

EXTRACTION AND CHARACTERIZATION OF FIBER FROM OIL PALM FRONDS

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Oil palm (*Elaeis guineensis*) frond biomass is a solid waste produced in significant quantities by the pruning of oil palm trees. The slow decomposition of oil palm fronds in the plantations creates environmental issues with persistent waste accumulation. Employing these fronds in industries offers a sustainable solution to address this environmental issue. This study focuses on extracting and characterizing fibres from oil palm fronds to meet the rising demand for natural fibres. Oil palm fronds were collected, cleansed, and retted in freshwater, hot water, and various concentrations of Sodium chloride (0.5 M, 0.7 M, and 0.9 M) for seven days. The extracted fibres were analysed for their physical and mechanical properties, length, diameter, dry moisture content, breaking force and tensile strength. Findings revealed that freshwater retting resulted in the significantly highest ($p<0.05$) fibre recovery of $32.70\pm1.21\%$. The lowest ($p<0.05$) fibre diameter, measuring 0.18 ± 0.001 mm was achieved through retting with a 0.9 M sodium chloride solution. The research revealed that an increase in sodium chloride concentration leads to a decrease in fibre diameter. The fibres retted in a 0.9 M sodium chloride solution exhibited the significantly highest ($p<0.05$) tensile strength at 2217.67 ± 1.04 MPa. Additionally, a negative correlation ($r=-0.984$) was observed between fibre diameter and tensile strength. The findings indicated that distinct retting methods yielded unique physical and mechanical properties in the extracted fibres. Hence, further research on suitable retting methods is essential to attain the desired fibre characteristics to meet the specific industrial requirements.

Keywords: Decomposition, Natural fibre, Retting, Sodium chloride, Tensile strength