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ADVANCING SUSTAINABLE ACOUSTIC SOLUTION: EXPLORING THE SOUND ABSORPTION CHARACTERISTICS OF BIODEGRADABLE AGRICULTURAL WASTES, COCONUT FIBER, GROUNDNUT SHELL, AND SUGARCANE FIBER

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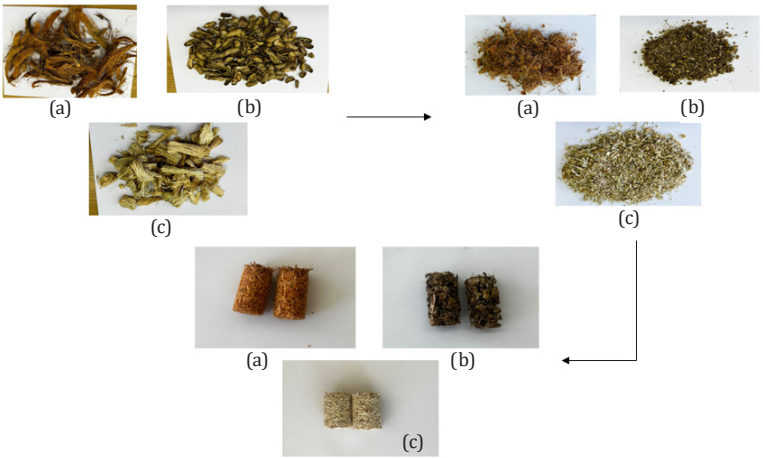
Abstract – Noise pollution is one of the most pressing global health issues affecting the well-being of inhabitants in densely populated cities. It affects urban areas, significantly impacting the quality of life for residents. The effects extend beyond mere annoyance, as noise has negative impact on health, emotions, and human behaviour. As noise pollution persists, researchers are exploring innovative solutions, with a particular focus on the potential use of natural fiber sound insulation materials. The conventional synthetic materials used in the sound insulation industry have a set of environmental and health risks. Based on these risks, attention has turned to the utilisation of the properties of biodegradable natural fibers, coconut fiber, groundnut shell, and sugarcane fiber as potential substitutes for synthetic materials. These materials do not only demonstrate sound absorption capabilities but are also ecofriendly and pose low risk to the environment and human health. The research examines the sound absorption characteristics of these natural biodegradable agricultural waste fibers (coconut fiber, groundnut shell, and sugarcane fiber) to determine the suitability of these materials as effective sound absorbers in acoustic applications. The experiment seeks to present the internal workings of the sound absorption mechanism inherent in coconut fiber, groundnut shell, and sugarcane fibers, highlighting the potential as a substitute for synthetic materials. The research aims to utilize its findings to develop eco-friendly insulation materials, integrating natural fiber such as coconut fiber, groundnut shell, and sugarcane fiber. The objective is to mitigate noise pollution in various settings, including offices, libraries, and cafes. The initiative aligns with the worldwide focus on sustainability, addressing the pressing need to combat noise pollution in megacities.

Keywords – Coconut fiber; groundnut shell; sound absorption; sugarcane fiber



Raw agriculture waste materials used in the study: (a) coconut fiber, (b) groundnut shell (c) sugarcane fiber.