

2ND EDITION

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**ABSTRACT**

**INTERNATIONAL  
AGROTECHNOLOGY  
INNOVATION  
SYMPOSIUM (i-AIS)**



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### INTERNATIONAL AGROTECHNOLOGY INNOVATION SYMPOSIUM (i-AIS)

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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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# LUFFA (*Luffa cylindrica*) AS A MATERIAL FOR SHOES OR SLIPPER MIDSOLE

Adibah Binti Ambo Asah<sup>1</sup> , Farzana Huda Binti Yanto<sup>1</sup> , Nursazatulniya Binti Sato<sup>1</sup>

<sup>1</sup>Faculty of Plantation and Agrotechnology, University Teknologi MARA (UiTM), Jasin Campus, Malaysia

Corresponding author e-mail: [adibahasah@gmail.com](mailto:adibahasah@gmail.com)

**ABSTRACT** - Luffa (*Luffa cylindrica*) is from member of cucurbitaceous family. It is a vegetable that can be used in many situations. It is used for food made into vegetables and can also be used as a body brush when bathing and used as a dishwashing brush at home. Our innovation focuses on luffa as a material that can be used as a midsole in shoes or slippers. The reinforced composite luffa sponge was used as a midsole for shoes or slippers to dampen vibration actively and critically. During running exercise, the damped vibration prevents knee and ankle injuries. The dried mat and chopped luffa sponge fibers were treated with a molar solution of sodium hydroxide to improve mechanical interlock and reaction sites. The matrix is then used as a binder and reinforcement to improve the Young's modulus and loss factor. There were tests for dynamic impact vibration, compression, low cyclic fatigue (LCF), and high cyclic fatigue (HCF). As a result, using past studies from (Zhang, Z., & Zuo, J. 2022) and (AKANO, T. T., & SUBERU, I. 2019). said that the reinforced composite luffa sponge is a fantastic solution for running shoe midsoles since it reduces running-related vibrations. The materials of luffa which is biodegradable is less environmental impact and it is also good for short-term energy storage.

**Keywords:** Luffa (*Luffa cylindrica*), midsole shoes or slipper

## INTRODUCTION

Luffa (*Luffa cylindrica*) is from member of cucurbitaceous family. This plant also known as sponge gourd, loofa, vegetable sponge, bath sponge, or dish cloth gourd. *Luffa cylindrica* fruits are smooth and cylindrical in form. A mature Luffa sponge can produce 30 seeds. Some will create many seeds. Leaf is made up of alternating and palmate leaves of *Luffa cylindrica*. The leaf has an acute-end lobe and measures 13 and 30 cm in length and width. It hairless and has serrated edges. *Luffa cylindrica* has yellow flowers that bloom from August to September. *Luffa cylindrica* is monoecious and the inflorescence of the male flower is a raceme, and one female flower exists [1]. Our innovation focuses on luffa being a material that can be used as a midsole on shoes or slipper. The reinforced composite luffa sponge was used as midsole for shoes or slipper to damp the vibration actively and critically. The damped vibration prevents knee and ankle injuries during running exercise [2]. Luffa sponge fibers are less expensive, have a low density, good mechanical strength, and have better noise and vibration reduction properties. It is easily accessible because the source is renewable [3]. The use of luffa as a natural fiber material it is because of their high damping coefficient and absorbing vibration.

## **MATERIAL AND METHOD**

### **Materials**

Dried luffa (*Luffa cylindrica*), distilled water, sodium hydroxide, matrix, scissors, sewing machine, fabric.

### **Method**

#### 1) Fiber Extraction

The luffa sponge plant's ripe and dried fruit has a thick peel and a sponge gourd with a multidirectional array of fibers. The fabric is made up of a natural mat divided into an inner fiber core and an outer cylindrical core. The fibers were manually extracted by removing the peel. The cylindrical sponge gourd was then cut longitudinally to create a roughly rectangular mat.

