International Journal of Innovative Research in Engineering
Volume 3, Issue 3 (May-June 2022), PP: 286-289.
www.theijire.com
ISSN No: 2582-8746

Use of Agricultural Material for EffectiveIndustrial Noise Reduction in Textile Industries

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How to cite this paper:
Pooja Kamble[1], Dr. D. B. Desai[2], "Use of Agricultural Material for EffectiveIndustrial Noise Reduction in Textile Industries", IJIRE-V3I03-286-289.

Abstract: *Noise is unwanted sound of the major pollutant which cause major effect on human being anddisturbing their life's.one of the main root cause of generation of noise is in textile industry there are different kind of machinery which create unwanted noise.so noise control is one of the major requirementto improve industrial working environment. The study of relevant research conducted to understand theuse of agricultural material such as Bamboo, Tulsi, Banana steam, Rise straw husk, Sugarcane bagasse,Coconut coir, date palm, hemp etc. in the construction of structure around the textile machineries fully or partial closure for industrial noise reduction to give an effective solution for industrial noise problem. The specimen preparation with composite mixture of two to three agricultural material with cement andwater, checking of sound frequency of those specimen by sound level meter, frequency generator and stereo speaker which is experimental set up of impedance tube system and the Noise Reduction coefficientis calculated. The study of noise reduction in textile sector and the effective use of agricultural materialto overcome this problem is discussed in this paper.*

Key Word: *Bamboo, Tulsi, Banana steam, Rise straw husk, Sugarcane bagasse, Coconut coir, date palm,Noise Reduction coefficient (NRC), impedance tube system.*

I. INTRODUCTION

Noise is 'unwanted sound' one of the major pollutant as noxious gases in the environment which plays an important role in occurrence of annoyance, inconvenience and creating nuisance which causes Noise Pollution. As a result of industrialization, urbanization and population growth in the 21st century, noise pollution continuesto grow in its extent and severity. Environmental noise pollution is a form of air pollution which has very adversedirect and cumulative effects on the health and degrades working, and living environments of wellbeing with corresponding real socio economic losses.

Noise pollution is an environmental problem all over the world, which has very harmful effects on health and life of the people who are exposed to continuous noise throughout the workday, may leads to some injuries such as hearing loss, weakness in nerves and pain in internal tissues, heart problems, and even higher blood pressure sustaining for long term. There is growing evidence that noise pollution is not merely an annoyance; likeother forms of pollution, it has wide-ranging adverse health, social, and economic effects.

Noise pollution in its behavioural sense is very much complex phenomena because of insufficientknowledge about its effects on human being, but it is fact that noise pollution has widespread and imposes long-term consequences on health. The overarching worldwide sources of noise pollution are Transportation systems,Industrial Machineries, Office Equipment's, Power tools, Construction Equipment's, Household appliances etc. These sources contributes to increase the noise level parameter measured in decibels, but there are some otherimportant factors to take into account like duration of exposure, frequency, incidence and distribution along the working day. The different types of numerous diseases are associated with various kinds of noise exposures whichcauses discomfort and dangerous impacts on the environment. However in most of the developing countriescomparatively very little attention has been rewarded to the noise pollution issue, in spite of its importance in theurban and industrial sectors.

The agricultural materials have become safer, lighter and more technologically optimized. In addition, the concept of environment friendly, sustainable, recycled, and green-building materials will soon have an important role in the marketing of sound-absorbing materials.

II.LITERATURE REVIEW

[1] INVESTIGATION OF NATURAL AGRICULTURAL MATERIAL TO REDUCE INDUSTRIAL NOISE

[A] K.N. Hemantha Dedigama et al**:** In the Present paper author has shown the potential use of Salvinia dust asnatural sound reduction material, to give a solution for the existing industrial noise problems. Specimens having a size of 75 mm (diameter) x 25 mm (thickness) were made by using Salvinia dust. Salvinia dust was mixed withcement at a ratio of 1:1 and water was added. Noise Reduction Coefficient of these specimens was investigated by using an experimental set-up consisted

of speaker at one end, propagation tube and a noise level meter. Noisereduction ability of the materials was quantified by using Noise Reduction Co-efficient (NRC) in this Paper authorhas been concluded Salvinia dust is natural material, which can be effectively used to manufacture a product withappreciable noise reduction properties. However, durability and strength of the product not checked.

