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Biodegradable Polymer Composites using Starch-based Polymer and Teak Sawdust

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Many useful material properties specifications and mechanical functionalities of biodegradable polymers are comparable to conventional plastics. However, the resistance of synthetic polymers to physical, chemical, or biological degradation has caused serious environmental problems. To overcome these problems, biopolymers are being suggested as safer alternatives. In this study, the synthesis of thermoplastic starch-based biopolymer from starch reinforced with sawdust was investigated. Glycerol was used as a plasticizer and acetic acid resisted the fungus to be formed and spread throughout the surface. Biopolymer composites were prepared with various percentages of sawdust (20%, 40%, & 60%) compared to the dry matter of cassava starch. Starch from both edible sources (cassava & jackfruit seeds) and non-edible sources (mango seeds & avocado seeds) and sawdust (~350 μm) from teak were used. The chemical and physical properties of these composites were analysed using Fourier Transform Infrared Spectroscopy, Scanning Electron Microscope, biodegradability, tensile strength, water solubility, water absorption capacity, and moisture content. Unmodified teak sawdust was soaked in 5% of NaOH (aq) solution and washed until base free. Unmodified starch with chemically modified sawdust (S/CMSD) composite resulted in higher tensile strength values compared to the composites with both chemically modified starch with unmodified sawdust (CMS/USD), and unmodified starch with unmodified sawdust (S/USD) composites. S/CMSD & CMS/USD composites had the lowest values for water solubility and biodegradability than S/USD composites. Water solubility, biodegradability, water absorption capacity, tensile strength, and moisture content were decreased with increasing sawdust percentage. These results indicate that S/CMSD and CMS/USD have great potential in the production of biodegradable packaging material.

Keywords: *biopolymer composites, starch, teak sawdust*