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FUTURE NEEDS OF BAMBOO: A REVIEW

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Abstract– Bamboos are a diverse group of mostly evergreen perennial flowering plants making up the subfamily *Bambusoideae* of the grass family *Poaceae*. Giant bamboos are the largest members of the grass family, in the case of *Dendrocalamus sinicus* individual culms reaching a length of 46 meters, up to 36 centimeters in thickness and a weight of up to 450 kilograms (Xinhua, 2003). Although primarily used in construction projects as wood, bamboo is actually a grass. Despite being primarily used in construction projects as wood, bamboo is actually a grass. Its capacity to fastly regenerate is facilitated by the fact that it is a species of grass. However, bamboo has the potential to grow much taller and wider than the typical lawn grass. Because bamboo has significant rates of carbon sequestration and generate carbon credits, which are traded internationally, In Bamboo cultivation there is a chance that it could generate carbon credits. Infertile land can be used for bamboo farming to increase the fertility of the soil and bring in more revenue for farmers. For the sustainable use of genetic diversity, its protection, and upcoming research, several efforts have been made in recent years to characterize various bamboo species using molecular markers.

INTRODUCTION

Modern society uses a wide variety of bamboo products. It appears that bamboo is a magical plant. It can grow in a variety of soils and under various climatic conditions. The distribution of bamboos on planet earth extends from 51^0N latitude in Japan (Island of Sakhalin) to 47^0S latitude in South Argentina. A total number of 1,400 bamboo species are distributed worldwide. The bamboo can grow in an altitudinal range which extends from just above the sea level up to 4,000 m (Behari, 2006). Bamboo farming can give farmers greater financial security. It has been reported that Europe has no native bamboo species (Liese and Hamburg, 1987). Bamboo has made a significant contribution to human social, cultural, and industrial development.

It is estimated that around 2 million people of India sale and use bamboo processing harvesting and selling bamboo products and their livelihood depends on bamboo product. Between $5 and $10 billion is anticipated to be traded internationally in bamboo. Local trade at the village level is frequently not formally documented. India is a significant player in the world bamboo market. 198 lakh acres or 80% of the world's bamboo forests are in India, China, and Myanmar. Despite contributing 45% of the world's bamboo production, India only holds a 4.5% market share. Bamboo grows quickly and produces stands that are renewable, which store carbon in their biomass at rates that are comparable to or even better than some tree species. Being a grass instead of a tree is the key to bamboo's success. There are two main types of rhizomes: (a) monopodial (running) and (b) sympodial (clumping). Running bamboo has the rhizome that spreads horizontally and forms the dispersed bamboo, whereas clumping bamboo has the shorter rhizome, is formed together and forms the bamboo clumps (Kaushal *et al.,* 2018). It has a broad root structure that endures yearly harvesting and develops swiftly and efficiently while absorbing carbon. Because they serve as carbon sinks that are locked in and promote the growth and better management of bamboo forests, the numerous long-lasting products manufactured from bamboo may also be potentially carbon-negative. TU Delft, INBAR, and Moso BV 2015 revealed that Internationally, bamboo could also be a good alternative to hardwoods, especially those that are FSC-certified, given its smaller carbon footprint and reduced environmental expenses.

Multipurpose use of bamboo

Bamboo is often a grass, not a tree. Culms, the name for the hollow stems of bamboo, are found in between the nodes. The woody rings between the culms are known as nodes. If all ideal conditions are present, the growth rate of this green gold can reach up to 30 to 35 cm each day. In bamboo, growth stages have three steps, and they are made with changes in the cell's structure, which include division, expansion, and hardening of cell walls (Choi *et al.,* 2008). Another study by Yu, (2015) stated that Bamboo scrimber, (modern industrialized bamboo) world which is produced during processes such as exposing bamboo to hot dry air, has been reported as a good option for use in outdoor landscaping, garden furniture, decoration, and civil engineering. There are several reasons for this: the enhancement of water absorption, width swelling, and thickness in bamboo scrimber. Today, the usage of bamboo is expanding day by day in areas such as construction and structural purposes, tropical homes, Wood flooring, beverages and spirits, bamboo beer, phone cases, sunglasses and eyewear, and clutches and purses.

