3rd EDITION

E-EXTENDED

ABSTRACT

INTERNATIONAL AGROTECHNOLOGY INNOVATION SYMPOSIUM (i-AIS)

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19 June 2023

Faculty of Plantation and Agrotechnology UiTM Cawangan Melaka Kampus Jasin

Published 2023
Faculty of Plantation and Agrotechnology
Universiti Teknologi MARA Cawangan Melaka Kampus Jasin
77300 Merlimau Melaka.

E-EXTENDED ABSTRACT of the INTERNATIONAL AGROTECHNOLOGY INNOVATION SYMPOSIUM (i-AIS) (3rd EDITION)

Mode of access Internet

https://sites.google.com/view/ais2023/publication

Perpustakaan Negara Malaysia Cataloguing -in – Publication Data

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ABOUT FACULTY OF PLANTATION AND AGROTECHNOLOGY

The Faculty of Plantation and Agrotechnology was established in 2010 at Universiti Teknologi MARA (UiTM). The mission of the faculty is to play the vital role of producing well-trained professionals in all areas of plantation and agriculture-related industries at national and international levels.

Bachelor of Science (Hons) Plantation Technology and Management is a three-year program that strongly emphasizes the various aspects of Production Technology, Management, and Information Technology highly sought after by the agricultural and plantation sectors. Students in this program will be fully trained to serve as professionals in the plantation sector and related industries. They will have ample opportunities to fulfill important positions in the plantation industry such as plantation executives. This program provides a strong balance of technology and management courses essential for the plantation industry such as management of plantation crops, soil fertility, plantation management operation, plantation crop mechanization, and agricultural precision. As an integral part of the program, students will be required to undergo industrial attachment to gain managerial skills in the plantation industry.

The faculty is highly committed to disseminating, imparting, and fostering intellectual development and research to meet the changing needs of the plantation and agriculture sectors. With this regard, numerous undergraduate and postgraduate programs have been offered by the government's intention to produce professionals and entrepreneurs who are knowledgeable and highly skilled in the plantation, agriculture, and agrotechnology sectors.

PREFACE

International Agrotechnology Innovation Symposium (i-AIS) is a platform to be formed for students/lecturers/ staff to share creativity in applying the knowledge that is related to the world of Agrotechnology in the form of posters. This virtual poster competition takes place on the 1st of December 2022 and ends on the 8th of January 2023. This competition is an assessment of students in determining the level of understanding, creativity, and group work for the subject related to agrotechnology and being able to apply it to the field of Agrotechnology. The i-AIS 2022 program takes place from December 1, 2022, to January 8, 2023. The program was officiated by the Dean of the Faculty of Plantation and Agrotechnology, namely Prof. Madya Ts. Dr. Azma Yusuf. The program involves students from faculties of the Faculty of Plantation and Agrotechnology (FPA)and HEP participating in i-AIS 2022, namely, the Faculty of Education and Pre-Higher Education. This program involves the UiTM student and some of the non-UiTM students which come from the international university and the local university. Two categories are contested, namely UiTM and non-UiTM. To date, students from these programs have shown remarkable achievements in academic performance and participation in national as well as international competitions.

This competition is an open door for the students and lecturers to exhibit creative minds stemming from curiosity. Several e-content projects have been evaluated by esteemed judges and that has led to the birth of this E-Poster Book. Ideas and novelties are celebrated, and participants are applauded for displaying ingenious minds in their ideas.

It is hoped that such an effort continues to breed so that there is always an outlet for these creative minds to grow.

Thank you.

Dean
On behalf of the Organizing Committee
Conference Chair
Universiti Teknologi MARA
Faculty of Plantation and Agrotechnology
http://fpa.uitm.edu.my

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PAPER FROM PINEAPPLE LEAF FIBRE

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ABSTRACT - In developing countries, there are different approaches to dealing with organic waste. One of the approaches from commonly fruits used are Pineapple. Taking into account the sample from each pineapple, only 52 % is used for the production of jam and juice and the remaining 48% consists of fruit skins and leaves that form waste. This residue is rich in lignin and cellulose and forms a very good raw material for allied fibers. In addition, waste disposal is a major problem in this industry because of the very high lignin and lignin content the cellulose content of wasted leaves, which is difficult to decompose, further results in pollution and affects the environment. Natural fibers from non-wood materials are an important resource to meet the growing demand for pulp and paper product. The main purpose of this survey is to highlight the potential of pineapple leaves used as a non-wood material for paper production. Experiments using pineapple leaf fiber as a raw material in paper production have been carried out to evaluate advantages in terms of mechanical properties, especially tensile strength, tear strength and paper thickness. In this paper, samples of pineapple leaf fiber are mixed with a recycle newspapers in different composition of which is, 25%, 35%, 45%, 55%, 65% and 75% pineapple leaf fibers mixed with 75%, 65%, 55%, 45%, 35% and 25% of the recycle newspapers.

