ASSESSING THE POTENTIAL OF USING SELECTED PLANT SPECIES IN EXTRACTING NATURAL FIBERS

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Abstract

Natural fibers are becoming popular over synthetic fibers due to their outstanding properties such as biodegradability, renewability, stiffness and low cost. In this backdrop identification of potential plant species for extracting fiber is important. Plant fibers contain a substantial amount of cellulose that could be extracted and separated from other compounds such as lignin and hemicellulose. These by products also has a potential to be used in many industries in ecofriendly manner. Fiber bearing plants such as pineapple (*Ananas comosus*), *Cyperus involucratus* and *Agave angustifolia* are widely available in Sri Lanka but not well studied for potential uses. The aims of this study were to investigate the potentials of selected plant species in extracting natural fiber and to characterize the fibers. Fibers were extracted from stems of *Cyperus* and leaves of *Agave* and pineapple by carrying out mechanical (Raspador machine) and chemical extraction (2% NaOH). The experimental design was two-factor factorial complete randomized design with three replicates. Extracted fibers were characterized using Fourier Transform Infrared Spectroscopy (FTIR), X-ray diffractometer (XRD) and texture analyzer. Interaction effect of plant species and extraction method on the extracted fiber amount was not significant ($p>0.05$). Dry fiber content was significantly higher in *Cyperus* (6.9±0.6%) followed by *Agave* (2.1±0.4%) and pineapple (2.3±0.5%). Mechanical method produced 74.4% higher fiber content compared to chemical method. Both FTIR and XRD conforms the cellulose structure. Chemically extracted fiber showed better crystallinity and *Cyperus* recorded the highest crystallinity index (64.2%). *Agave* recorded the highest tensile strength of 507g (4.97 N). Extracted fibers from different plants could be utilized in different industries depending on the final quality of the extracted fibers.

Keywords: chemical extraction, crystallinity index, fiber content, mechanical extraction, tensile strength