

Critical factors for optimum biodegradation of bast fiber's gums in bacterial retting

ABSTRACT

Bast fiber plants require a post-harvest process to yield useable natural cellulosic fibers, denoted as retting or degumming. It encompasses the degradation of the cell wall's non-cellulosic gummy substances (NCGs), facilitating fibers separations, setting the fiber's quality, and determining downstream usages. Due to the inconvenience of traditional retting practices, bacterial inoculum and enzyme applications for retting gained attention. Therefore, concurrent changes of agroclimatic and socioeconomic conditions, the conventional water retting confront multiple difficulties, bast industries become vulnerable, and bacterial agents mediated augmented bio-retting processes trying to adapt to sustainability. However, this process's success demands a delicate balance among substrates and retting-related biotic and abiotic factors. These critical factors were coupled to degrade bast fibers NCGs in bacterial retting while holistically disregarded in basic research. In this study, a set of factors were defined that critically regulates the process and requires to be comprehended to achieve optimum retting without failure. This review presents the bacterial strain characteristics, enzyme potentials, specific bast plant cell wall's structure, compositions, solvents, and interactions relating to the maximum NCGs removal. Among plants, associated factors pectin is the primary binding material that determines the process's dynamics, while its degree of esterification has a proficient effect through bacterial enzymatic degradation. The accomplished bast plant cell wall's structure, macerating solvents pH, and temperature greatly influence the bacterial retting process. This article also highlights the remediation process of water retting pollution in a biocompatible manner concerning the bast fiber industry's endurance.