UNIVERSITI TEKNOLOGI MARA

REDUCTION OF KENAF WATER RETTING PERIOD BY USING SELECTED *BACILLUS SP*

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ABSTRACT

Kenaf (*Hibiscus cannabinusl*) has been introduced in Malaysia since year 2000 after being identified as new source of economy growth by National Economy Action Council (MTEN). Kenaf was introduced as new alternative crops to replace the tobacco. Kenaf is a multi-purpose crop as it can be used bio composite, automotive part, geotextile, livestock feed, and replacing raw product base on petroleum. Kenaf is a short terms crop. It can reach maturity in 4 month. Kenaf fiber would be harvested through a process called water retting. Water retting process is a process of degradation in the river or pond in order to soften the kenaf stalks for fiber extraction. However, the water retting was a time-consuming process. The process is not only time consuming but also pollutes the water body. In this study, several retting bacteria from *Bacillus sp* was identified from research journal which study the bacteria diversity in retting water which namely *Bacillus cereus, Bacillus macerans, Bacillus subtilis* and *Paenibacillus polymyxa*. These bacteria produce an enzyme known as pectinolytic enzyme which is used to soften the fiber from the stalk. The kenaf water retting process was observed within a week. The water quality test on the retting water was done daily as the water retting process continues. The fiber strength was then measured to determine the effect of using the bacteria in retting and observation on how much time taken for the water retting process to complete was recorded. It is found that the fiber can be extract from kenaf stalk within six (6) days of retting and the strongest fiber was found to be extracted from tap water although the fiber was under-retted. Enzyme study was recommended for further research as enzyme act specifically on substrates and may be the key to better quality fiber production.

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CHAPTER ONE
INTRODUCTION

1.1 BACKGROUND STUDY

Kenaf (*Hibiscus cannabinus*. L) is an annual crops and under certain conditions sustainable fibrous plant from *Malvaceae* family. It was cultivated in many regions in many countries throughout the world for its bast fiber which have chemical compositions and physical properties that almost identical to jute fiber of *Corchorus capsularis*. Both kenaf and jute have been planted for their fiber and both plants share the identical method for their fiber extraction. There are many ways to extract the fiber from kenaf stalks such as retting or power-driven decorticating machines.

Commonly used method for fiber extraction is retting. According to Encyclopaedia Britannica (2009) retting is a process which employed the action of micro-organisms and moisture on plant in order to dissolve or rot away much of the cellular tissues and pectins surrounding bast-fibre bundles, and thus fascillitating separation of the fibre from stem. Retting process widely used in the production of fibre from plant materials such as hemp, jute, flax and kenaf stalks and coir from coconut husks. The degradation of fibrous substances such as lignin, cellulose and hemicelluloses are considered as retting for fiber extraction. The length of the retting period, as reported by Caldweld, may varies considerably from five (5) to twenty-two (22) days (Pole-Evans, 1917; Mischotte and Felicien,1928; Caldwell, 1936).

Pectin is a gummy substance which acts as an intercellular cementing material that binds adjacent cells together. The pectin binds fiber to the stalk of the plant and in order to remove it, the pectin must be digested. According to Bacarat *et al* (1989) and Brumano *et al* (1993), pectinolytic enzymes are enzymes that responsible in breaking the chain of pectin which soften the stalk for fiber extraction and ripening process of fruit. They also reported that almost all microorganism mainly plant pathogen have the ability to produce this pectinolytic enzymes. Currently, they are widely used in industry for retting of natural fibers and extraction of oils from vegetable and citrus peels.