

# Noise Pollution Control by using Agro Waste Material

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**Abstract:** *Increasing use of electrical and mechanical appliances at home and industries has created a concern for noise pollution created by them. Urbanization and heavy growth of construction work in every neighborhood further emphasize the need of new technologies for noise reduction. Noise created by different machines can be controlled either by suppressing the noise generating factors or by using the noise proofing agro materials which help to reduce the acoustic wave's energy by blocking or absorption. Maize, rice straw, and coconut fiber these agro products help to reduce the noise pollution. Newspaper waste also used as noise absorbing materials noise pollution control using agro waste involves leveraging agricultural residues to create effective sound-absorbing solutions. This abstraction encompasses the development of materials like acoustic panels, barriers, or insulation from agro waste, providing sustainable and eco-friendly methods to mitigate noise pollution in diverse settings.*

**Keywords:** Agro waste materials, maize, rice straw, rice husk, gypsum, natural latex

## I. INTRODUCTION

Noise Pollution: Unwanted or disturbing sound in the environment that affects the health and well-being of humans and other living organisms is called as noise pollution. Noise pollution has become the 3 pollution sources. It has adverse effect on environment, human health and economy. Recent studies reveal that a prolonged exposure to noise levels about 90 decibels can cause permanent deafness. Researcher are of opinion that if the present noise levels continues unfettered, future generation may be born deaf and dumb, At present the focus is to develop a cheap, renewable sound proofing material from agro waste, which is non-abrasive, porous, good insulation, hygroscopic and architecture combustive material for automobile, home appliances applications As the population grows, the number of people living in crowded urban areas will also increase. It is estimated that by 2050, over two-thirds of the population will live in urban areas, which will only increase the amount of noise pollution. Long-term exposure to day- evening- night traffic noise levels of at least 55 decibels affects an estimated 113 million Europeans. Furthermore, 22 million Europeans are subjected to high levels of noise from railways, 4 million to high levels of aircraft noise, and fewer than 1 million to high levels of noise from industries According to a recent BBC report, parts of the London Underground were "loud enough to damage people's hearing," with noise exceeding 105 decibels on many lines. According to the report, some were "so loud that hearing protection would be required if they were workplaces."

Based on a survey among citizens of the EU, by the World Health Organization (WHO), 80% of respondents believed that noise affects their health. Per the World Hearing Index, a person living in the loudest cities has hearing capabilities equal to someone 10- 20 years older. Overall, the findings revealed a 64% correlation between hearing loss and noise pollution

## II. METHODOLOGY

- Types of artificial acaoustic material available
- Study of properties of Agro Waste Materials
- Study of adhesive material
- Study of finishing material

- Study of noise absorption Equipment
- Deciding and fixing casting and testing mould
- Procedure of shredding of Agro waste material
- Procedure of making the sample
- Procedure of testing the sample
- Result

### III. NATURAL SOUND ABSORBING MATERIALS

1. Maize waste
2. Rice straw waste
3. Coconut fibre waste

#### 1. Maize Waste

- The maize stem was composed of 24% soluble, 26% hemicelluloses, 43% cellulose and 7% lignin components.
- The bundles occurring towards periphery are smaller in size and more crowded, whereas those at the central region are larger in size and more spaced. All the bundles are common to the stem and leaves, the central ones from the median veins of the leaf blade and small peripheral ones form the marginal bundles. Un-like most of the grasses maize stem is not hollow in the region.
- Sound observing capacity of maize is 75%



#### 2. Rice straw Waste

- The biochemical composition of rice straw and wheat straw is characterized by a typical composition of an agricultural-based lignocelluloses residue: it contains on average 30-45% cellulose, 20-25% hemicelluloses, 15-20 % lignin, as well as a number of minor organic compounds.
- Rice straw is poor in nitrogen, but relatively high in inorganic compounds, often referred to as ash.
- Physical Properties of Rice Straw
  1. Water or moisture does not pass through the surface of straw due to presence of wax nature on its outer surface.
  2. Due to presence of hollow space, it exhibits light weight property.
  3. It has good thermal resistance nature.