Keywords: Pineapple, Leaf, Pineapple Leaf, Paper, Leaf Fiber

INTRODUCTION

Pineapple (Ananas comosus) is an unusual fruit in India. Information provided by the Database (IH), suggests, in India pineapples are planted in 115 thousand areas and the total production is 1,988 thousand tons until the year 2017. The main origin Pineapple is native to South America. Thailand is one of the world's leading pineapple growers, with about two million tons of production per year, part of which is processed into canned pineapple, which has also become one of the country's main commercial exports, with more than 5,00,000 tons of finished products annually. Thai people eat fresh pineapple, while cooking with their meals or as a snack. Its long, hard leaf fibers make good raw material for the paper-making industry; its body can be processed into animal feed and fermented organic fertilizer. With industrial processes, factories produce a large waste of raw pineapple fiber every day. Most of them are sold to farmers, who will be used to mix with animal's feed. Due to the large amount of waste every day, Asst. Associate Professor Sudjaya Ritsorn, from Rajamangala University of Technology Thanyaburi, came up with the idea to convert these fibers into handmade paper that could increase its commercial value as well as creating jobs for villagers. A sheet of finished pineapple fiber paper can be sold for much more than the price of the raw fiber that is sold as animal food. The use of non-wood resources as material for paper production covers 10% of its use all over the world. However, the situation varies by country and depends on country. For example, China uses more than wheat straw and other non-wood fibers as raw materials for paper production. The demand for paper nowadays is increasing as technology advances with the current. This challenges the opinion that information advances technology will lead to less paper use and society to create a paperless world. By regarding this situation, many alternatives have been introduced to replace the main source wood in the paper industry. Before this, there are some ingredients that have been commercialized as alternatives such as empty fruit bunches of palm oil, banana fiber and carpet grass. The use of pineapple leaf fiber can consider to be new in the paper manufacturing industry in Malaysia. This paper is intended to improve or add to natural fiber paper-based material products as alternative ways to reduce environmental problems involving for example cutting down trees without close supervision.

Pineapple Fibre

Every year a lot of pineapple leaf fibre is produced but a very small part is used for raw materials. The development of bio composites makes it possible to minimize the waste of renewable and encouraging materials non-food-based markets for the agricultural industry. The fibres are white, shiny like silk, and smooth. Medium length fibres have high tensile strength compared to short lengths. The surface is soft when compared to other natural ones. The fibre also absorbs and retains good colour. Pineapple leaf fibre has high strength and stiffness and is hydrophilic nature, which has a high cellulose content. Pineapple leaf fibre consists of many chemicals. It is a multicellular lignocellulosic fibre that contains chemicals such as fat, wax, pentosan, pectin, uronic acid, anhydride, colour pigments, and inorganic substances, polysaccharides, lignin in the main amount. Fibre is nothing but a collection of thin and small multicellular threads, which are tightly joined with the help of pectin.

Chemical Composition

As per Technical Association report of Pulp and Paper Industry standards (7) the chemical constituents like lignin, wax, pectin, ash content, nitrogenous matter, α-cellulose, degree of polymerization, antioxidants of PALF were analysed from different sources of fibres, climatic conditions, and age of fibres. It has a large quantity of α-cellulose, lignin content, and low quantities of hemicelluloses. The performance of fibres is directly affected by the chemical's composition fibre.

Table 1: Chemical Composition of Pineapple

Nutrients	Units	Value per 100g
Water	g	86.00
Protein	g	0.54
Total lipids	g	0.12
Ash	g	0.22
Carbohydrates	g	13.12
Fibre	g	1.4
Sugar	g	9.85
Sucrose	g	5.99
Glucose	g	1.73
Fructose	g	2.12
Vitamins		
Vitamin C	Mg	47.8
Vitamin A	IU	58.0
Others		
Carotene	µg	35

Source: USDA Nutrient Database

MATERIAL AND METHOD

The methodology that has been used in the work project must be clearly stated and described in sufficient details or with sufficient references.There are several raw materials such as banana fiber, wheat straw, bagasse, rice straw from which paper is produced with the traditional method of fiber extraction that involves the process of scraping, packing, decorating, combing and others, which take up to 5-7 days.

Raw Material

In the first process, pineapple leaves are collected from freshly harvested bunches of pineapples obtained locally pineapple shop. Samples are washed, sorted and cut into chips about 2-4cm, driedand sorted in bags.

Extraction Decortications

It is difficult to extract the fiber because it is sticky due to the presence of pith thus requiring the use of chemicals which is not Eco safe. Therefore, there is an urgent need for the development of environmentally friendly, cost-effective technologies.

