

## **Abstract**

In this study, cellulose fibers from 5 types of biomass plant sources, banana stem, pineapple leaf, coir, hemp bast and palm oil empty fruit bunch, were investigated for using as the reinforcement materials in composites. The appropriate method for cellulose fiber extraction of each material was chosen. Cellulose fibers from banana stem and pineapple leaf were prepared by the decorticating machine, then washed with soap and water. Hemp fiber was prepared by water retting of hemp bast. Fibers from coconut husk and palm oil empty fruit bunch were prepared by treatment with sodium hydroxide, followed by bleaching with hydrogen peroxide. The chemical composition, physical, mechanical and thermal properties of these fibers were investigated. The chemical composition of these fibers contained 48-66% of alpha cellulose found with the maximum content in the pineapple fiber, and 15-28% of hemicellulose found with the minimum content in the hemp fiber. Fiber diameter can be sorted by the finesse from pineapple, hemp, coir, palm to banana fibers, respectively. For the fiber surface, hemp fiber indicated hydrophobicity while banana and pineapple fibers showed the hydrophilicity. These mean that banana and pineapple fibers can absorb water well, while hemp has the lowest water absorption. From the mechanical properties point of view, the tensile strength of pineapple fiber was the highest, followed by hemp and banana fibers. Meanwhile, the Young's modulus of hemp fiber is the highest, while fibers from coconut and oil palm present a predominance of elongation better than other fibers. However, the adhesion properties between the fibers and the polymer matrix (LDPE and PLA) using the pull-out test found that pineapple and hemp fibers (with high cellulose contents and low non-cellulose contents, and split to a single fiber) had good adhesion properties in both types of matrix. Finally, for the thermal properties of the fibers from banana, pineapple and hemp fiber, with high cellulose contents, displayed better thermal stability than coir and palm fibers. Therefore, the cellulose fibers from plants used for reinforcement in composites based on the source of raw material, fiber preparation that can eliminate impurities out, and prepare the small fibers that can adhered well to the polymer.

Key words: Cellulose fibers, Composite