### 3. Coconut Fiber Waste



- Coconut fiber is obtained from the fibrous husk (mesocarp) of the coconut (*Cocos nucifera*) from the coconut palm, which belongs to the palm family (Palme).
- Coconut fiber has high lignin content and thus low cellulose content, as a result of which it is resilient, strong and highly durable. The remarkable lightness of the fibers is due to the cavities arising from the dried-out sieve cells.
- Coconut Fiber is the only fruit Fiber usable in the textile industry. Coir is obtained by retting for up to 10 months in water followed by sun-drying. Once dry, the Fiber is graded into "bristle" Fiber (combed, approximately. 20 - 40 cm long) and "mattress" Fiber (random Fibers, approx.

#### Adhesive Material:

##### 1. Wheat Flour

Wheat paste (also known as flour paste or simply paste) is a gel or liquid adhesive made from wheat flour and water. We used wheat flour as adhesive material. Wheat flour has stickiness properties and also has binding capacity

##### 2. Natural latex

- Natural latex as found in nature is a milky fluid found in 10% of all flowering plants. It is complex emulsion that coagulates on exposure to air consisting of protein, alkaloids, starches, sugars, oils, resins and gums. In most plants latex is white, but some have yellow, orange or scarlet latex. We used natural latex as adhesive material.
- Natural latex also has stickiness properties and also has holding capacity. Latex refers generically to a stable dispersion (emulsion) of polymer micro particles in an aqueous medium. Latexes may be natural or synthetic.
- Latex as found in nature is the milky sap of many plants that coagulates on exposure to air. It is a complex emulsion in which proteins, alkaloids, starches, sugars, oils, tannins, resins and gums are found.



### Deciding and fixing of Casting and Testing Mould

#### Casting Mould

- The size of mould is 270mm x190 mm x 10mm.
- The mould is made up of plywood

#### Testing mould

- For testing of absorption test of sample 1 and we used 290mm x270 mm x 90mm mould .
- This mould is made up of bricks.



### IV. MIX DESIGN

#### Agro Waste Material Used and Its Proportion for Sample

##### Natural Adhesive gum ingredients and proportion

SR.NO	Name Of Agro Waste	Proportion
1	Maize	45 gm
2	Coconut Fiber	2.5 gm
3	Rice Straw	12.5 gm

##### Natural Adhesive gum ingredients and proportion

SR.NO	NATURAL ADHESIVE MATERIAL	PROPERTIES
1	Natural Latex	45 gm
2	Lime	15 gm
3	Water	200 ml

**V. PROCEDURE**

Procedure for making the natural adhesive

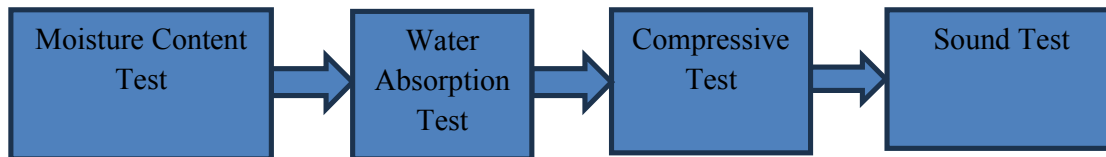
1. Take the Wheat Flour of about 100 gm.
2. Add 2 cup of water into the wheat flour.
3. Add the 3 spoon of natural latex and 1 spoon of lime into it.
4. Mix it properly then heat the mixture at 50 -60 deg. Cel. For 10 to 15 min until it turns into white and sticky gum.
5. After that this hot mix is mixed with sound absorption material as the binder material in the 1: 1/2 proportion

