Topic: Bamboo Instead of Steel For Reinforcement

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Abstract- *As we know steel is one of the most important key aspect for any type of construction as steel reinforcement is provided to give strength to the building or road to carry load without collapsing and due to this feature the cost of project differs accordingly.*

But have we ever given a thought why steel? Like in ancient time people use to build structure using woods, then why not use woods in new modern era?

The answer to this thought is simple our ancestors may build their temporary shelters using woods but during any environmental effect they get affected but why to rebuild anything again and again when we can give strength using other materials.

Now, let's give a thought of using bamboo as they can carry more load than woods but less when compared to steelbut we can increase their load bearing capacity using modern equipments.

Purpose:

a) Using Bamboo not only decreases the cost of project but also a step towards the green and clean environment.
b) Also using bamboo can boost the country's economic growth as well as it is safe to use in hilly and earthquake zone areas.

Keywords-
a) Replacing steel by bamboo
b) Research and redevelopment in reinforcement technology
c) Modification in building material
d) Civil engineering innovation aspect
e) Make in India
f) Detailing of steel, concrete, wood, bamboo.

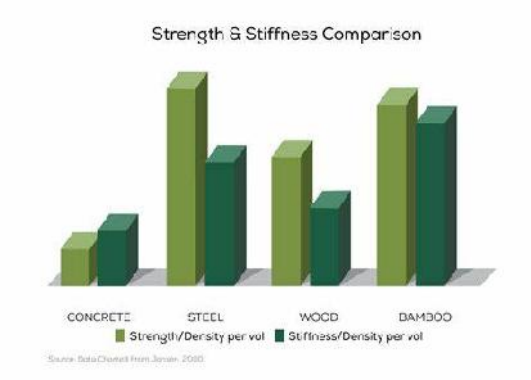
I. INTRODUCTION

a) Planting bamboos along all the national highways and harvesting them instead of trees that are usually cut for construction will be very beneficial for the development of the nation.

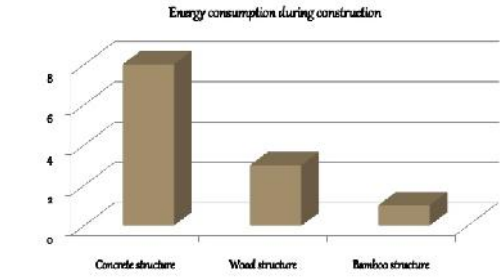
b) Bamboo is lighter in weight than steel and can easily substitute in the construction of homes i.e., corrugated steel sheets can be replaced by corrugated bamboo roofing sheets during construction.

For example: Let's construct a wall or a road by two ways one where we use steel reinforcement and other way in which we use bamboo reinforcement, the difference between load bearing capacity will not be much but the difference between the costing will be at peak.

For a kg, steel costs Rs.40-70(approx.), however, 1kg bamboo costs only Rs. 3.10, but involvement of middleman it may rise to Rs.18, but it is still cheaper than that of steel.



Comparative analysis



As you can see in above pictures it is specified that stiffness of bamboo is more than steel, also the energy consumed while construction is also less in bamboo material results in cost degradation of the project and more efficiency in work.

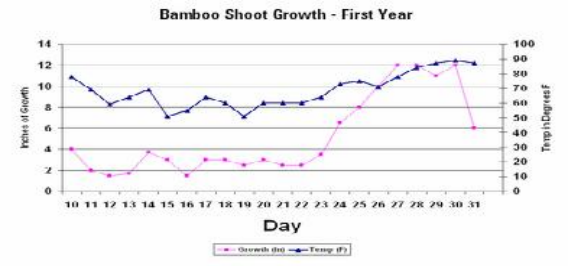
II. IMPACTS

Positive

- Modulus of elasticity of bamboo is (1.5-2) x10^5 kg/cm^3 while that of mild steel is 2.1x10^6 kg/cm^3, thus making it suitable for construction after certain treatments.
- Modulus of rupture of bamboo exceeds the corresponding value of Salby 131.38%.
- Safe working stress in comparison of bamboo is 105kg/cm^2 and the allowable compressive stress has decreased by 20%.
- It can withstand up to 3656kg/cm^2 of pressure.
- Safe working stress in tension of bamboo is 160 to 350 kg/cm^2.
- There is a high content of silicate acid that shows its fire resisting ability.
- Bamboo is three times cheaper than steel reinforcement technique and has similar reinforcing design like steel.
- Internodal sections of bamboo is stronger than steel i.e., 582MPa v. ~ 350MPa.

Negative

- When concrete mix proportion technique is used for reinforcement excess water causes swelling of bamboo, in such cases high early-strength cement is preferred to minimize cracks caused by swelling of bamboo when seasoned bamboo cannot be waterproofed.
- Avoid bamboo cut in spring or early summer. These culms are generally weaker due to increased fiber moisture content.
- It has low modulus of elasticity; in flexural members some cracks are developed.
- When using whole culms, the top and bottom of the stems has to be alternated in every row and the nodes or collars should be stagged otherwise it will lead to non-uniform cross section of the bamboo throughout the length of the member.
- Bamboo is weak at node section so failure can occur.



III. CONCLUSION

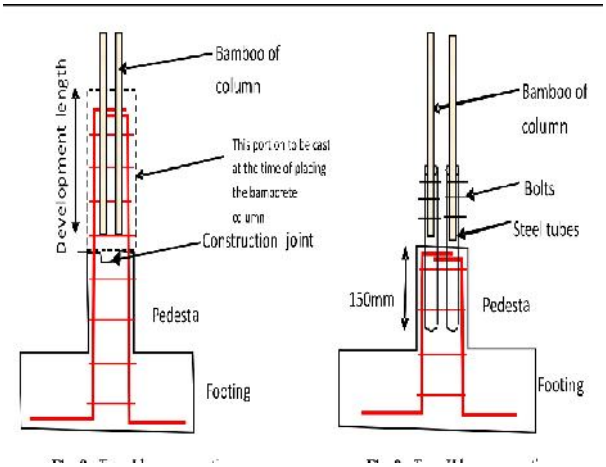
a) Apart from having negative impacts bamboo is more advantageous in hilly, earthquake prone areas. As bamboo is light in weight it can also be used in road construction.

b) Using Bamboo can also help in boosting the country's economy by two ways:

i) It will create employment for the rural areas and can lead towards their self-development.

ii) As bamboo is usually found easily in many states of India, hence giving opportunity to these states to contribute in economy of country.

c) Many Asian countries are working towards such gesture and China among all is leading this league by applying such components in construction and we Indians can beat them in this league.



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