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# Bambusa Bambos A Material For Floorboard

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***Abstract:***

*For Ghana to fully exploit the potentials of the bamboo resource available to her, it is necessary to experiment with the sympodial bamboo available, holding on to the structural strength, durability and aesthetic quality of the bamboo. Studies made, indicate that over 90% of manufacturers in the Bamboo industry in Ghana do not know that bamboo can be processed into floorboards. This is so, because most bamboo craft manufacturing industries have not experimented with the available local sympodial bamboo to create floorboards. This study has experimented with Bambusa Bambos, a sympodial bamboo to produce a sample floorboard for adoption in the affordable housing projects in Ghana.*

***Keywords:*** *Bambusa Bambos, preservation, biodegradation, floorboard, lamination.*

**1.Introduction**

Bamboo is a unique natural resource. It is a woody plant that grows very fast compared with other plants. Bamboo lends itself easily to processing, unlike timber wood; it can be easily split and slivered using traditional hand tools. In most cultures, bamboo has a well-built relationship with rural communities and this according to Ramanuja et al (2009) can be used as an entry point for development. The development of bamboo based industries require relatively low capital, raw material, tools and machinery investments in comparison with other handicraft activities like timber wood. Many of the bamboo crafts reflect the close, almost mystic, relationship of bamboo, people and culture. In Ghana, rural people employ bamboo extensively for construction of fencing, housing, and agricultural implements.

In Ghana the traditional bamboo craft manufacturing industries produce for the local market utilitarian products that have not changed for a long period of time. Results of interviews conducted reveals that a strong perception had been built in their mind that bamboo could not be converted into products that have adequate demand and remunerative value in the markets. As a result most of the craftsmen do not pay attention to the development of the bamboo craft manufacturing industries in Ghana. Studies conducted showed that the vast natural resources of Ghana, which at the present include oil, turned government focus away from non-timber forest products like bamboo. Timber, one of Ghana's natural resources is now under strict control, because it continues exploitation has become a threat to the environment. The need for a substitute is obvious. Meadows et al. (1992) said that as resource availability declines and resource demands increase in today's modern industrialized world, it is becoming increasingly necessary to explore opportunities for new, sustainable building materials. This statement by Meadows et al can be complemented by the assertion by Van der Lugt et al.( 2006) that Lack of knowledge and experience with bamboo were seen as contributors to much inefficiency and unnecessary cost currently associated with bamboo construction. These inefficiencies and costs are expected to diminish as familiarity with this material increases. The aim of this study project, accordingly, is to explore the possibility of manufacturing floor boards using bambusa bambos.

**2.Materials And Methods**

Bambusa bambos is one of the sympodial bamboos in Ghana used for manufacturing furniture and a wide range of handicraft products like baskets, lamp stands, and other

products. This particular bamboo is from the Kwame Nkrumah University of Science and Technology Botanical Garden.

*Figure1: Bambusa Bambos in the KNUST botanical Garden*

After harvesting of the bamboo, the culms were cut into lengths of 150cm using the power cross cut saw.

*Figure 2: Cutting of the bamboo into lengths of 150cm*

*Figure3: Cross cut bamboo ready for splitting*

The bamboo was further processed into splits of about 25mm width. This was gently and gradually done on the circular saw as shown in .Figure 4

*Figure 4: Splitting of bamboo*

*Figure 5: Split bamboo*

After splitting the bamboos, the lumen which is the inner lining and the epidermis were planed off, thus reducing the thickness of the splits and getting rid of the nodes. The planing resulted in the production of bamboo parallel strips. *Figure:* 6 and 7. Although, the plaining was a necessary preparatory process for lamination, it also prepared the bamboo for preservation.

*Figure 6: The planning of the bamboo strips*

*Figure 7: Planed bamboo strips*

Baah (2003) explained that, the lumen of the bamboo is saturated with sugar and other soluble minerals and these form the principal food of the degrading agents of bamboo. He argued that, processing and preparation of bamboo if possible must aid at the removal of the lumen. Steiner (2006) said the epidermis of bamboo is impermeable by water and other liquids and must be scraped or planed off to ensure permeability by soluble preservatives during preservation.

The strips were preserved by boiling in chloropyrofous based chemicals in the proportion of 480 grams per liter called Dursban 4e as recommended by Steiner et al (2008). The strips were boiled for three hours and were left submersed for 24 hours after which they were removed and stacked to dry.

