

## Abstract

Owing to environmental concerns caused by the use of synthetic fibers, there is an urgent need to find new eco-friendly fibers. In addition, conventional cellulosic fibers are becoming costly due to an increase in production cost, therefore, sustainable alternative sources of *eco*-friendly fibers need to be explored. This study investigates the extraction and characterization of fibers from the *Cyperus papyrus* plant and evaluates its potential as textile fibers. *Cyperus papyrus* plant fibers were extracted using water retting and alkaline extraction methods and their mechanical, physical, thermal, and chemical properties were studied. The fiber's chemical composition was established and alkaline extracted fibers contained 61.82% cellulose, 11.82% hemicellulose, 23.6% lignin, 3.86% ash, and 2.75% extractive while the water-retted fibers contained 57.98% cellulose, 13.45% hemicellulose, 25.42% lignin, 6.07% ash, and 3.15% extractive. The fineness of the extracted fibers was 8.38 and 7.31 Tex for water-retted and for alkaline extracted fibers, respectively. The average tensile strength of the extracted fibers ranged from 26.25 to 31.05cN/Tex. The average elongation of the fibers was between 2.02% and 2.79% while its thermal degradation temperature was as high as 150°C. Compared with conventional fibers, the extracted fibers have the potential of replacing them based on the properties studied.