

# Polymer powder and pellets comparative performances as bio-based composites

## Abstract

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Polypropylene (PP) is adopted as a matrix. This polymer is usually processed in the form of pellets with natural fillers to fabricate biocomposites. The micronized powder form of PP is rarely used by polymer manufacturers. This paper investigates the effect of polymer powder form on the overall properties of date palm filler-based composites. In particular, the mechanical, physical, and thermal properties of newly developed date palm powder (DPP)-filled composites were experimentally characterized, evaluated, and compared with two forms of PP: powder (PW) and pellet (PL). Specimens were fabricated using a laboratory-scale single-screw extruder followed by compression molding. The experimental characterization of materials supported by scanning electron microscopy (SEM) showed that the PW form of PP when used as a matrix in the biocomposites was very important to achieve a higher degree of homogeneity in filler distribution, stronger interfacial strength and thus enhancing the performance. Therefore, biocomposites fabricated using the PW form exhibited more advanced properties than those used with the PL form. Depending on the fiber content, tensile strength and flexural strength for PW-based biocomposites were 53% and 27% higher than similar values for PL-based biocomposites, respectively. Water absorption was lower in the case of PW form which indicated good durability of the developed material. The findings of the present study may help manufacturers to effectively process date palm powder-filled biocomposites to achieve better properties and enhanced performance.