

ABSTRACT

ECOLOGICALLY SOUND FIRE RETARDANCY PROTOCOLS FOR ROUND NATURAL BAMBOO DENDROCALAMUS STRICTUS

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Sustainable development entails adopting a balanced approach which necessitates that while economic objectives are pursued, social and environmental well being are not compromised but in fact strengthened. The ever increasing demand for timber by various industries poses an imminent and serious danger to the ecology. The need of the hour, therefore, is to find a fast growing and abundantly available alternative, with comparable attributes, that will address this ever burgeoning demand. Bamboo is one such material that carries a great deal of promise. However while Bamboo is a material which has several excellent properties its behavior when subjected to fire remains unknown, casting doubts over its efficiency despite its many advantages.

The research work undertaken was focused on assessing the fire retardant behavior of various chemical applicants. *Dendrocalamus strictus* was treated with five different fire retardants and thereafter its performance against fire was observed and analyzed. The fire behavior of treated Bamboo was assessed using the LOI, LIFT, and UL-94 test methods, while its fire retardant capability was measured on the basis of its Ignition, Flame Spread, Charring Rate and Char Depth Characteristics.

Dendrocalamus strictus is known to have an Ignition Critical Flux value of 15kW/m². Tests conducted on *Dendrocalamus strictus* and wood showed a flame spread rate of 0.59 and 0.73mm/second respectively. This research observed that *Dendrocalamus strictus* when treated with Melamine Phosphate and Ammonium Phosphate falls in the V0 categories in the UL-94 test, while is a safest category as per standard. Flame penetration and burning rate were also calculated using the IS5509 test standard. The morphology of the fractured surfaced surface of the treated bamboo samples were also analyzed using SEM.

Based on these results, It was concluded that the P-N flame retardant is the best treatment option to enhance the fire retardant characteristics and consequently the level of fire safety of Bamboo based constructions.