour is suitable as reinforcement. Minimum as of plant in three years to get good strength. To increasebond thin coating of chemical can be applied. Bond will become weak if thick coating is applied due to increase lubrication.

[6] Jigar K. Sevalia, Nirav B. Siddhpura et. al. More elastic behavior is shown by doubly reinforced beam as compared to singly reinforced beam during flexural test performed. Doubly reinforced beam carry 29.31% more load than singly reinforced beam.

[7] Prof. M.R. Wakchaure, AjinkyaKaware et. al. Nodes of bamboo are quite weakpoint hence maximum failure occurs at nodes. Coating of epoxy material should beapplied to bamboo as to increase bond stress. Bamboo is inappropriate to be used as shearreinforcement. Bamboo is cost effective. So it can be used in small budget houses andtemporary structures.

[8] S.V. Rayudu, Akshay Pradeep Randiwe, Ishwar Kumar Gupta Strength reduces to 26% if steel is fully replaced by bamboo. Strength increases to 83% when bamboo is only used in compression side and steel at tension side.

[9] Dr. M. B. Varma Failure of plain concrete beam is brittle while beam reinforced bamboo strip shows ductile break down. Moreover bonding of bamboo strip can be enhance by using certain chemicals showing adhesive properties.

III. CONCLUSION

1. In small budget houses bamboo can be used in place of steel due to its good tension carrying capacity.

2. Bamboo cannot be used as shear reinforcement due to its weak shear strength.

3. Water absorption imparts far greater influence on mechanical properties of bamboo.

4. Bamboo resembles nearly same behavior as that of steel bar.

5. Bamboo reinforcement can be provided in the similar ways as steel reinforcementis provided.

6. Bamboo is light in weight due to its low density.

7. Epoxy coating is needed to increases bond stress of bamboo with concrete.

8. Bamboo having particular brownish colour is used. Bamboo of less than threeyear should not be used as reinforcement with concrete due to low developmentof tensile strength.

9. Maximum strength (tensile) that bamboo can achieve is nearly about 360MPa.Variation of strength (tensile) occurs between 110MPa to 360MPa.

10. Amount of moisture content in the bamboo is high i.e. 45% - 55% by weight.

References

[1] I. K. Khan (2014),"Performance of bamboo reinforced concrete beam", Internationaljournal of science, Environment and Technology, Vol. 3, pp 836-840.

[2] Sanjiv Gill and Rajiv Kumar (2016),"To experimental study and use of bamboo incivil structure as reinforced concrete", International journal of latest research in scienceand technology, Vol. 5, pp 102-105.

[3] Anurag Nayank and Arehant S Bajaj (2013),"Replacement of steel by bambooreinforcement", IOSR journal of mechanical and civil engineering, Vol. 8, pp 50-61.

[4] Dr. Ashok Kumar Gupta, Dr. Rajiv Ganguly and Ankit Singh Mehra (2015),"Bambooas green alternative to steel for reinforced concrete elements of a low cost residentialbuilding", Electronic journal of Geotechnical Engineering, Vol. 20 pp 1523-1545.

[5] Chandra Sabnani, MadhuwantiLatkar and Utpal Sharma (2013),"Can bamboo replacesteel as reinforcement in concrete, for the key structural elements in a low cost house"International journal of Chemical, Environmental and Biological Sciences, Vol.-1, pp257-262.

[6] Jigar K. Sevalia and Nirav B. Siddhpura (2013),"Performance evaluation of axiallyloaded element using bamboo as reinforcement", International journal of Engineering andAdvanced Technology, Vol. 2, pp 413-415.

[7] AjinkyaKaware and Prof. U. R. Awari (2013),"Review of bamboo as reinforcementmaterial in concrete structure", International journal of Innovative Research in Science,Engineering and Technology, Vol. 2. pp 2461-2464.

[8] K. Ghavami (2003),"Bamboo functionally graded composite material", Asian journalof Civil Engineering (Building and Housing) Vol.4, pp 281-288.

[9] Pritesh Kumar, Ashish Jodhani and Abhay Singh (2016),"Bamboo as constructionmaterial and bamboo reinforcement", International journal of Civil and StructuralEngineering Research Vol.4 pp 312-323.

[10] M. Usha Rani (2017),"Investigation on the flexural behavior of bamboo reinforcedconcrete beams", International Journal of Research in Science and Technology, Vol.7 pp9-24.

[11] James Kariuki and Richard A. Shuaibu (2014),"Flexural strength of laminatedbamboo beams", International Journal of Advances in Engineering and Technology. pp1531-1538.

[12] Atul Agarwal Bharadwaj Nanda and DamodarMaity (2014),"Experimentalinvestigation on chemically treated bamboo reinforced concrete beams and columns"construction and building material 71 pp 610-617.

[13] Dr. M. B. Varma (2015),"Properties of bamboo strip reinforced concrete",International Journal of Engineering Research and Technology. Vol. 4 ISSN: 2278-0181.