Rice Straw, Tree leaf and Plastic used in wooden panel: A Review

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Abstract— Every year farmers burn their straw on agricultural fields and it generates a lot of smoke and this smoke was spread poison in the air of big cities like Delhi, Noida, Ghaziabad. Due to which many people have to face the diseases related to respiratory problems. In this massive society of people are completely dependent on natural resources and are exploiting it badly. Wooden ply made products available in the market, which is manufactured from wooden log, people like it more. Ply is available in different sizes in the market, which are used in different places. Waste plastic, straw, leaves falling from the trees, all these are stuck around us. We will use this useless material to make a wooden panel. For making this panel plastic waste, rice straw and tree leaf composition sandwich between the two layer of veneer. This panel will be used in making tables, chairs, low security doors etc.

Keywords: Rice Straw, Plastic waste, Pollution, Wood, Panel, Adhesive

I. INTRODUCTION

India is a fastest growing country in the world with this respect the increase in standard of living and requirement of good food of people also generate more solid waste. In developed cities and town various awareness program has been conducted by state government and local authorities. All these awareness programs relatively give basic ideas, how to manage the solid waste and other non pathogenic waste. But in rural areas due lack of awareness the former either burned their waste or dumped at low lying areas. In some rural areas awareness program has been done but the neutral behavior of rural people not follows the waste management instructions.

Straw is the vegetative parts of rice crop which is sowing in the month of June-July and harvesting in the month of October-November. Most of the formers of Hariyana, Punjab and U.P. burned their straw in the agricultural field after removing the rice from the crop. In the month of October- November farmers burn their straw and creating lots of smoke. In the month of October-November, winter season is starting fog and cold gradually increases. The smoke and fog combine to form the smog, which is cover the entire Delhi and its surrounding cities and Delhi becomes like a gas chamber. In this month Delhi become much more polluted city in the world. The Sox, NOx, CO2 and HS level crosses the permissible limit of about 6th to 7th times.

II. LITERATURE REVIEW

Han-Seung Yang, Dae-Jun Kim, Hyun-Joong Kim has studies on the Rice straw–wood particle composite for sound absorbing wooden construction materials. They have use the straw using with adhesive of urea formaldehyde for making sound proof wooden materials. They have properly discussed the physical property, mechanical property, and acoustic property.

Nicolas Boquillon, Ge'rard Elbez, Uwe Schönfeld has studied the Properties of wheat straw particleboards bonded with different types of resin. They have use the urea formaldehyde as binder and found that the properties of board is poor on several parameters such as internal bond strength, flexural modulus, and thickness swelling. For making efficient board, they have used the PTP (polymeric material from triglycerides and polycarbonic acid anhydrides) resin for the bonding of straw particles.

Abbas Ghanbari, Mehrab Madhoushi, Alireza Ashori has studied the Wood Plastic Composite Panels: Influence of the Species, Formulation Variables and Blending Process on the Density and Withdrawal Strength of Fasteners. They have adopted and examine four parameters includes fiber type, fiber contents, fiber size and blending method on selected physical and mechanical properties of Wood Plastic Composite. They have found that the poplar fiber type, Fiber content (45 wt%) and size (20 to 40 mesh), and extrusion method is good for wood plastic composite.

Bekhta, P., Korkut, S., and Hiziroglu, S has studied the Effect of pretreatment of raw material on properties of particleboard panels made from wheat straw. They have use the pretreated wheat straw in straw based particle board and examine the properties of particle board experimentally.
They have found that pretreated wheat straw amend the thickness swelling, bending strength and internal bond strength particleboards.

Muhammad Yasin, Abdul Waheed Bhutto,, Aqeel Ahmed Bazmi, Sadia Karim has studies the Efficient Utilization of Rice-wheat Straw to Produce Value –added Composite Products. In this research authors utilized the agricultural waste like straw into the useful production of fiber board and particle board. They have done the exhaustive study on straw and relative properties.

III. MATERIAL USED

A. Rice Straw:

Straw is the byproduct of rice crop, after removing the rice from the crop rest part is straw which is useless and waste agricultural product. India is agriculture dominated country, throughout the year different kind of agricultural crop sowing and harvested. India is the second largest rice production country in the world and West Bengal is first in India, followed by UP, Punjab, Odisha, Andhra Pradesh, Bihar and so on. The annual production of rice and straw in India is roughly 88 to 110 million tonnes and 130 to 170 million tones. Of this about 20 to 30% used as animal fodder in very adverse case and rest very amount is used in fruit and crockery protection bed, formation of statues etc and major part is burned at the field. The burned straw emits

huge quantity of greenhouse gases. The reuse of straw based the following properties such as physical property, chemical property and thermal property.

