THINK INDIA JOURNAL

ISSN:0971-1260
Vol-22-Issue-34-December -2019

Bamboo as a sustainable material in residential space of Northern India

N.Tondonsana Singh[1]

[1]*Department of Interior and Furniture Design, Lovely Professional University, Punjab*

ABSTRACT

Northern India has the experience of different extreme climatic condition throughout the year, extreme hot during summer and extreme cold during winter in some region. The target of this paper is to implement Bamboo to the interior space of Northern India to get the maximum comforts for occupants throughout the seasons. From the beginning of human civilization people had started using bamboo as a very important material for making house, paper, fence, flute, and so on. Currently as the technology is developed, bamboo can be deformed and use in many ways like making vehicles, furniture, flooring, ply, paneling etc. Bamboo is also known as "Future Material" for its incredible properties. Well-treated bamboo can enhance the properties and gives great appealing to the user. From the perspective of health, bamboo has the capability of absorbing carbon and weather proof property. So, implementation of bamboo to the region of extreme variation of climatic condition is very much important as a construction and accessories material.

Keywords: *Northern India climatic condition, Implementation of bamboo, Properties of bamboo, Sustainable.*

INTRODUCTION

Since long period of time Asian countries include India, Vietnam, Thailand, LaosChina, and Latin America bamboo is used as traditional building material. Bamboos arelargely found in Tropical and Sub-Tropical area of the earth. People are aware and liking about bamboo nowadays because of its incredible properties. It is renewable, sustainable materials, durable and low cost. Bamboo gets mature within five year; the best time for harvesting bamboo is when the glucose levelcontains in bamboo is downed.Bamboos are grown all over the world. It's believed that bamboo was originated from China. Houses were made from bamboo 5,000 years ago. During Han Dynasty (206 B.C to 221) paper was introduced in China. [2].

CLIMATIC CONDITION OF NORTH INDIA

ISSN:0971-1260
Vol-22-Issue-34-December -2019

Northern Indian stateswhich are affected by extreme climatic condition are Punjab, Haryana, Himachal Pradesh, Uttar Pradesh, and Uttarakhand. And Union Territories are Delhi, Chandigarh and Jammu and Kashmir.North India has the maximum diversity of climatic condition on earth. Extreme hot during summer and extreme cold during winter, temperature can be increased plus 35°C and drop to 5°Cevenminus 0°C in specific region. North part of India lies in the North Temperate Zone of the earth. [1]

India hasfour different types of seasons.

I) Summer- From March- May
II) South-West monsoon- June –September
III) Retreating monsoon--October-November
IV) Winter- December-February

Table 1:COMMON SPECIES AND DISTRIBUTION OF BAMBOO IN INDIA1

species	States
Bambusa arundinacea	Arunachal Pradesh, Karnataka, Orissa, Maharashtra, Himachal Pradesh, Andhra Pradesh, Gujarat, Punjab.
Dendrocalamus strictus	Andhra Pradesh, Assam, Gujarat, Maharashtra, Himachal Pradesh, Madhya Pradesh, Manipur, Orissa, Karnataka, Uttar Pradesh, Rajasthan, Punjab, H.P
Melocanna bambusoides, Dendrocalamus hamiltonii, Bambusa tulda, Bambusa pallida	Assam, Mizoram, Nagaland, Tripura, Manipur, Meghalaya.

ADVANTAGES OF BAMBOO

World known bamboo due to the incredible properties of it and it is also one of the primary sustainable materials in current scenario. Bamboo possesses the properties of earthquake resistance and the products of bamboo are being sponsored all around the globe. Bamboo is

1. Eco friendly material,
2. Fast growth rate,

ISSN:0971-1260
Vol-22-Issue-34-December -2019

3. Locally available ,
4. It is renewable material,
5. Cost effective material,
6. It is durable,
7. Extremely productive.[7]

Table 2:COMPARATIVE TABLE OF DIFFERENT MATERIALS OF DENSITY, TENSILE STRENGTH, GROWTH, LIFE SPAN, AND ITS AVAILABILITY

Material	Density	tensile Strength (MPa)	Growth (years)	Life span (years)	available
cork	0.123 to 0.203 g cm^{-3}	26.1 to 30.8	20 to 30	10 – 20	natural
wood	0.38 to 0.85 g/cm^3	40	20 to 30	100+	Natural easily available
bamboo	0.86 to 1.08 g/cm^3	51.2 to 2834	3 to 5	100+	Natural easily available
Laminated	0.76-0.96g/cm^3	64- 69		15 – 25	artificial
tiles	2.38- 2.40 g/cm^3	3–5		75 – 100	artificial
marble	2.4 - 2.7 g/cm^3	15	1000+	100+	Natural
granite	2.6 - 2.7 g/cm3	2-5	1000+	100+	natural

BAMBOO PROPERTIES

1. Shorter internode bamboo has better strength.
2. Green bamboo contains 100% moisture and can be reduced by evaporating process.
3. The Specific gravity (SG) of the bamboo is differs from lower to upper portion.
4. Contain of fiber also different from top to bottom.
5. The properties of bamboo are changes as the age of bamboo changes.
6. Density- 16.02 kg/m3
7. More the thicker wall of bamboo the strength is more.

