

Recycling of Agricultural Residue to Fabricate High Strength Environmentally Friendly Composite material

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Jute is cultivated almost exclusively in developing countries of East Asia and in some parts of Latin America. Bangladesh, India and Thailand account for over 90 percent of world jute production and among them Bangladesh is in the second position. Jute, which is the second most important vegetable fiber after cotton due to its versatility, has diversified applications. Jute fibers are using extensively as automotive nonwoven material. However, after harvesting the jute fibers the leftover jute sticks are treated as a wastage which has no prior use to Bangladesh except fuel purpose. The chemical component of jute stick is much more similar to wood. So jute stick can be considered as an alternative of wood to a considerable extent since wood based industries are facing scarcity of raw materials. Jute stick is one of the promising raw materials which caused a revolution in the field of materials and received wide attention of the researchers from all over the world because of its outstanding advantages like environmental friendliness, biodegradability, recyclable, cost-effectiveness, and comparable chemical composition.

On the other hand, in most of the cases industries are manufacturing composite materials by using fossil resource based synthetic resin adhesive which contain formaldehyde, a component harmful to the human body as well as global environment. Moreover, it is believed that to face the challenges of future global environmental issues there will be a strong push to replace fossil resource based adhesive to a new bio-based adhesive. Nonetheless, composite material bonding using naturally-derived substances in many cases requires a high addition ratio of natural adhesive to get high performance jute stick board.

This thesis projects the feasibility of using jute stick to manufacture high strength, environmental friendly composite material while using a natural adhesive like citric acid which comes from citrus fruits like lemons and limes. The major advantage in our invention is that, we have applied simple resin insertion technique only using a small addition of natural adhesive to get high performance jute stick boards in comparison to existing formaldehyde based boards. In this invention, we have provided a completely new type of manufacturing method by using citric acid as a natural adhesive to develop high performance board with jute stick.

The aim of the study is to make a road map for the farmers to utilize their waste recourse to covert value added high strength environmental friendly composite product for uplifting their economic condition. It will ensure a sustainable recycle of agricultural waste to face the upcoming challenges of global environmental safety by reducing pressure on forest resource as well as fossil fuel recourse.

Keyword: Recycling, Sustainability, Agricultural residue, High strength material