

SILANATED AGRICULTURAL WASTE BAGASSE FOR WOODEN-POLYESTER COMPOSITE

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Summary: This work aims to introduce agricultural waste fibers, specifically Bagasse, as filler of unsaturated polyester resin for making wooden-polyester composites. Bagasse fibers were firstly treated using 5% Sodium Hydroxide (NaOH) and then with methyltrichlorosilane coupling agent (CPL). Bagasse-UP (B-UP) composites were then prepared by addition of untreated (B), alkali-treated (ATB) and silanated (STB) Bagasse fibers as (5, 10 and 15%) by weight of UP. The B-UP composite mix was subsequently cross-linked at room temperature using methyl ethyl ketone peroxide then exposed to elevated temperature to achieve full crosslinking. The flexural behaviour of the B-UP composite was studied using standard flexural tests. In addition, water absorption at room and high temperatures was also examined.

Young's modulus and flexural strength apparently improved with STB-UP composites. ATB-UP composites had higher water absorption compared with B-UP composites, but STB-UP composites had the least water absorption. To quantify the effect of water on the mechanical characteristics of the B-UP composite, dynamic mechanical analysis (DMA) tests were performed. DMA results show that silane treatment of Bagasse fibers significantly improved the storage modulus of the composite. While water exposure slightly reduced the storage modulus of B-UP and ATB-UP composites, silane treated composites STB-UP showed the least reduction of storage modulus after water exposure. TEM, FTIR, and XRD measurements were performed to explain the improvement of silane treatment of the Bagasse fibers over other treatment methods.