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## RESEARCH ON BIO-TREATMENT CONDITIONS OF COTTONISED PINEAPPLE FIBERS, ATTRIBUTED TO TEXTILE SUSTAINABLE DEVELOPMENT

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Natural fibers are currently a global trend in the development of a sustainable textile industry. Pineapple leaves are an abundant agricultural waste source that can be processed into green raw materials for textiles. As other natural fibers pineapple fibre exhibit some good mechanical properties and have been applied in industry [1, 2]. The conventional treatment of pineapple fibers generally involves two steps: mechanical processing and chemical treatment, which result in disadvantages such as Fiber loss, poor fiber quality, and environmental pollution [3-5]. Moreover, the fibre mechanical properties may be decreased after the treatment. To eliminate these disadvantages, this paper investigated the treatment process of raw pineapple leaf fibers using pectinase enzyme with different durations (2 h, 4 h, 6 h, 8 h), concentrations (2%, 3%, 4%, 5%), and treatment temperatures (20, 30, 40, 50 °C) in an acidic medium of pH 5. The fiber physico-mechanical properties such as flexural rigidity were determined by ISO 9073- 7:2024, recovery from creasing was measured by ISO 2313-2:2021.

The results showed that pectinase treatment reduced flexural rigidity, making the fibers more flexible, and improved crease resistance, particularly optimized at a treatment duration of 4–6 h, concentration of 3–4%, and temperature of 30–40 °C.

The Fourier transform infrared spectroscopy (FTIR) of treatment pineapple fibre showed only a very little decrease at the peak 1200 cm<sup>-1</sup>-1000 cm<sup>-1</sup> (C-O vibration) that demonstrated the small change in fibre structure after treatment. The study demonstrated that pectinase enzyme affected fiber properties, and the treatment conditions (time, temperature, enzyme concentration) could be selected to obtain pineapple leaf fibers with properties suitable for specific applications.

**Keywords:** *Pineapple fibre, pectinase enzyme, sustainable textile industry.*

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