

## **Analytic hierarchy process (AHP) based materials selection system for natural fiber as reinforcement in biopolymer composites for food packaging**

### **ABSTRACT**

The biodegradability of a material has been an important measure in packaging design. Green biocomposites, which are made of natural fiber and biopolymer matrix, are promising alternative materials in single-use packaging to replace conventional materials. Selection of the most suitable natural fiber for reinforcement in green biocomposites is an initial attempt towards reducing resources depletion and packaging waste dumping. A selection system of analytic hierarchy process (AHP)-based method is proposed. Food packaging materials' requirements and production factors are the basis of selecting 13 vital characteristics of natural fibers as the selection criteria. Nine natural fibers were assessed based on data gathered from recent literature. From the results, ijuk obtained the highest priority score (14%). Whilst, sisal had the lowest rank with a score of 8.8%. Sensitivity analysis was then performed to further validate the results, and ijuk remained at the top rank in four out of the six scenarios tested. It was concluded that ijuk is the most suitable natural fiber for reinforcement in green biocomposites for food packaging design. Nonetheless, for future development, more comprehensive selection criteria, such as fiber specific properties, fiber processing, and fibre treatment, are suggested to be included in the framework for more comprehensive results.

**Keyword:** AHP; AHP rating mode; Natural fiber selection; Green biocomposites; Food packaging; Design process