Retting

The scratched leaves are being tied and immersed in a retting tank. Urea or diammonium phosphate added for quick retting. At the end of retting, leaves are taken out and washed mechanically by pond water.

Scrapping

Pineapple leaf fiber is scrapped by scrapping machine. The machine contains combination of three rollers: (i) feed roller (ii) leaf scratching roller and(iii) serrated roller. The leaves are fed through feed roller into the machine then it goes through the second roller that is called scratching roller, which scratches upper layer of leaf to remove the waxy layer and lastly leaves come to the dense attached blade serrated roller, which crushes leaves and makes several breaks for the entry passage for the retting microbes.

Laboratory analysis of paper sheets

As reported, paper samples are then tested for strength properties such as modulus of elasticity, elongation at break, tensile stiffness, tensile strength and tear strength. This value is used to obtain the tear index and tensile index for various paper samples.

Mechanical Properties

In bio composites and materials science, natural fiber reinforced composites play a large role. The strength of natural fibers supports to increase the physical and mechanical strength of the polymer matrix without any additional processing. Physical and mechanical properties of any natural fiber mainly depend on fiber volume fraction, fiber-matrix adhesion, orientation, aspect ratio and stress transfer efficiency at the interface.

RESULTS AND DISCUSSION

Table 2: Characterization results of paper from different midday wood materials

Agro wastes	Grammage	Thickness	Tensile index	Tear index	Modulus of elasticity	Elongation at break
Pineapple leaf	45.62	0.24	0.19	17.19	5.87	1.14

Characterization of paper (Tensile strength of paper sheets)

Analyses such as mechanical and paper strength represent intrinsic chemistry, morphology, and structure. Individual fibres are also the network structure of paper. Factors that affect the properties of paper sheets produced from any pulp is residual lignin, impurities, pulp consistency, degree of pulp pulsation, relative humidity of the environment. Fibre dimensions, strength, arrangement, and limits until they are bonded to each other are some of the important one characterization factors.

Analysis of Surface Morphology

While producing paper scanning electron microscopy (SEM) analysis of pineapple leaf paper is done. By literature shows that the higher the magnification the clearer the fibre structure and the lower the magnification the smoother it is coverage. Furthermore, pineapple leaves have the smoothest covering and a clearer fibre structure, which makes the best pulp replacing wood in the production of paper and pulp. The results obtained from the report show that there is a large fiber bundles in sheets of paper, oriented in various orientations. A large bundle of fibers is made of several technical fibers made from fine fiber with a diameter below 10 m. This is because, fiber extraction from dried leaves proved difficult with more tissue present on the surface and fine fibers pulled from the bundles. During drying, the leaves also make it almost impossible to remove the technical fibers from the underside of the leaves. From the color of the fiber it is observed that, in addition to the brown color of the lignin particles in the fiber, many more the paper part looks brown. This shows that some lignin, although not in particulate form is not observed by light microscope, exists in the fiber wall. For example, acetone is not as strong as caustic, which can shorten fiber length and lead to poor surface appearance of the paper sheet.

CONCLUSION

Pineapple leaf fibre in composite material is a new resource, which can be economical, environmentally friendly and recyclable. based on the survey of paper made from pineapple leaf fibre, and old newspapers have the basic properties of paper can written on, tear able and can absorb moisture, which is essentially what paper is. As a way of converting waste materials into wealth, research is expected to give value to solid waste. Farmers will obtain more revenue and also play a prominent role in getting rid of the environment from the huge solid wastes generated by the poor disposal of these agro-wastes. However, when evaluating the conditions of thickness and other characteristics found on the paper produced, it can only be currently used as a packaging medium such as boxes. Mechanical properties and natural chemical properties fiber is very useful in the manufacturing sector. In conclusion, the result of the latest technology, development natural fiber as a material that needs to be done and improved in various forms of application and use. It is also expected provide raw materials for investors and job opportunities for people because it will be a start-up industry to save capital and encourage the establishment of processing factories in rural areas.

REFERENCES

[1] Yusof, Y., Ahmad, M. R., Saidin, W., Mustapa, M. S., & Tahar, M. S. (2012). Producing paper using pineapple leaf fiber. In *Advanced materials research* (Vol. 383, pp. 3382-3386). Trans Tech Publications Ltd.

[2] Mahatme, S. S., Kanse, N. G., & Bandsode, A. K. (2018). Pulp and paper production from pineapple leaves as a substitute to wood source: A review. *International Journal of Creative Research Thoughts*, *6*(2), 20-26.

E-EXTENDED ABSTRACT of the INTERNATIONAL AGROTECHNOLOGY INNOVATION SYMPOSIUM (i-AIS) (3rd EDITION)

e ISBN 978-629 -97220-5-2

9 786299 722052

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