DEVELOPMENT OF PAPER BOARDS FROM SELECTED AGRICULTURAL PLANT RESIDUES EXTRACTED FROM ALKALINE HYDROGEN PEROXIDE PRE-TREATMENT METHOD

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DECLARATION

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ABSTRACT

This study focuses on the development of environmentally friendly paper boards using fibers derived from agricultural residues specifically bagasse, cornhusk, and rice straw combined with recycled waste paper. In the first phase, cellulose fibers were extracted from these lignocellulosic materials using the Alkaline Hydrogen Peroxide (AHP) pretreatment method. The extracted fibers were characterized through tests for tensile strength, cellulose content, weight loss, and morphological features. Additionally, Fourier-transform infrared spectroscopy (FTIR) was used to confirm the presence of cellulose and assess the structural integrity of the fibers.

In the second phase, paper boards were fabricated manually by blending pre-treated fibers with recycled paper at varying proportions (0%, 25%, 35%, 50%, 75%, 85%, and 100%). The resulting samples were evaluated for key properties, including tensile strength, tear resistance, burst strength, stiffness, and water absorption capacity. Their performance was compared against a commercially available reference paper board. The results indicated that while higher fiber content (75–100%) led to increased production costs, blends containing 50% pre-treated fibers provided a favorable balance of cost and mechanical performance, suggesting their potential for sustainable industrial application.

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LIST OF ABBREVIATIONS

AHP	-	Alkaline Hydrogen Peroxide Pretreatment
TAPPI	-	Technical Association of the Pulp and Paper Industry
FTIR	-	Fourier Transform Infrared
SEM	-	Scanning Electron Microscopy
ASTM	-	American Society for Testing and Materials
SLS	-	Sri Lanka Standards
ISO	-	International Organization for Standardization