#### 2) Chemical Treatment

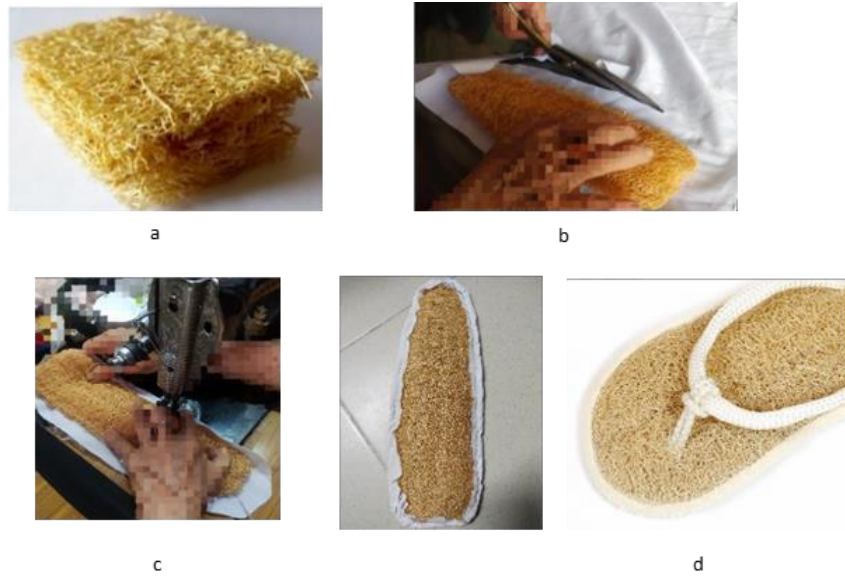
Distilled water was first applied to the rectangular luffa sponge fibers. For an hour, the luffa sponge fiber material was soaked, washed, and rinsed with distilled water until soft and slippery. It was dried in an open for room-temperature. Second, the luffa sponge fibers were soaked for two hours in a molar solution of sodium hydroxide made by dissolving 40g sodium hydroxide pellets per cubic decimeter. It was then removed from the solution and allowed to dry in the open air at room temperature.

#### 3) Matrix

The thermoplastic resin DY250 was mixed in a 2:1 ratio with the hardener TH7103 until curing occurred. The cured mixture was applied to the sample in a 10:1 ratio. To improve its Young's modulus and loss factor, the matrix is used as a binder and reinforcement.

#### 4) Preparation of sample

- a) The result of compressed luffa sponge with matrix is used as a midsole.
- b) White cloth cut by using scissors according to the size luffa midsole shoes of slipper.
- c) The edges of the luffa are covered with white fabric and then sewn using a sewing machine.
- d) The luffa sponge can be used as a midsole for shoes or slipper.



**Figure 1: Sample Prepared for Midsole for Shoes or Slipper From Luffa Sponge**

## RESULTS AND DISCUSSION

Author's Name, Title of Journal and Source of Journal	Outcomes Of Midsoles Made from Luffa
<p>Authors' Name : Zhonghai Zhang, Jingwu Zuo</p> <p>Title: Research on a cushioning structure for the midsoles of sport shoes based on the three-dimensional pore structure of luffas</p> <p>Source of Journal: Research Square</p>	<ul style="list-style-type: none"> <li>- Numerical investigations conducted by the authors show that pore material has a similar elastic modulus to the solid model but a lower equivalent density and higher specific stiffness [4].</li> <li>- Based on studies and analysis, the reinforced composite luffa sponge is a fantastic solution for running shoe midsoles since it reduces running-related vibrations.</li> <li>- Lightweight porous material is good for short-term energy storage.</li> <li>- Luffas' unique pore space layout was exploited to design a lightweight bionic material.</li> </ul>
<p>Authors' Name: Theddeus Tochukwu Akano, Isah Suberu</p> <p>Title: On design and analysis of damping physiognomies of reinforced composite luffa sponge on athlete's shoe</p> <p>Source of Journal: Journal of Science and Engineering</p>	<ul style="list-style-type: none"> <li>- Experiments by the author show that reinforced composite luffa sponge is a great material for designing and reducing runner-ground vibrations [2].</li> <li>- The author said the concept is great for athletic shoe midsoles. It absorbs running-related vibration well. Biodegradable materials have less environmental impact.</li> </ul>

## DISCUSSION

The findings that we obtained earlier led us to the conclusion that using luffa as an alternative to solid models for midsoles would be beneficial. This is because luffa has an elastic modulus that is comparable to that of solid models, but it has a lower equivalent density and a higher specific stiffness. People who participate in a wide variety of sporting activities, in addition to those who just want to use them in their day-to-day lives, are the target demographic for our innovative product, which consists of midsoles produced from natural luffa. Even people who have problems with flat feet can benefit from these breathable insert pads since they absorb tension and minimise foot pain. These pads are ideal for people who have problems with flat feet. Flat-footed individuals who struggle with foot pain may benefit from using these pads. The moisture-wicking and breathable characteristics of the insole will keep any moisture away from your feet, allowing them to remain clean and dry. They can efficiently reduce tension, protect your feet from the pressure that is incurred as a result of your forefoot coming into direct touch with the ground, and exfoliate the rough skin that develops on your feet as a result of walking. Because they are composed entirely of plant fibre, our natural luffa midsoles are completely compostable, which means they are better for the environment than traditional synthetic alternatives. You simply need to bury it in your garden or add it to the compost in your backyard, and it will break down within a month.

## CONCLUSION

In conclusion, the development of midsoles produced from natural luffa has the potential to allow us to make optimal use of luffa that is grown in our nation without resulting in the waste of any materials. Because of its unique fibres, textures, and structural components, luffa could be used to create midsoles that are functionally equivalent to those that are already in use. Creating something new from a vegetable has the potential to be beneficial for our environment since, once we are finished with it, it may be readily broken down in the soil.

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