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COMPARISON BETWEEN CHEMICALLY TREATED BAMBOO AND STEEL REINFORCEMENT AS A BUILDING MATERIAL

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Abstract - *In this research, bamboo stirrup used as reinforcement in a beam that was made with supplementary cementation material and partial replacement of river sand. It has good strength durability. Now a day concrete is widely used as construction material for its various advantages such as low cost, availability, fire resistance etc. The potential application of newly developed bamboo composite material as structural reinforcement called forth for durability test and bond strength examination. Firstly, durability of bamboo composite material and effectiveness of protective epoxy coating were evaluated by subjecting samples to various corrosive environments normally encountered during the life span of construction material The findings of this study suggest the epoxy coating can be an effective approach to simultaneously enhance the bamboo composite material resistance toward acid attack and improve its bond strength with concrete reinforcement application. The size of the beam is 300×300mm and the beam length is 1000mm.*

Key Words*: *Bamboo stirrups reinforcement, Steel reinforcement, Modulus of elasticity, Poison's ratio, flexural strength, deflection strength, Durability

1. INTRODUCTION

Steel reinforced concrete (SRC) is mostly used for construction load-bearing structures. Giant bamboo is the biggest individuals of the grass family. In bamboo, the intermodal locales of the stem are ordinary empty and the vascular bundles within the cross segment are scattered throughout the rather than in a round and hollow course of action. The world timber request expanding at a fast rate but the supply is exhausting. Mechanically treated bamboo has appeared more prominent quality as well as for fabricating of composite material and component which are the conservative and can be reasonable for basic and non-structural application in development. Creating nation have the most elevated request for steel strengthened concrete, but frequently they didn't have implies to create the steel to meet that demand. The large maintainable financial development, efficiency, and the well-being of a country depend intensely on the usefulness, unwavering quality, and solidness of its development office. Research, innovations in alternative materials and building technologies, targeted for the low-cost mass housing sector are unable to see the light of day Addressing all these problems, bamboo stirrups are one of the suitable replacements of reinforcing bar in a concrete beam for low-cost constructions. So, generally steel is used to reinforce the concrete through steel has a high tensile strength to
complement the low tensile strength of concrete, use of steel should be limited as it is very costly and also so much energy consuming in a manufacturing process. Thus a suitable substitute of this with a low cost, environmentally friendly and also less energy consuming one is a global concern; especially for developing countered. Bamboo is a natural material that bothers in diameter, length, and quality according to the climate. The specific gravity of bamboo ranges between 0.4 and 0.5.

II. Preparation

Sizing:
splint beam is generally more desirable than more beam as reinforcement. The larger beam should be split into splint approximately 2/3 inch wide. Whole beam fewer than2/3 in diameter can be used without splitting.

Bending:
bamboo permanently bent by heating, either dry or wet, is applied while applying pressure or load. This procedure can be used for forming splints into square shape stirrups and putting hooks on reinforcement for additional anchorages.

Concrete Mix Proportions:
Mix designs can be used as would normally be used with steel reinforced concrete. Concrete slump must be as low as workability will allow. Excess water causes swelling in bamboo.

Compressive Strength
High early-strength cement is preferred to minimize cracks The hollow column of 200mm length are cut for compressive test three different types of Specimens are select for test first types of specimens contain central nodes second type of specimens contain End nodes and third type of specimen contain without nodes dimension of samples are measured And sample where placed compressive testing machine of capacity 2000kNthe load is applied Parallel to fiber of bamboo in gradual increment until sample failure form the ultimate load Compressive strength is determined used by swelling of bamboo when seasoned

bamboo cannot be waterproofed. The compressive strength was determined by using of compressive strength testing machine (CTM). The specimens were placed vertically on a testing machine one by one and tested. Then the compressive strength can be determined using equation (1). The compressive strength of concrete after 28 days was found 22.5 MPa using a cylinder of diameter 100 mm and height 200 mm.

Description	Area (mm2)	Load (KN)	Compressive Strength (N/mm2)	Avg. compressive strength (N/MM2)
CENTRAL NODE	1689.77	75.80	44.91	35.90
CENTRAL NODE	1547.40	66.40	42.94	
NODE TO NODE	1811.82	35.30	19.48	
NODE TO NODE	2687.85	77.80	28.95	
WITHOUT NODE	1676.59	68.35	40.77	
WITHOUT NODE	1711.25	65.70	38.39	

Table.1- compressive strength

Fig.1- Compressive Strength

Chemical Treatment (Epoxy Coating)-

When seasoned bamboo, either split or whole is used as reinforcement; it should receive an Epoxy coating to reduce with concrete. Without some type of coating, bamboo will swell before the concrete has developed sufficient strength to prevent cracking and the member may be damaged, especially if more than 4 percent bamboo is used.

Fig.2- epoxy resins

Fig.3- epoxy coating

Casting of beam

Beams of size 300mm x 300mm x 1000mm were cast for the testing of flexural and deflection strength. Among 10 beams, 2 were steel reinforced concrete beams (RC) and 4 were bamboo stirrups reinforced concrete beams (BSRC), where remaining and 4 were the whole bamboo reinforced concrete beams (WBRC).

A rate of support in RC bars and WBRC and BSRC bars were kept steady at 3.5%. RC bars were strengthened with 4 numbers of 16mm breadth bars, and WBRC and BSRC bars were fortified with 4 numbers of props with beam were cast as it were with flexural fortification and shear support was not given. A clear cover of 25mm was given for all the ten beam Concrete utilized for the bars was arranged with OPC 53 review cement, slag sand and coarse totals of measure 20mm down. All the fundamental tests on concrete fixings were conducted to know the properties of materials and blend plan was arranged. Droop test was conducted to test the workability and the droop gotten was 75mm. Extents of materials are shown in table

Table.2- many materials

Materials	**Weight in kg for 1m^3 of concrete**
Cement	400
Fine aggregates	713
Coarse aggregates	1075
Water	505

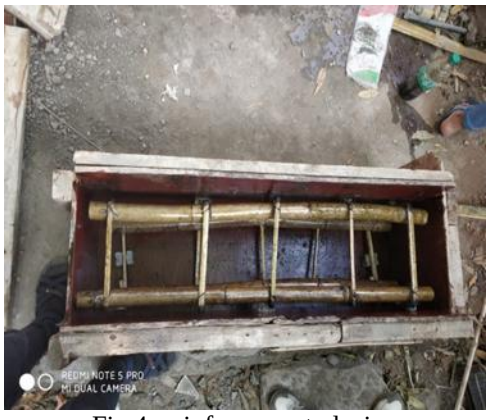

Fig.4- reinforcement placing

Fig.5- the casting of beam

Curing of Beam –

Curing contributes an important role in strength development and durability of concrete. Curing takes place immediately after concrete placing and finishing, and involves maintenance of desired moisture and temperature conditions, both at depth and near the surface, for extended periods.

Fig.6-curing tank

Fig.7-curing of beam

Conclusion

As per the review of the various research papers we selected curtain bamboo species which is used in construction. The result calculated and compared by the testing of flexural test and deflection test on beam section. After the review of the research paper, it was found that the research work in using bamboo reinforcement in concrete is very vast and popular. In this project,

we have adopted advanced bamboo reinforcement technique instead of traditional steel reinforcement. This is a good idea for low-cost economical structure & flexural strength of steel & bamboo reinforcement beam are almost the same.

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