[B] RozliZulkifli (2010) Authors have elucidated that the Noise Absorption Coefficient (NAC) of coconut coir fiber was increased at all frequency when they were backed with Woven Cotton Cloth (WCC) and perforated panel with 0.20 perforation ratio tested to measure its sound absorption coefficient. At low frequency, the NAC have significant increased. This is because higher flow resistivity of WCC than coconut coir fibers; so that soundcan be dissipated as it travels through material significantly. The results from the experimental tests showed that it has good acoustic properties at low and high frequencies and can be used an alternative replacement of syntheticbased commercial product. By using the porous layer and perforated plate backing to coconut coir fiber, the soundabsorber panel shows a good potential to be cheaper, lighter and environmentally friendly product compared to glass fiber and mineral based synthetic materials. The coconut coir fiber backing with woven cotton cloth was found better than tea-leaf fiber backing with woven cotton cloth. Hence in this dissertation here it is scope to workwith coconut coir fibers with some more additives from natural, agricultural or artificial materials.

[C] Lamyaa Abd AL-Rahman (2013) this paper throws light on effective use of date palm fiber as a sound absorber. The study has been carried out on the effect of date palm fiber as backing on sound absorption using three types of perforation plates and porous layers. The researchers has been used innovative material of date palmfiber as a backed with various 1-mm-thick zinc perforation ratios and hole diameters: 10% with 3 mm hole diameter, 10% with 4 mm whole diameter and 22% with 2 mm hole diameter. This Paper also shows that this innovative material has a promising future because it is much cheaper and lighter than industrial substances. It has been concluded in this paper that the of perforated plate backing, woven cotton cloth and polyester with datepalm fiber exhibits the high quality of acoustic absorber plates with easy production and environment friendlinessapplication.

[2] NOISE CONTROL TECHNOLOGY AND ITS NEED

[A] Nailong Zhang (2008) in this paper authors have explained noise control techniques of enclosures for various machines in the industry. The sound-attenuated enclosure is more convenient and effective noise controlmethod and it is acceptable for many types of power equipment. This paper also throws light on Active Noise Control (ANC) technique. By experimentation it has been seen that the noise can be effectively reduced by 15 dB for Propellers and 8-14 dB in adjacent cabins. Also noise cancellation using hybrid active-passive control technique has been studied from experimentation in which noise absorption coefficient achieved up to 0.82.

[B] Rupesh R. Kadam (2016) in this paper authors have explained Noise control is one of the major requirementsto improve industrial working Environment. The higher noise level is one of the most highly found contaminant in the industrial sector. Its negative effects are related to hearing system and professional deafness and permanentdeafness. Industrial noise can interfere with communication between supervisors and employee. Continuous exposure to higher noise level reduces the pace and quality of work. Noise affects negatively on health of industrialworkers and life of surrounding people. The research work was conducted to investigate the use of Bamboo and Tulsi for industrial noise attenuation to give effective solution for industrial noise problem. Specimens were prepared using Tulsi, Bamboo, cement and wood grip (Adhesive). Specimen having thickness 12.5mm and 25mmwhile diameter is kept 75mm for all specimens casting. Tulsi and Bamboo mixed with cement and wood Grip at ratio 0.5:0.5:0.5:0.5 and 1:1:0.5:0.5 with addition of water. Noise Reduction coefficients of specimens were calculated by using impedance tube system experimental set up. Impedance tube system experimental set up consists of stereo speaker, noise level meter and frequency generator. Effectiveness of Tulsi and bamboo for industrial noise attenuation is discussed in this Paper.

[C] Rupesh R. kadam (2016) in this paper authors have explained Noise free workplace is always expected by every industrial worker. Noise occurs inconvenience, annoyance which effect on quality of life of workers. Fromvarious field visits and questionnaires‟ it is seen that long exposer of 85db noise might be dangerous for blood pressure. Presently, in the industrial construction the problem of undesirable and potentially hazardous noise hasbecome much more complex and serious; the demands for a better environment and quality life styles are increased. However owners and architects are not paying much of the attention to control the noise pollution. Most of the developed countries use practical techniques to minimize the nuisance such as barrier walls, duct silencers, acoustical wall panel, sound proof curtains, sound enclosures for industrial machinery and other similarnoise control treatments that are installed near the source to effectively reduce the sound level. However, India has not yet yielded much into this issue as noise reduction methods are costly. Therefore, it is necessary to find out cost effective solution to control industrial noise.