Procedure to Make Sample

1. Collecting of dried maize waste from the Lonikand and rice straw is also collected along with the maize plants.
2. Dried maize waste skin was removed then white colour stem is present inside that material is used in this project.
3. Take that white stem cut into small pieces which is comfortable for making powder.
4. Rice straw is cutting into small pieces with 3 cm length wise.
5. Collect coconut fiber separate the hairs of coconut is cut into 2 to 3 cm pieces.
6. for sample 1 we took maize waste 70 %, rice straw 25%, coconut fiber 5.0%. 6.for sample 1 we took maize waste 70 %, rice straw 25%, coconut fiber 5.0%.
7. Natural adhesive is prepared with Wheat flour powder, sugar and vinegar these there are mixed in hot water and stirred it well. It will look as a gum which is white in colour.
8. Then the maize waste powder, rice straw and natural adhesive is mix well.
9. Take a mould of dimensions 200mm\*150mm\*10mm apply any oil or grease to remove the sticky nature.
10. Place the mix into the mould compact it well evenly. Let it dry in sunlight about 24 hours.
11. After 24 hours apply gypsum powder to the board and again dry it in sunlight about 2-3 hours.



**VI. METHOD OF TESTING**



**VII. RESULT AND DISCUSSION**

**Moisture Content Test**

The procedure for conducting a water absorption test on gypsum plaster sheet is covered by this standard, IS: 2542 (Part II/Sec 7) - 1981.

Table ( Oven Dry )

Sheet size	Average %
	50.51
19cm×27cm×1cm	52.82



	55.57
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1.2 Table ( Air Dry )

Sheet Size	Average %
	42.3
19cm×27cm×1cm	40.6
	45.2

Water absorption Test:

The procedure for conducting a water absorption test on gypsum plaster sheet is covered by the standard, IS: 2542 (Part II/Sec 7) - 1981.

Table ( Oven Dry )

Sheet Size	Average %
	8.7
19cm×27cm×1cm	8.9
	9

Table ( Air Dry )

Sheet Size	Average %
	9.1
19cm×27cm×1cm	9.3
	9.6

**Compressive Strength Test:**

The standard IS: 2542 (Part II/Sec 7) – 1981 covers the method of carrying out compressive strength on gypsum products. 4 cubes of 70x70x70mm are casted and tested. While inside the compression device, the cubes are loaded equally throughout their whole surface at a rate of 140 kg/cm<sup>2</sup>/min while being applied without shock

Table Compressive Strength of cube

Sheet Size	Average of Compressive Strength (N/mm <sup>2</sup> )
	2.6
19cm×27cm×1cm	2.1
	2.9

Sound Test:



Without Sample Plate



With Sample Plate

Small speaker are used for conducting the test .



**Without Sample Plate**



**With Sample Plat**

Following are the readings measure by using sound meter.

SR. NO	Absorption Test Of sample	ReadingG1 (db)	ReadingG2 (db)	ReadingG3 (db)	Average (db)	Noise Absorption BySample
1	without samplePlate	127	129.2	130	128.7	34.89%
2	With SamplePlate	84	85	82.4	83.8	

### VIII. CONCLUSION

From the above experiment test conducted the mix having 12.5 gm, rice straw, coconut fiber 2.5 gm, 45.5 gm maize waste has held better performance than the other mixes casted. The mix as shown better result in moisture content up to 51.67 % and a water absorption rate is 8.7 percent. The specimen has a transverse strength of 6.75 N/mm<sup>2</sup> and a bending strength up to 40.5 N/mm<sup>2</sup>. The noise level is 90.2 dB, but after the panel is in place, the noise level reading drops to 83.8 dB. Hence, this mix can be cast and be used in interiors of a building for better noise insulation.

To reduce the noise that is being produced unnecessarily by utilizing noise reduction. The conduction an experiment using agricultural waste as a material and found that it is an effective noise reduction that can be produced with minimum cost. This initiative is a solution to noise pollution, one of today's issue. The best use for this product is as a noise-reduction panel in the building and construction industry. This study demonstrated the use of an agricultural material, such as rice straw, as a modified material and design for an environmentally friendly product.

### IX. FUTURE SCOPE OF WORK

Agro- Waste Material can be used as alternative for Noise absorption By changing various parameters (proportion of agro- waste), sample can be tested for noise absorption capacity

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