



Short Review Paper

Conserving wood biodiversity with the help of wood science and technology

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Abstract

Over the past few years, several emerging technologies have been introduced to produce eco-friendly wood based products. The concept of wood modification has moved from the development phase to reality of late as many wood modification methods have been adopted and implemented successfully across the globe for its sustainable use for a longer run. Many of these technologies add value through modification and enhancement of various wood properties by means of increasing the service life of the product and maintaining the biodiversity in return as the consumption of raw material becomes less. Among the wood modification technologies, microwave treatment is found to be highly effective as it has the flair in it and henceforth is gaining popularity because of having many advantages over other conventional modification techniques in practice. If implemented successfully this technique can result in subsequently lesser energy consumption for woodworking processes and sustainable use of the arte facts for eons.

Keywords: Biodiversity, emerging technologies, microwave, modification, sustainable use.

Introduction

Forests are one of the most important storehouses of telluric biodiversity. Different types of woodlands offer diverse territories for floras, faunas and microbial entities. Biological diversity, undoubtedly provides the foremost substance for a wide range of forest produces¹. The varied lot of trees prevailing in a woodland are of utmost importance and are the vital cogs contributing immensely to the day to day rural livelihood in many remote areas across the country. Forests contribute significantly in the GDP of many of the poor countries, as sources of wood and a plethora of non-wood forest produces and provide employment in the organised as well as unorganised sector in developing countries like India, Brazil and in many others of the African continent. Forests have a significant role in conserving natural resources like soil and the water bodies, further adding up as repositories of several ethical and cultural values and practices. Animals, birds, insects and pathogens living in and around forests act as critical sources of nutrition and aids in generating revenues for many tribal and localities, and have vital roles in maintaining the forest ecology¹.

However, in spite of such stupendous impact on global economy, environment, ecology and climate change, depletion and deterioration of forest cover continued globally, limiting the growth of sustainable forest management practices in the hindsight, and there is enduring loss and squalor in many developing countries like India. Consequently, diminishing natural diversity of forest land significantly affects the growth and welfare of society as the population depending on it becomes deprived of its reserves and supplies.

Wood is arguably the most important forest product harvested from forests, so far as human civilization is concerned, and in the present context, bamboo also has emerged as one of the major resources coming out of them. Timber is one of those very few natural resources available that can be renewed and reconstituted or restructured for different end uses. The fact that wood can be recycled and reconstituted, alongside its ability to sequester carbon (CO₂), and its natural origins are among the main factors making it a striking substitute to synthetic materials for years.

However, rapid industrialization and acquisition of land for household purposes in the present century have resulted in deforestation and in return made this resource dearer. Frequent felling of trees in and outside forest cover, to meet the fissure between supply and demand has remarkably affected the biodiversity of the concerned forest land and in return had adverse effect on its eco-system. Another point to be noted is that in India, several wood processing and furniture manufacturing units are facing hurdles regarding timber procurement mainly because of certain policies induced by the Governing bodies and ban on felling of trees from natural forests.

The country for several years now, is dealing with acute crisis and paucity of timber and the gap between supply and demand is ever increasing. Whereas the policies developed worked in favour of the Government as revealed by several reports showing their success in restoring the green cover and maintaining the biodiversity of the concerned areas, several innovative ideas are coming up to make the wood in use more durable and to ensure its sustainability.

Present Scenario

To address this cauldron, timber species are being imported from abroad which might provide temporary solution to the crisis but can never be a solution in the long run and must not be promoted either as this has literally no impact on conserving the biodiversity and maintaining the ecosystem of the locality/forest land concerned.

Plantation grown timber and agro forestry practices are emerging as other viable alternatives out of the niche sector of forestry research in the country which can be considered as permanent solutions to the above concern. However, the short rotation periods of such crops and their effects on the biodiversity and ecosystem must be studied thoroughly prior promoting these practices. Since these crops are regularly harvested within certain intervals, the flora and fauna depending on these or growing around, might get affected adversely, spoiling the very aim of the drive.

Role of Wood Science and Technology: The Solution

Wood technologists, however, promote the idea of preservation of timbers in use, to put a hold on this never ending catastrophe, as this practice is very useful for sustainable use of timber in use as it significantly improves its service life.

Wood being a lignocellulosic material, is susceptible to biological deterioration. The potential ability of microorganisms to decay wood and wood products causes great economic and environmental losses to users all over the world and in return calls for additional procurement. This phenomenon is particularly high in tropical countries with high temperature and humidity favouring microbial wood decaying agencies. Furthermore, woods susceptibility to fire also adds to the dilemma.

A whopping 80-85% of known tropical wood species are reportedly non-durable and the problems associated with none or low durability of tropical timbers are one of the major deterrents to increased utilization of tropical woods. Monitoring the economic losses is difficult but it can be inferred that the loss is substantially high. Now-a-days, sustained supply of wood is in jeopardy and it becomes severe even more when non-durable wood is not protected in use against decay. Preservation of wood through chemicals is the most efficient way, involving pressure impregnation of toxic chemicals like Copper Chrome Arsenic (CCA), Penta Chloro Phenate (PCP), Creosote and many more². Microwave wood modification is another such eco-friendly technique, that aims at minimizing the requirement of energy for several wood working operations by merging extensive and rigorous processing parameters such as seasoning and treatment of timber. It significantly improves its permeability and preservative uptake³⁻⁸, resulting in its sustainable use for a longer period as well as helping in carbon trapping for eons.

Conclusion

Presently, as many wood preservatives are under scrutiny, for allegedly causing environmental and health hazards, developing new eco-friendly preservatives is the need of the hour. The new eco-friendly preservative ZiBOC⁹ and its efficacy in MW treated samples of wood needs to be evaluated for its performance for outdoor purposes against major wood decaying microorganisms¹⁰. This may promote sustainable use of woody raw material for a longer run resulting in lesser demands and consequently bridging the gap between demand and supply. This may give us a pioneering technique which will aid in maintaining the wood-biodiversity as procurement of wood will be less due to its sustained use and consequently will benefit the ecology and environment of the surrounding, helping in ensuring a cleaner and greener future for all. It is the present day requirement to save forests and trees by means of collaborative research and by means of developing further techniques that protect wood and trees against both decaying agents and fire at the same time to maintain ecological balance.

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