Development of Highly Filled Phenolic Resin-Endocarp Particles of Coconut (*Cocos nucifera*) Composites

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Considering the growing interest in the development of new materials preferably based on renewable materials, this paper presents work carried out with the particles of coconut endocarp with a view to explore its potential use in the development of composite material having the highest content of these particles in a phenolic resin for possible engineering applications. The morphology, chemical composition and thermal stability of these particles and chemical characterization and thermal stability of phenolic resin were evaluated. Composites were prepared by compression molding by incorporating coconut shell powder into 5-20 % phenolic resin. It was found that the swelling characteristics, chemical and mechanical properties of these composites were influenced by the resin content. Tensile and flexural properties of the composites exhibited improvement with increasing resin content from 5% to 20% with ~146% increase in YM, ~184% in UTS, 15-23% % elongation,~34.5% in flexural modulus and ~131% in the flexural strength ~63% in flexural strength. While the improvement in tensile properties are attributed to good bonding between the phenolic resin and the CSP and presence of less number of voids in the composites, those in flexural properties to the microstructural in-homogeneity. These results are corroborated by the fractographic studies. Thermal stability of the composites is influenced by the proportion of shell powder in composites. Swelling characteristics indicated a decrease in the absorption of water in the composite laminates with higher amount of resin. All these results suggest that the developed composite can be used for various applications including those exposed to external atmosphere.