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MECHANICAL PROPERTIES OF SHORT PINEAPPLE LEAF FIBRE REINFORCED POLYPROPYLENE COMPOSITE

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ABSTRACT

In the central stage of material science, natural fibres appear to be the outstanding materials which come as the viable and abundant substitute for the expensive and nonrenewable synthetic fibre. The synergized effect of this natural fibre and thermoplastic polymer in composite include low cost, low density, acceptable specific properties, ease of separation, enhanced energy recovery, biodegradability, reduce wear on processing machinery and reduced health hazard. In this research, short pineapple leaf fibre (PALF) reinforced polypropylene (PP) composite was studied. The main objective was to achieve the optimum PALF loading in PP matrix towards better mechanical properties. PALF was prepared from raw pineapple leaf. It was then chemically treated to hinder the water content. Both PP and PALF were compounded using two-roll mill machine prior to compression via hot press machine to form a sheet. After forming the composite sheet, samples were prepared for tensile test (ASTM D638), flexural test (ASTM D790) and impact test (ASTM D256). Scanning Electron Microscope (SEM) was used to investigate the miscibility between the fibre and the matrix. It was found that the Young's modulus increased slowly and curved down after 30 wt% of PALF. Meanwhile, the composite tensile strength as well as the elongation at break reduced. However, flexural modulus and strength increased linearly with increment of fibre loadings. This trend was similar for impact strength where it exhibited a slight reduction at the initial stage but increased later on as the fibre loading increased. The study has demonstrated that the optimum fibre loading for peak performance was at 30 wt% of PALF. This was clarified further by SEM where fibres and matrix have shown better miscibility at 30wt% of PALF.

Keywords: Natural fibre, composite, pineapple leaf, polypropylene, Scanning Electron Microscopy (SEM).