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Abstract

The shortage of housing in developing countries motivated the search for low cost construction sustainable materials that can be applied in the construction of affordable houses in this context; researchers have been studying the application of the locally available natural materials as building material as blocks, reinforcement, soils, and cement. The understanding of working with bamboo has caught the attention of Engineers, architects and material researchers due to its great potential as a construction material. This study attempts to investigate and assess bamboo as a construction material, benefits, Veritable investment for low and high income earners, bamboo applications, and its characteristics. The study provides recommendation and conclusion which befit the subject matter under consideration.

KEY WORDS: - investigation, assessment, bamboo as a construction material.

Introduction

Bamboo is a strong, fast growing and sustainable material, having been used structural for thousands of years in many parts of the world. In modern times, it has the potentials to be an aesthetically pleasing and lower cost alternative to more conventional materials, such as timbers as demonstrated by some impressive recent built structures. Bamboo is widely used across the world for everything from food and medicine to furniture and scaffolding. It tends to grow in a “belt” running through tropical, subtropical and temperate climates around the globe. Bamboo is a form of grass and can grow up to 25m in six months. Each Culm emerges from the ground at it increase in height, and growing vertically through cell division. Once it has fully grown, the culms typically take

three to five years to mature to full strength during which time they experience silicification and lignifications (i.e hardening due to deposits of silicon and lignin in cell walls). After a period of five to six years, the culms strength begins to deteriorate. Because of the global demand for non – polluting sustainable and earthquake resistant building materials, the interest in bamboo construction is now growing rapidly.

Bamboo offers not only optimal solutions for communities with smaller resources, but also a popular resource and study subject for professionals and institutions of a high economic level which has resulted into its use in high scale residential houses, schools, offices, hotels, etc.

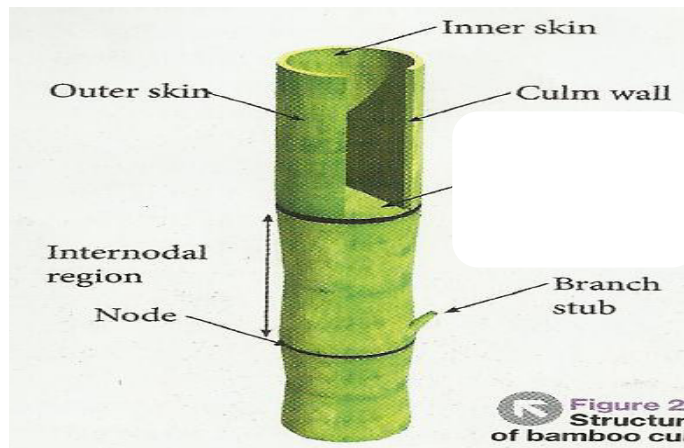


Figure 1

Source: - The structural Engineer (2016), vol: 94, issue 8, pg

Materials and Methods

The methodology for this study is based on the following:-

- i. Site visits to different construction sites where Bamboo is presently being used as a construction material for different structures
- ii. Visits to different places where Bamboo has been used for already completed simple like structures like ware houses, relaxation centers, sheds, and simple non load and load bearing buildings.
- iii. A detailed study of various Laboratory specimen tests that have been conducted on Bamboo at different stages and to compared their results in terms of moisture content, shear, compression, flexure, percentile modulus and finally comparing their results.

Discussion

As the world celebrates world Bamboo Day every September, it is still saddening that Nigeria's bamboo industry is underutilized, especially in terms of the potential the plant offers for all round economic development. With the various suggestions in the countryⁱ⁾ for the weed for diversification, and with theⁱⁱ⁾ potential in the bamboo industry, it is just asⁱⁱⁱ⁾ well that is offers so much for improving^{iv)} Nigeria's foreign exchange, a factor which has contributed in no small terms to the^{v)} present economic recession. For example, export of bamboo and its products from Asian^{vi)} countries contributes billions of dollars in foreign exchange earnings. For Nigeria, such

investment in the bamboo industry will be a goldmine. It will not only generate employment, but will also encourage foreign investment and in no Time, Nigeria with its capacity for excellence, may just become one of the next Bamboo capital of the world.

According to Professor Onilude (2016), Bamboo can provide a veritable source of foreign exchange if that industry is developed. It is a biological resource that can be planted and harvest like any other cash crop in a maximum of four years. As such, it can be used as a raw material for pulping, charcoal, furniture making, among others and when processed, can be a top grade product for exportation. Bamboo thrives in moist areas, and especially where there are indigenous trees or plants. The continuous growth of Bamboo can become a colony, and they can be present in natural forests. It's furniture can last longer than that made with conventional wood, depending on the kind of the furniture. Most biological materials face the risk

It can be used by farmers

It can be used for effective stakes for yam

It can be used for scaffolding construction

Bamboo is very effective for building wooden bridges

Construction of building such as schools, Residential and even public buildings

It can contribute to the fashion industry, as it can be fashioned into lovely jewelry

- (iv) Demand on the loads on the members and connections.

Characteristics of Bamboo

Bamboo possesses many characteristics. A few of these are discussed below:-

1) Fire consideration: - Bamboo behaves in a similar way to timber in fire, in that it usually starts at a slow and predictable conductor of heat. Though limited fire tests have been conducted, it is concluded that after burning for only a few minutes the thin walls will start to lose strength rapidly. This implies that a usually exposed Bamboo structure would only be suitable for situations where there is no fire resistance requirement, such as roofs and possibly the walls of single-storey buildings. Bamboo has occasionally been used for two-storey buildings, but only in locations where fire regulations are not vigorously applied or where the bamboo is adequately protected, e. g by cement plaster.

2) Behaviour in earth quakes: - Bamboo as an individual element possesses several brittle failure modes which could affect its seismic performance. Bamboo in buildings have historically performed well in earthquakes primarily because of its light weight nature (i.e high strength to weight ratio) and secondly because of its ability to absorb energy at connections, especially if nails are applied during construction process. It has been observed that modern Bamboo structures generally require higher strength bolted connections with Mortar, which are unfortunately brittle, but where good practice seismic design principles are introduced together with more locally ductile connections, such as nails, greater earthquake resistance and overall building ductility can be realized.

3) Suitability consideration for construction projects: - Bamboo for construction projects should always be subjected to the following conditions: -

- (i) Satisfaction for architectural aesthetic
- (ii) Risk of exposure to rain or other sources of water
- (iii) Suitable size and species of Bamboo available locally

Recommendation

- (i) With the various benefits Bamboo as a construction material can offer, there is the need for Diller sification in Bamboo industry in Nigeria. The government should encourage the present Bamboo industry towards maximum protection
- (ii) The Bamboo industry in Nigeria should be expended on a larger scale in order to improve Nigeria's foreign exchange, a factor too which can contribute in no small terms to the present economic recession in the country.

Conclusion

With the concerns raised about the applications of environment – friendly products; and to prevent deforestation, Bamboo as a construction material can safely provide an ecofriendly alternative for as many uses as can be imagined possibly. In a country already blessed with numerous natural resources, of which Bamboo isn't lacking Nigeria stand out to gain a lot especially in the area of those who shape the wood, depending on the request from Bamboo. With the construction of Bamboo Industry to the economy and other Businesses, efforts should be re addressed in order to improve the image of the industry in the country

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