ISSN:0971-1260
Vol-22-Issue-34-December -2019

Table 3:GENERAL INFORMATION OF BAMBOO

Species/year	Breath height		Total height (m)
	Wall thickness (mm)	Diameter (cm)	
Bamboo/one	8.15	7.81	13.15
Bamboo/three	7.87	8.12	12.58
Bamboo/five	7.94	8.46	13.65

BAMBOO HARVESTING

Perfect stage for bamboo collection is within 3 to 5 years, and it would be collected only on winter. Duringthree to five years of bamboo age the glucose level is low and it is the perfect time for harvesting. Insects and termites are not active and dull during this period due to low glucose level, so less chances of attack during this season. Perfect months for harvesting bamboo areDecember to February.To defending the external layer of bamboo the twigs must be detached wisely from bamboo culms. It used to be stockedhorizontal or vertical. It would be safe from direct sunrays, rain water and soil moisture. Duration of drying process issix to twelve weeks. [4]

TREATMENT PROCESS

Treatment of bamboo is much important which would be utilized for construction. Guarding bamboo from mold, beetles and termites, it is must essential for treatment. Absence of treatment can lead to damage within short period of time. Method of treatment can be classified into basic three parts.

IMMERSION PROCESS

ISSN:0971-1260
Vol-22-Issue-34-December -2019

Newly cut bamboos are submerged in water for four to twelve weeks. During this time the nutrition for bugs in bamboo is impassive. River is more appropriate for this particular technique. This technique eliminates the sugar from freshly cut bamboo.

IMPREGNATING COATING METHOD

Layer with solution of borax is excellent process. Borax solution is being pressure fed into bamboo pole till it is seen at the external finish of the pole. This process must be practice on the very day of the collection.

HEATING METHOD

In this process bamboo pole must be heated for a while at 150^{o}C. Alternative technique is bamboo polemust put in a big vessel and boiled about 25 to 30 minutes. This technique can prevent bamboo from termites attack [5].

PROPOSAL FOR PROMOTION OF BAMBOO PRODUCTS IN NORTH INDIA

We have studied about the properties and advantages of the species of bamboo which is found in north India. As it is a sustainable material it can be adapted to the environment where the species of the north Indian bamboo is growing. We have studied about the climatic condition of the northern India also so we understand that northern India has extreme hot in summer and extreme cold in winter. We generally know that bamboo has the capacity and properties of heat and cold proof. The cavity inside the bamboo wall absorbs less heat and release less heat in summer. Same way during winter also the heat inside the room does not escape outside easily because during the day time the temperature of the material is heat up.So it maintains the thermal comfort in the room of the building. It improves the indoor air quality also. Plus it enhances the aesthetic of the room. Most of the residential building in North India does not use bamboo due to lack of awareness. So I would like to promote the bamboo in interior of residential building of north India.

ISSN:0971-1260
Vol-22-Issue-34-December -2019

CONCLUSION

Bamboo is becoming one of the leading sustainable materials, so it performed a vital role in current days and for future too. It takes a significant role in global warming, it emit oxygen at the maximum level and purified air and can grow during minimum duration. Since earlier time people utilize bamboo for making shelter and accessories and many others objects, bamboo has the potential ofmanufacturing aircraft somewherebamboo vehicles are previously introduced. So bamboo has extreme potential which people could do incredible things. Now people are facing extreme change in climatic condition due to our activities. So, utilize bamboo resource would be one of the solution to the problem we are facing in current scenario.

Bibliography

[1] travelogyindia.com/north-india/weather-in-north-india.html

[2] chinadaily.com.cn/life/2011-01/19/content_11882983.htm

[3] indiacelebrating.com/essay/seasons-in-india-essay/amp/

[4] crida.in/DRM1-Winter%20School/RK2.pdf

[5] guaduabamboo.com/preservation

[6] (n.d.). Retrieved from 3. https://www.indiacelebrating.com/essay/seasons-in-india-essay/amp/

[7] Li, X. (2004, 4). PHYSICAL, CHEMICAL, AND MECHANICAL PROPERTIES OF.