EFFECT OF FIBRE EXTRACTION AND ENZYMATIC TREATMENTS ON THE PROPERTIES OF PINEAPPLE LEAF FIBRES (PALF)

BY

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Contents

2. Letter of Offer (Research Grant)

Su*at Kami 600-RMI/ST/DANA 5/3/Dst (16/2011)
Tarikh Januan201i

PEMENANG J*%
Anuaerah Kuoliti f
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KELULUSAN PERMOHONAN DANA KECEMERLANGAN 01/2011

T.* •* B M U L T ajuk Projek	Effect of Fibre Extraction and Preparation Processes on the Properties of Pineapple Leaf Fibres
Kod Projek	600-RMI/ST/DANA 5/3/ Dst (16/2011)
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Ketua Projek	Prof Madya Dr Khadijah Omar

Dengan hormatnya perkara di atas adalah dirujuk

2. Sukacita dimaklumkan pihak Universiti telah meluluskan cadangan penyelidikan Y. Brs Prof./tuan/puan untuk membiayai projek penyelidikan di bawah Dana Kecemerlangan UiTM

3. Bagi pihak Universiti kami mengucapkan tahniah kepada Y. Brs. Prof./tuan/puan kerana kejayaan ini dan seterusnya diharapkan berjaya mcnyiapkan projek ini dengan cemerlang.

4 Peruntukan kewangan akan disalurkan melalui tiga (3) peringkat berdasarkan kepada laporan kemajuan serta kewangan yang mencapai perbelanjaan lebih kurang 50% dari peruntukan yang ditehma.

Peringkat Pertama	20%
Peringkat Kedua	40%
Peringkat Ketiga	40%

5. Untuk tujuan mengemaskini, pihak Y. Brs Prof./tuan/puan adalah diminta untuk melengkapkan semula kertas cadangan penyelidikan sekiranya perlu, mengisi borang setuju terima projek penyelidikan dan menyusun perancangan semula bajet yang baru seperti yang diluluskan Sila unat lampiran bagi tatacara tambahan untuk pengurusan projeK

Sekian, harap maklum

"SELAMAT MENJALANKAN PENYELIDIKAN DENGAN JAYANYA"

Yam
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MUST AFAR KAMAL HAMZAH
Ketui Penyelidikan (Sains dan Teknologi)

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5.2 Enhanced Executive Summary

The pineapple leaves are the waste products of food industries commonly thrown away as solid waste. Potential usage of pineapple leaves as raw materials for textile has not been widely studied in Malaysia although the fibres have been used in cottage industry in the Philippines, India and Japan. One of the drawbacks is the difficulty in obtaining good quality of fibres and yarns due to the inefficient fibre extraction and retting processes.This study focused on the development of enzymatic retting for the pineapple leaf fibre using combination of enzymes and chemicals. Formulations used in this project were cellulase and EDTA, pectinase and EDTA, xylanase and EDTA, and combination of the cellulase, pectinase, xylanase and EDTA. Untreated sample was used for comparison purposes. The morphological and physical properties of the fibre were tested for fibre fineness, moisture content and moisture region, fibre strength, and yarn strength. For the morphological properties combination of xylanase and EDTA was effective because the fibres seemed to be closely associated in bundles and more compact and the fibre surfaces were relatively cleaner and smoother. The finest fibres obtained were those treated with combination of cellulase and EDTA (7.17 micronaire) while the strongest of fibres obtained were from those treated with pectinase and EDTA (0.57 N of force was needed to break the fibre at 2.64% elongation). For the yarn strength, obtained were from those treated with xylanase and EDTA (0.93 N of force was needed to break the yarn at 1.83% elongation). For the lowest moisture content and moisture regain obtained were from those treated with xylanase and EDTA which 12.00% and 13.64 %. Overall compared to conventional treatment, enzymatic treatment using cellulase and EDTA produced the finest fibres, xylanase and EDTA produced the strongest yarn and lowest percentage of the moisture content and moisture region while combination of pectinase and EDTA produced the strongest fibres. This new retting formulation perhaps can be applied in textile industries especially in textile composite in order to produce high quality of pineapple leaf fibres.

5.3 Introduction

Pineapple is the third most important tropical fruit in world production after banana and citrus; 70% of the pineapple produced in the world is consumed as fresh fruit in the country origin. This worldwide production has developed since the early 1500s when pineapple was first taken to Europe and then distributed throughout the world's tropics (Bartholomew *et* a/., 2002). The pineapple stem is club-shaped, with a length of 25-50 cm and a width of 2-5 cm at the base and 5- 8 cm at the top. Leaf number is variable between cultivars but generally around 40-80. The lower ones, originating from planting material or produced soon after planting, are smaller (5-20 cm) compared with the younger ones, which can reach more than 1.6 m in length and 7 cm in width, depending on the cultivar and ecological conditions. Primary roots are only found in very young seedlings. Under ideal conditions, the soil root system may spread up to 1-2 m laterally and 0.85 m in depth. The flowers are small and timorous, red or purple, borne in inflorescence at the apex of the stem. The fruits are berries that merge together and form a single, cone-shaped, juicy and fleshy fruit where the core is the former stem and the fruit develops in 20 days; the fruit generally seedless and is very variable in shape, size, weight and colour from greenish to reddish or yellowish.

Retting is the separation or loosening of fibre bundles from the cuticularized epidermis and the woody core cells. In order to be usable in textile industry, the cellulose fibres of the pineapple leaves have to be extracted. Those can be done in several ways which include water retting, dew retting, bacterial retting, chemical retting, biochemical retting as well as enzymatic retting. However, these retting have several problems for example water retting produced water pollution and also involved large amount of water to ret the fibres and thus it was not an economic process to be practiced in the industry. Thus, a need exists for a method for retting of pineapple, which is cheap, simple, reproducible, and easily adaptable to existing equipment and fast. Besides that the retting treatment should also give rise to the pineapple fibres of superior strength, colour and also reduce the time of retting to a few hours (Akin, 2000).

Using enzyme retting, flax stems are incubated in the presence of specific plant cell wall degrading enzymes such as pectinase, xylanase and cellulase. The advantages of enzymes frequently results in many benefits that cannot be obtained with traditional chemical treatment. These often include higher product quality and lower