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Resourceful Utilisation of Wheat Straw into Value Added Composites

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Abstract

Panel industry is growing at 20.25% largely due to shift in consumer's preference for Medium Density Fibre board (MDF). Medium-Density Fibreboard Market estimates that the market for MDF reached a value of more than US\$ 22 Billion in 2017. The demand for MDF in India is 1600-1800 cbm per day. Since wood raw material is becoming scarce, there is a need to source raw material from other available resources. In India huge quantity of agricultural residue is generated every year. On the other side in the absence of assured returns, farmers find burning is an economic way of managing the agro waste. Burning of straw emits gases like carbon dioxide, methane, carbon monoxide, nitrogen oxide, sulphur oxide which adversely affect human health as well as the environment. Hence instead of burning, use of agro waste for value addition would replace wood in MDF manufacture and thus save valuable trees in forest or outside. Although some breakthroughs have already been made in this direction by previous workers some enhancements in the strength properties have been envisaged through the present investigation. Wheat straw contains 4-6 percentage of Silica. The percentage of silica varies depending on the source of wheat grown. Wheat straw with alkali treatment (0.1 and 0.3%) on the weight of wheat straw was studied for the manufacturing of MDF. MDF panels were made using (10 and 12%) Urea formaldehyde resin, phenol formaldehyde resin and Melamine urea formaldehyde resin and tested as per IS 12406-2003 "Specification for MDF for General Purpose". The chemical and physical characteristics of alkali treated and untreated wheat straw fibres investigations reveals that the, ash content decreased with the removal of dust and increased alkali treatment. Wheat straw fibre board without alkali treatment can be successfully made using MUF resin and with 0.1% alkali treated using PF resin. The product developed conforms to requirements for MDF as specified in IS-12406-2003 standards for PF and MUF bonded boards. These results indicate that MDF can be made from fibre derived from wheat straw.

Keywords: Wheat straw, Medium density fiber board, Forest, Agro waste, Composites