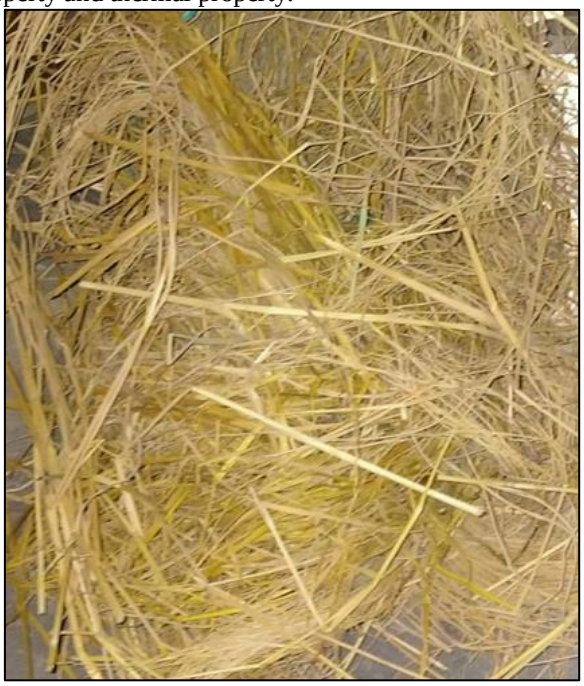

Fig. 1: Rice straw

B. Plastic Waste:

Plastic is an inorganic matter, now it is easily available and widely used in every level such as producer to consumer. The interesting features of plastic to become the product water tight, air tight, isolation from outer environment and too much slow degradation of it. If any organic product in the contact of air, after some time due to natural action the decomposition of organic product will start. The Global production of plastic was 359 million metric tons in 2018 (statista) and India generates close to 26,000 tonnes of plastic a day, according to a CPCB estimate from 2012. The use of plastic is preventing oxidation or decomposition of product. After the utilization of organic product the enveloping plastic is discarded or throws into the dustbin. Today plastic waste becomes a global problem, every country trying to reduce over plastic production and existing plastic recycle or reuse. There is too much problem associated with disposal and burning of plastic. The disposal of plastic into the deep earthen trench or burial causes the leaching of toxic chemical into the soil and subsurface water. But most of countries disposed their plastic waste into the ocean, which harm the lots of aquatic life of the ocean. Burning of plastic causes release of toxic gases, which contaminates the air.

Fig. 2: Waste Plastic

C. Tree Leaf:

Leaf is the parts of tree which is extensively used by tree for photosynthesis. They extract the energy from sunlight and use it make glucose and sucrose with water and carbon dioxide. After some time they are free fall to the ground and spread on roads, houses, garden etc and create littering around us. Some less fibrous leaf easily decomposed but some strong fibrous and wide leaf takes more time to decompose. This leaf can be used in the wooden panel for reducing their cost.

Fig. 3: Tree Leaf

IV. METHODOLOGY

In this work waste plastic used as binder and straw used as filler material in the wooden panel.

1) Melt the plastic waste (LDPE) up to the solid plastic convert into liquid.
2) Remove the straw from unwanted materials like sand, clay, and other inert material.
3) Manually compaction or densification of clean straw about 90% with small amount fibrous leaf about 10% and makes an individual rope.
4) Put the first veneer at bottom and make boundaries on veneer by wooden batten for stability of wooden panel
5) Size of wooden batten is select as per requirement of thickness of panel.
6) Put the thin layer of liquid plastic on veneer then arrange the compacted straw ropes on panel and properly fill the boundaries with straw.
7) Put the thick layer of liquid plastic on straw ropes. After thickening of liquid plastic put the second veneer at top and apply weight (sandbags, bricks, etc) on wooden panel for gradual compaction.

V. CONCLUSION

In this work effectively utilized the waste plastic, straw and tree leaf for making the economical wooden panel. This panel is sound proof, heat proof and moisture not transfer from outside to inside. This panel used for making table, chairs, partition wall, less security doors and windows etc. This panel save the trees reduces the cost of wooden ply, plastic pollution and littering of leaf around us.

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