

BIO-DEGRADABLE MATERIALS FOR PACKING ACOUSTICS AND NOISE CONTROL

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Key words:

Rice straw, Biodegradable resin, Packaging material, Noise acoustics Sound absorption panels, Fiber length, Physical strength and Deformation of sample

Introduction:

Currently only 20% of rice straw is used for practical purposes such as production of bio- fuels, paper, fertilizers and animal feeds. Rest of 80% of rice straw is either dumped or burnt. Burning of paddy straw causes lot of air pollution and also affects the fertility of soil, and some states like Haryana, Delhi, Punjab and Utter Pradesh are suffering from a thick mixture of smoke and fog in the atmosphere.

Also, India generates around 26000 tons of plastic per day which is another environmental issue. Mismanaged plastic waste causes harm to natural environment, it effects the oceans and land. Plastic pollution adversely effects our ecosystems and also linked to air pollution

To overcome from these problems rice straw-based packing can be best option, which will help in effective use of rice straw and also reduces the usage of plastic for packing. This ~~part~~ may provide a solution for two major environmental concerns i.e., rice straw burning and pollution due to plastic. **Rice straw is very good packaging material because of compaction resistance and resiliency.** There are many technologies to convert stubble waste into packing materials rice straw has cellulose and lignin contents and we are using bio degradable gum as a bonding component.

Objectives:

- Selecting a suitable and most economical biodegradable material to produce packaging and noise control components.
- Selecting suitable natural and synthetic material to use as use adhesive.
- Study of physical, chemical and other engineering properties to find the suitability of material to use as raw material for production of biodegradable packaging and noise control elements.
- Finding the optimum proportion of the material for mixing and moulding.

- Mold the material to required shape and finding the suitability to be used for packing, acoustics and noise control.
- To minimize the use of material which are harmful to the environment.

Methodology:

- Collection of different biodegradable material rice straw, Saw dust.
- Collection of different adhesive such as slurry (water + small quantity of Maida flour), Synthetic resin, molasses.
- Conduction of studies on collected material
- Cut the rice straw to different lengths to use it as main component of packaging material moulding of specimens
- Drying of specimens
- Visual observation
- Test on the different specimens
- Suggesting suitable composition to use it as packaging and noise control panels.

Results and conclusion:

Rice straw as a biodegradable packaging material and panel board

- The different tests were conducted on prepared panel boards such as Flexural strength test, apparent density, moisture content, thickness swelling, compressive strength.
- The results are obtained as given below and it is compared with thermocol.

mix	Sample	Apparent density (g/cc)	Flexural strength (N/mm ²)	Thickness swelling (mm)	Moisture content (%)
Mix1	Rice straw +slurry	0.166	0.056	2	54
Mix2	Rice straw + molasses +saw dust + synthetic resin	0.46	0.096	0	22.2
Mix3	Rice straw + saw dust + slurry	0.26	0.158	0	31.8
Mix4	Rice straw + slurry + synthetic resin	0.13	0.10	1.5	31.5

1	Thermocol	0.0087	0.088	0	0.5% for every 7 days
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Conclusion

In the present study, four different combinations/mixes were made with different waste material as illustrated in the above Table 1, tests were conducted for the evaluation of engineering properties as per standard guidelines. Flexural and density test on the samples were conducted to evaluate the loads.

An attempt was made to compare the apparent density test, flexural strength test, Swelling (Water absorption) test and Moisture content tests on samples of different mixes, with thermacol samples. Table 1 presents the summary of the comparison of tests different mixes samples with Thermacol sample.

The study shows that, Mix 3 (Rice straw, Saw dust Slurry) shows better results when compared with thermocol samples. Compare to thermocol the biodegradable material is have maximum Elastic properties.

Scope for future work

The majority of plastic and thermocol used now a day are produced from crude oil and other fossil fuels. The conventional packaging materials as such many disadvantages as compared to bio degradable packaging. There is a shift towards biodegradable packaging mainly attributed to rise in health awareness and environmental concern associated with non-biodegradable packaging.

Many different adoptions and tests and experiments have been left for future due to lack of equipment and time. (I.e. the experiments with real data are usually time consuming, requiring even days to finish single run).

- The different tests on samples have to be done as mentioned in the methodology
- The sound absorption test has to be carried out for noise control panel.
- Casting of molds to a different shapes and sizes has to be carried out.
- To give the better finish and compaction the hot compressor setup has to be developed