

Title: Enhancing mechanical properties of natural waste-based composites for automobile and plastic industry

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Abstract: Natural fiber composites are a renewable and environmentally friendly alternative to conventional synthetic materials that combine the biodegradability and essential durability of natural fibers with adaptability. Improved adhesion between fibers and matrix can be accomplished by comparing surface treatments applied to sugarcane, water hyacinth, and banana plant wastes. This will allow us to produce composite materials that are more durable and sustainable. To study the mechanical and morphological characteristics of the composites, two surface treatments were applied: gamma radiation at a dose of 1, 2, 3, 4 and 5 kGy and alkali treatment at a concentration of 5, 10, and 15%. The study revealed that with the increasing treatment of alkali solution, improvements in the composite's mechanical characteristics whereas gamma irradiation treatment enhanced the mechanical properties to a certain extent (2 kGy) after that the mechanical traits dwindled significantly. SEM, XRD, and FTIR analysis of the developed composite samples also revealed the reasons for the improvements in mechanical properties after alkali and gamma radiation treatments. As an ecofriendly and lightweight substitute for conventional materials, bio epoxy composites reinforced with natural fibers can be used for car interior panels, eco-friendly furniture and as a replacement for any plasticware offering eco-sustainability for contemporary living space.

Key words: Natural fiber composites Renewable materials Environmentally friendly Biodegradability Durability

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