

**INFLUENCE OF PARTIAL REPLACEMENT OF
CARBON BLACK WITH ARECA NUT
HUSK FIBRE ON PROPERTIES OF NATURAL RUBBER
COMPOSITES**

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ABSTRACT

Development of Natural Rubber (NR) composites using natural fibres such as coconut, bamboo, banana, sisal, etc. has increased during the recent past due to the growing need for green rubber composites. Natural Fibres (NF) are low density and low cost materials and they have high recyclability and biodegradability. However, compatibility between NF and NR is not adequate to achieve properties required for various applications. Areca nut husk is one of the good sources of NF which abundantly present as a waste. Two series of NR composites were prepared for this study. One series was prepared with six NR composites using carbon black (N 330) and surface treated (with silane coupling agent) areca nut husk fibre (SAF) by varying the SAF loading from 0 to 50 phr at 10 phr intervals, whilst maintaining the total filler loading at 60 phr. Another series was prepared also with six NR composites using the same formulation, but with untreated areca nut husk fibre (UAF). UAF and SAF composites were characterized using Fourier Transform Infrared Spectroscopy (FTIR). Cure characteristics and physico-mechanical properties of these composites were tested to select the best areca nut husk material to partially replace carbon black and the ratio of the two filler materials in terms of properties for low cost applications. Cure rate decreased, however scorch safety improved with the increase of the amount of SAF in the composite. Increase of UAF loading increases cure rate and resilience. Results indicate that Two third of the carbon black in NR composites could be replaced with areca nut husk fibre without significantly affecting properties such as hardness, resilience and compression set. Out of the two types of materials UAF and SAF, UAF is the most suitable areca nut husk material to partially replace carbon black (CB) in NR composites. The best blend ratio in terms of all properties is 40:20 CB to areca nut husk fibre.

Keywords: Natural rubber, rubber composites, areca nut husk fibre, surface treatment of fibre and reinforcement of rubber