Climate change mitigation

Due to fast growth rate Bamboo has excellent potential for absorbing and storing carbon. Bamboo's capacity for CO_2 sequestration varies from species to species and is influenced by growth rate and life cycle. Carbon sequestration has the potential to offset fossil fuel emissions by 0.4 to 1.2 gigatons of carbon per year, or 5 to 15% of the global fossil-fuel emissions (Lal, 2004). This unique growing capacity makes bamboo a valuable sink for carbon storage. Bamboo plantations can play a major role in 'carbon-trading' in a developing country like India. 'Carbon trading' which is also known as "cap and trade" is a method developed to reduce the carbon emissions which contribute to global warming. Singh *et al.,* (2004), conclude that per hectare biomass accumulation by the *D. strictus* at the age of three years is very high compared to that of *Tectona grandis*, *Dalbergia sisoo*, *Greveillea robusta* or *Acacia nilotica* of ten year age. So that bamboo is very suitable species for cap and trade strategies. Therefore, bamboo forests are an important resource for mitigating climate change (Ricardo *et al.*, 2013).

Use of bamboo in Soil conservation activity

In India rainfall causes lots of soil loss every year, its results are very dangerous in the ravine lands. These formations are referred to as "cancer of the land" due to the severe difficulty in managing and reclaiming those (Kumar *et al.,* 2020). Since their topography is quite undulating, unfavorable climate, poor soil fertility, strong biotic pressure, unprofitable natural vegetation, and lack of cultivable land, ravines are also defined by these characteristics. Planting bamboo in slope croplands has been shown in a long-term monitoring experiment to reduce topsoil erosion, A form of manufactured biochar called bamboo charcoal is made by pyrolyzing bamboo residue in an anoxic environment, according to Liao *et al*. (2013). It has attracted significant attention owing to its beneficial properties in absorption, catalyst support, and agricultural function. Additionally, bamboo charcoal has excellent absorption ability for most pollutants Lou *et al*. (2007).

Bamboo is a highly active species for carbon sequestration

According to Goodess *et al.* (1992), the CO_2 rate increases 1.8 $\mu mol^{-1}_{(air)}$ $year^{-1}$, equivalent to 0.5 % $year^{-1}$. Estimates indicate that in 100 years the environmental CO_2 will reach values of 650-700 $\mu mol^{-1}_{(air)}$. Bamboo species are capable of absorbing plenty of carbon dioxide from the atmosphere than the amount of carbon dioxide they release on their own. Bamboo captures carbon dioxide very quickly and it helps restoring soil fertility, thus rejuvenates degraded land Paraseth *et al.* (2023). In due course, an area covered with bamboo plants and their products has the ability to store a greater amount of carbon than some tree species. Charlotte *et al.* (2021), stated that bamboo forest ecosystems can store between 94 and 392 tonnes of carbon per hectare (tC/ha): that is, significantly less carbon than in natural forest ecosystems (126-699 tC/ha) but similar to tree plantation ecosystems (85-429 tC/ha) and more than grassland or pasture (70-237 tC/ha).

CONCLUSION

Bamboo is widely acknowledged as a versatile commodity with the potential to boost farmers' incomes due to its diverse applications, making it a valuable resource in the green economy. The local community and researchers are very different in their understanding of bamboo production, lack of education, and youth's lack of awareness of bamboo's relevance and environmental benefits.

Because working with bamboo is always different from working with wood, the bamboo industries tend to draw more skilled laborers than the other sectors. The preservation of this remarkable plant's quality is imperative, not just for financial gain but also for the further application of traditional knowledge and environental sustenance.

Conflict of Interest - None

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