*Figure 8: preservation of bamboo strips*

*Figure 9: Gas fired bamboo boiler for preservation*

*Figure10: Drying of preserved bamboo*

When the drying was completed, the preserved bamboo strips were coated with poly vinyl acetate in composition with dursban 4e, the base chemical containing the chloropyrofous. The composition was in the proportions of 20ml of dursban 4e to 1litre poly vinyl acetate. The coated bamboo strips were arranged side by side and clamped in a specially designed clamp for laminating bamboo manually.

*Figure11: clamps for lamination of bamboo with bamboo strips to be laminated*

Several strips of previously planed and preserved bamboo strips were coated with the mixture of dursban 4e and poly vinyl acetate and were clamped for 24 hours. The result of the clamping was a rough board and this was planed smooth.Figure12.

*Figure 12: Laminated bamboo strips ready for planning*

After plaining of the laminated board, it was subjected to light test to check openings that might result from manual manipulation of material in the lamination process. The test results revealed openings, and these were refilled with the mixture of dursban 4e and poly vinyl acetate and was reclamped for 24 hours. Figure: 13.

*Figure 13: Refilling with the mixture of dursban 4e and poly vinyl acetate*

After the second clamping of the board, a second light test was conducted after which the bamboo board was processed for flooring.

*Figure14: The bamboo board*

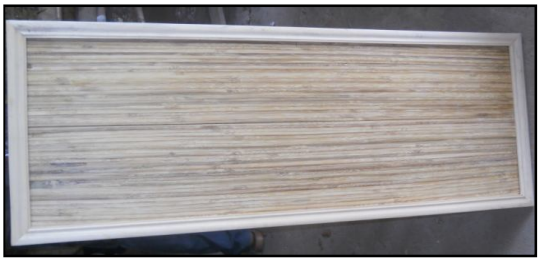

*Figure*15: First Sample of bambusa bamboss floorboard

*Figure16: Wax Polished Bambusa Bambos Floor*

**3.Result**

Moso bamboo is the most popular bamboo used for the manufacture of bamboo floorboards. This has international recognition. Countries like the United State of America, Europe and some few others have received bamboo flooring through international trade for use in housing and construction. In Ghana very little is known of bamboo flooring although knowledge of other plants like mahogany and other timber species used as flooring is known.

In this study, bambusa bambos a sympodial bamboo harvested in the botanical gardens of the Kwame Nkrumah University of Science and Technology, was processed and laminated for use as floorboard. The result of this study indicates that moso bamboo is most likely not the only bamboo that can be processed into floorboard.

It is also evident that bambusa bambos is a potential material for bamboo floor board manufacture. Researchers consider it as a potential material because there is a limitation to our study on this material that prevents researchers from observing the finished floorboard over a longer time frame in order to be able to attest it being a substitute to moso bamboo.

Results attained from observations made on the product indicate that bambusa bambos is suitable for the manufacture of bamboo floorboards. This is so because the product is hard, resists bending, and has very high resistance to abrasion and aesthetically pleasing. Again in the manufacturing of bamboo floorboards, some manufacturers use urea-formaldehyde as the adhesive for bonding the bamboo strips. According to the stringent California Air Resource Board (CARB) standards there can be no more than 0.05 ppm (parts per million) of outgassed formaldehyde. According to the USGBC's LEED standard products with Urea-formaldehyde do not meet the criteria for the EQ 4.4 Low-Emitting Products group. In this study, poly vinyl acetate was used, it is environmentally friendly and gives a perfect bond to bambusa bambos in lamination.

**4.Conclusion**

Bamboo is one of the nearly all adaptable construction resources with many applications in the field of construction, in Ghana. In order to completely take advantage of the prospects of bamboo, attempt have to be aimed at the area of converting the culm into boards, and massive cultivation of bamboo so that it can be positioned to develop into a primary manufacturing and building material for Ghana. This in away will contribute to employment generation, improvement in the economy and a step in the direction of replacing timber with bamboo in Ghana. In studies made on lamination of bamboo Van der Lugt et al.( 2006) concluded that “the use of bamboo in structural applications has been shown to have the least environmental load and cost (excluding additional costs such as assembly/disassembly, maintenance, and material disposal) by a large margin”. They further closed their findings by saying “It is reasonable to conclude that it could be economically, environmentally, and, perhaps, structurally beneficial to use bamboo as a wood alternative”. This is a worthy conclusion for Ghana and countries that have bamboo as a natural resource.

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