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**EVALUATION OF ACOUSTIC BEHAVIOR OF *BORASSUS FLABELLIFER* (ICE APPLE) FRUIT HUSK FIBRE: AN INNOVATIVE APPROACH TO MAKE USE OF A DOMESTIC WASTE.**

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**INTRODUCTION:**

Over the years, there have been significant developments in the materials that can be utilized for effective sound absorption on the roof of the theatres, walls of auditorium, sound proof rooms, aerospace applications and more. As the technology advanced the variety of sound absorption materials have been developed. Most of them are synthetic and non – degradable type of materials. Plant-based materials such as fibre, bark and leaves are often used for sound proof applications. The natural fibres are biodegradable, non-hazardous and inexpensive. Some studies have been reported in literature regarding the use of natural fibres like bamboo, paddy straw fibre and coir as acoustic absorber [1-2].

*Borassus flabellifer* (Ice Apple) fruit which is widely found in the coastal parts of Karnataka and Kerala is a plant that belongs to Aceraceae (palm) family which have the high fiber density, long fibres and a slow degradation rate like coir fibre. The *Borassus flabellifer* (Ice Apple) fruit husk is mostly being neglected after consuming the fruit pulp and discarded as domestic bio-waste materials. The research on coir fibre provides enough evidences regarding the superior thermal, mechanical and sound absorption ability [3-6]. There is no literature is available on the thermo-mechanical and acoustical behavior of *Borassus flabellifer* (Ice Apple). This work aims to study

the physio-chemical, thermal and the acoustic behavior domestic bio-waste of *Borassus flabellifer* (Ice Apple) fruit husk.

**OBJECTIVE:**

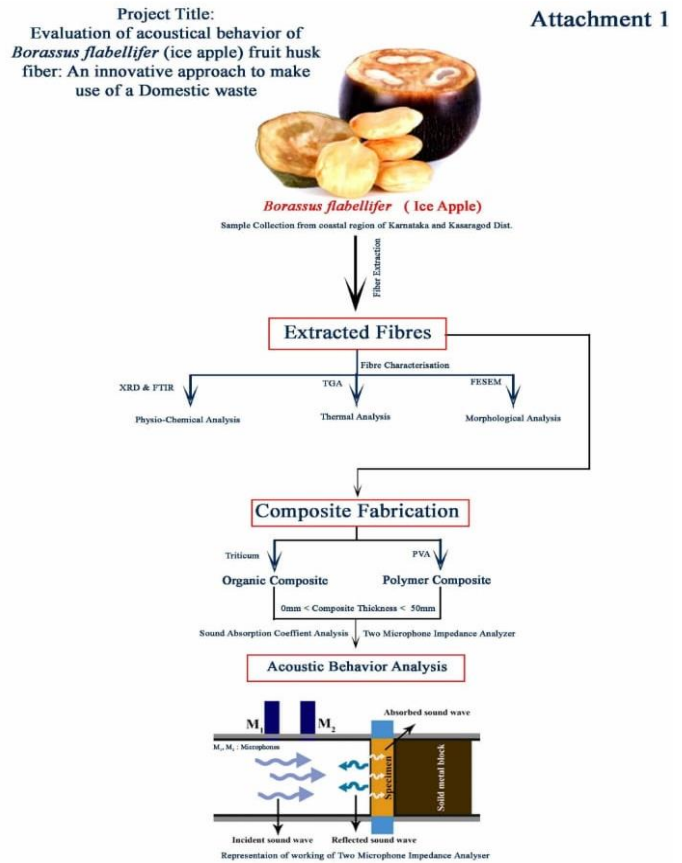
- Identification of major region in south costal Karnataka and Kasaragod, where *Borassus flabellifer* fruit is commonly found. Collection of *Borassus flabellifer* fruit husk.
- Extraction of the *Borassus flabellifer* fruit fiber from the husk through retting and beating process.
- Study of its chemical composition (Qualitative) using Fourier transform Infra-red Spectrometer.
- Study the morphology, physio-chemical properties and thermal degradation behavior of extracted husk using FESEM, XRD and TGA respectively.
- Fabrication of the extracted fiber with *Triticum* (natural) and Poly Vinyl Alcohol (synthetic) binding materials.
- Evaluation of the acoustical behavior of *Borassus flabellifer* fruit husk fiber composite.
- Examination of the effect of thickness of the fabricated composites on its acoustical behavior.

**METHODOLOGY:**

1. *Borassus flabellifer* fruit husk fiber will be extracted using retting and beating process, dried and stored with respect to their regions for further characterization.
2. The Physio-chemical, morphological and thermal degradation analysis of extracted fiber will be studied through XRD, FTIR, FESEM and TGA.
3. Composite fabrication will be carried out using hydraulic dye press with *Triticum* and Poly vinyl Alcohol (PVA) as binding agents.
4. The acoustical behavior of *Borassus flabellifer* fruit husk fiber will be studied through two microphone impedance tube analyzers.

**EXPECTED OUTCOME:**

1. The physio-chemical, morphological and thermal degradation of *Borassus flabellifer* fruit husk fiber will be obtained.



2. The acoustical behavior of the *Borassus flabellifer* fruit husk fiber will be analyzed.
3. The region-wise impact on phyio-chemical properties of *Borassus flabellifer* fruit husk fiber will be evaluated.
4. A bio-degradable, low-cost eco-friendly acoustical absorber may replace major synthetic acoustical absorbers in various aspects.
5. The preliminary information on *Borassus flabellifer* fruit husk can aid the researchers to improve wise the research plan and can furnish the better products.
6. The comparison study with other major natural fibers such as coir, jote can give the better idea to use it in daily life applications.

### **SCOPE FOR FUTURE WORK:**

The use of *Borassus flabellifer* fruit husk fiber as acoustic absorber presents an interesting scope for future work considering the growing demand for sustainable and eco-friendly materials in various industries. The basic information regarding the physio-chemical behavior of *Borassus flabellifer* fruit husk can helps the researcher to fabricate composite materials. The further intense research on this fibre helps to understand the ability of the fibre to utilize in daily life applications.

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