

## Abstract

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Extensive research works have been carried out with different agro-based fibers for their application for human benefits. Since no information are available on the composition, properties and application of Mat Grass (*Cyperus Tegetum* Rox b) an attempt was made for investigation on these aspects for exploration of the application of mat grass as suitable products.

Compositional analysis of mat grass has revealed the presence of around 40 % lignin and 15 % cellulose in it. After removing the water-soluble matters (22 %) by water leaching and hemicellulose (21%) by alkali treatment of mat grass improve its properties. Spectroscopic, SEM, XRD analyses and tensile strength measurement carried out physical and chemical characterizations of mat grass. Influence of water leaching and alkali treatment of mat grass on tensile strength was studied. Mat grass treated with 5% sodium hydroxide solution for 15 minutes provided maximum tensile strength. Thermal stability of mat grass was studied by isothermal gravimetric analysis, thermogravimetric analysis and differential scanning calorimetry. With an objective of modification of mat grass with polymer, mat grass sticks were soaked with monomer/prepolymer solution followed by in situ polymerization within the tubular voids of the mat grass. Polyacrylamide modified mat grass exhibited almost three times improvement in the tensile strength over the unmodified mat grass. For exploring the application possibility, mat grass was incorporated in natural rubber matrix as 400 mesh and 1 mm short fiber filler. Alkali treated mat grass filled rubber vulcanizate showed some inherent aging resistance. 30 mm long mat grass shredded fiber was soaked with latex, containing vulcanizing chemicals, for making fiber rubber mat product. Such fiber rubber mats have shown low compression set and low moisture absorption. Both water leached and alkali treated chopped mat grass fiber reinforced phenol-formaldehyde resin composites were made using 55 wt % phenolic resin. Alkali treated chopped mat grass fibers have shown higher tensile strength and lower moisture absorption compared to those of water leached chopped mat grass fiber composites.