[3] ARTIFICIAL NOISE REDUCTION MATERIAL

[A] Balan A.V. & Shivasankaran N. This paper presents a research on the properties of new waste material reinforced composites to absorb sound. The raw materials used to prepare these composite materials are wastes generated from the textile, maize and newspaper wastes. These raw materials were bonded using Poly Vinyl Acetate (PVA) adhesives. The seven samples of different combinations and proportion were prepared with the diameter and thickness of 99.5mm, 100mm respectively. Sound absorbing capacity for these new composites relays on the nature and proportion of the waste used. The sound absorption coefficient for each sample was determined using impedance tube method. The test results indicated that, while the frequency increases then the sound absorption coefficients increases for all the samples. The maximum sound absorption coefficient (0.43) athighest frequency and extreme Noise Reduction Coefficient (0.2875) are found in the sample having 75% maizeand 25% textile wastes as reinforcements. This waste material exploitation approach is more cost beneficial and offers an environmental friendly solution to the noise control.

[B] M.R. Pranesh (2021) in this paper authors have explained Use of synthetic porous and fibrous acoustic materials is still frequently found especially in building acoustics as well as in noise control applications. The products such as foam, rock wool, and glass wool made from minerals are known for their toxicity and pollutingeffects which are harmful to human health as well as to the environment. It has been presented that their production can release more carbon dioxide into the atmosphere compared to those made from natural materials. In order tosupport "Green" environment campaign, Acoustic absorbers from natural materials are therefore of interest due to their biodegradability and sustainability. As an alternate, natural fibres like jute, cotton, flax, ramie, sisal, and hemp obtained from renewable resource can be used as a cheap, biodegradable and recyclable sound absorbing materials. Although composites made of jute fibre/felt with other fibres are being used for various applications inautomotive industry, construction, building sectors, furniture etc.

[C] Mariam Azimi,(2017) This paper presents an Airborne sound insulation of natural materials such as flax or of recycled cellulose fibers is similar to the one of rock or glass wool [6]. Many natural materials (bamboo, kenaf,coco fibers) show good sound absorbing performances; cork or recycled rubber layers can be very effective for impact sound insulation [7]. These materials also show good thermal insulation properties, are often light and theyare not harmful for human health. Furthermore, many of these materials are currently available on the market at competitive prices [8].

III.METHODOLOGY

[1] Study various characteristics of sound from various review paper for effective textile industrialNoise reduction.
[2] Study of different agricultural waste materials and their noise reduction properties from variousLiterature reviews for noise reduction in textile industry.
[3] Understanding necessity of textile industrial noise reduction by conducting field visits.
[4] Methodology includes specimen preparation by using different combinations ofSelected materials and testing of specimen for noise reduction capacity by usingImpedance tube system.
[5] Cost effectiveness study of prepared noise reduction materials

IV.DISCUSSION

Industrial environmental can be easily improved by application of agricultural material in industrial construction. Noise reduction is important for organs that suffer from the lowest contrast and highest noise levels.From the review of all literature it is clearly seen that overall efficiency of selected material is better. It is evidentthat noise is not merely a nuisance but is a serious environmental problem and a health hazard. Like all other pollutions, noise pollution needs to control by measures which will maintain the acceptable levels of noise pollution for human beings and buildings. It is recommend that this agricultural material combination is more effective than high cost material. High noise level of 100 dB can be brought up to permissible acceptance limit of ambient noise standards. Selected material is available at low cost hence industrial environmental can be improved by use of this material in industrial construction. In India textile mills, the noise level is high and it is high time that the mills must recognize this an as environmental problem with an impact on occupational environment and take step to reduce it.

There are some important factors discussed below to help in noise reduction in simple way:

[1] Sound travels through the cracks that get left between the door and the wall. For reducing noise, this space(jamb frame gap) should be packed with sound absorbing material.
[2] Sound insulation can be done by constructing windows with double or triple panes of glass and filling the gapswith sound absorbing materials.
[3] Acoustical tiles, perforated plywood etc. can be fixed on walls, ceilings, floors etc. to reduce noise (especiallyfor sound proof recording rooms etc.)
[4] Planting green trees and shrubs along roads, hospitals, educational institutions etc., help in noise reduction to a considerable extent
[5] Increased distance between source and receiver by zoning of noisy industrial areas

Table no [1] Standard Permissible Noise Level:

Sr. No.	Area	Noise Level (dB)	
		Day time	Night time
1	Industrial Area	75	70
2	Commercial Area	65	55
3	Residential Area	55	45

Noise reduction coefficient can be determined as the ratio between reduced noise intensity due to theplacing specimen to the incident noise intensity without placing the specimen

$$\textbf{Noise Reduction Coefficient} = \frac{\text{Reduced Noise intensity (dB)}}{\text{Incident Noise intensity (dB)}}$$

Here,

Noise reduction is the difference between noise level measured without placing specimens (a‟ dB) in the propagation tube and Noise level measured with placing specimen (b‟ dB) in propagation tube.

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