4TH EDITION

E-EXTENDED

ABSTRACT

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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THE ANTIBACTERIAL PROPERTIES OF SCHIZOPHYLLUM COMMUNE AND THEOBROMA CACAO L

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ABSTRACT - Natural products consist of their own properties where it can inhibit bacteria from growing. Splitgill mushroom content of alkaloids, terpenoids, and flavonoids, while cocoa have polyphenols made up of flavanoids and non flavanoids. These bioactive components discovered in splitgill mushroom and cocoa have an important function as antibacterial agents. The purpose of this study is to investigate the impact of natural products in suppressing selected Gram-positive and Gram-negative bacteria that might cause damage to humans. Kirby-Bauer disc diffusion was used to test antibacterial activity. The results indicated that the extract of splitgill mushroom had the highest inhibitory zone against *E. coli* (21 mm) and *S. aureus* (11 mm), whereas the extract of cocoa had the least inhibitory zone with *E. coli* (13 mm) and *S. aureus* (10 mm). The achieved results indicated that splitgill mushroom was the best natural product with antibacterial properties, followed by cocoa oil.

Keywords: Mushroom extract, Cocoa oil, Antibacterial activity, Gram-positive and Gram-negative bacteria, Kirby-Bauer disk diffusion method.

INTRODUCTION

Splitgill mushroom (*S. commune)* and cocoa oil (*Theobroma cacao L)* are medicines that have been taken for thousands of years due to their benefits. The main issue usually relates to the immune system, as disease always comes from the system, and there are various such as diarrhoea, dental carries, and leishmaniosis wounds, as well as the abuse of drug users, which causes some consumers resistance to drugs such as penicillin, vancomycin, and amikacin, which cannot be consumed by the users. Hence, the research is being carried out in order to get additional information about natural products. Alkaloids, terpenoids, and flavonoids are bioactive components found in splitgill mushroom [4], whereas polyphenols made up of flavanoids and non flavanoids are bioactive components found in cocoa oil [6]. These components have an important function as antibacterial agents against *E. coli* and *S. aureus*. The products are significant in this study because they may be used to replace the existence of antibiotics because this medicine may create an allergic response in certain consumers, such as an itchy skin rash, coughing, or constriction of the throat, which causes breathing difficulties [3].

MATERIAL AND METHOD

The splitgill mushroom was harvested from forest, cocoa was obtained from Lembaga Koko Sabah Malaysia, and the pure culture of bacteria were obtained from labaratory stock culture.

The preparation of media

34.2 g of Mueller-Hinton Agar (MHA) powder was dissolved in 900 mL of distilled water, which was then autoclaved for 2 hours. The sterile agar solution was heated before being poured onto sterile petri dishes. Inversely kept at 4^{o}C until further usage, the agar was permitted to solidify. Next, 16.8 g of Mueller-Hinton Broth (MHB) powder was dissolved in 800 mL distilled water, and after that it was autoclaved for 2 hours. Then, the broth was kept at 4^{o}C until before been used. For the preparation of nutrient agar (NA), 7.0 g of nutrient agar powder was dissolved in 500 mL of distilled water. Then, the dissolved compound was autoclaved for 2 hours. After that, it was allowed to cool except solidify. Next, the NA was moved into each plate and it was left on the sterile surface before the agar harden. The lid of each Petri dish was settled and the plates was kept in a refrigerator.[2].

The preparation of inoculum

All bacterial strain was expanded from a stock culture by streaking it on NA, then it was incubated for 16 to 18 hours (overnight) at 37ºC. Next, using a wire loop, 4 or 5 colonies was extracted out of an absolute bacterial culture and the colonies was put to 5 ml of MHB. Then, the broth was incubated at 30°C or at an ideal growth temperature and each strain was adjusted to a concentration of 1 x 108 cells/ml using UV-Vis Spectrophotometer[2].

The preparation of samples extract

The mushroom was washed thoroughly under running tap water to eliminate dirt and then were rinsed with distilled water. Meanwhile, the cocoa shells were removed manually from cocoa beans. Mushroom was chopped while cocoa beans were crushed into tiny bits before even being dried in a drying oven at 60 ºC for 24 hours. Using a blender, the dried mushroom and cocoa beans were grounded into fine powder and were stored in airtight containers until further used. For the preparation of mushroom extract, 20 g of powdered mushrooms was weighed and was placed in sterile glass bottles and 200 ml of ethanol was added to completely soak the mushroom samples. The samples were soaked for 48 hours. The samples were filtered through a Buchner funnel using Whatman No. 1 filter paper after 48 hours, and the filtrates were then evaporated using a rotary evaporator at 50ºC to obtain the crude extract [2]. Meanwhile, for the preparation of cocoa oil extract, soxhlet method was applied. About 5 g of dried cocoa powder sample had been weighed into an extraction thimble. The opening of the thimble will be plug loosely with cotton. The thimble then placed into Soxhlet extractor. A dried round bottom flask was weight accurately and 150 ml of petroleum ether were added. The apparatus was connected to the condenser, the water is turn on and extract for a minimum 6 hour at 60 ºC on an electrochemical extraction unit. The flask containing petroleum ether extract is remove after extraction complete. The crude cocoa oil that had obtained was then evaporated with rotatory evaporator to obtain the pure cocoa oil. The cocoa oil was stored in chiller at 4 ºC for further use.

The preparation of impregnated disc

Starting at 200 mg/ml, mushroom and cocoa extracts were diluted in dimethyl sulfoxide (DMSO) in a serial two-fold dilution in a test tubes. The concentration was then further diluted to 16-fold in water accordingly. Then, to infuse a blank sterilized disc, 20 µL from each of the tube was utilised. The impregnated discs were dried for 30 minutes at room temperature before being used right away for the sensitivity test.

Antimicrobial sensitivity testing by using Disc diffusion method

A bacterium culture was utilised to uniformly cover MHA plates using a sterile hockey stick. After drying for 15 minutes, the plates were utilised for the sensitivity test. The antibiotic disc was put on the surface of the inoculated and dried plate using sterile forceps. The discs were put on the MHA surface after being infuse with a variety of mushroom and cocoa extracts. Each test plate was comprised of 6 discs; 1 positive control (standard commercial antibiotic disc), 1 negative control, and 4 treated discs. The standard antibiotic discs was Vancomycin 30 µg for S. aureus and Amikacin 30 µg for E.coli. DMSO was the negative control. Aside from the controls, there were four treated discs on each plate that were located near to another. Then, the plate was incubated at 37 °C for 18 to 24 hours subject to the kinds of bacteria employed in the test. After the incubation, the plates were tested for an inhibitory zone. Calipers was utilised to compute the inhibitory zone and the reading was noted [7].

RESULTS AND DISCUSSION

Table 1 The Tabulate Of Antibacterial Activity Of Splitgill Mushroom And Cocoa Againsts Selected Microorganisms.

Microorganisms	Samples	Concentration (mg/ml)				Positive control (Vancomycin 30µg)	Negative control (DMSO)
		12.5	25	50	100		
		Inhibition Zone (mm)					
S.aureus	Splitgill	0.0	8.0	9.0	11.0	18.0	0.0
	Cocoa	0.0	7.0	8.0	10.0	17.0	0.0
						Amikacin (30µg)	
E.coli	Splitgill	0.0	10.0	15.0	21.0	27.0	0.0
	Cocoa	0.0	8.0	9.0	13.0	26.0	0.0

In this research, the concentration of the splitgill mushroom extract and cocoa oil has been divided into four types of concentrations, which are (100, 50, 25, and 12.5) mg/mL. The result of the disc diffusion analysis showed that mushroom extract and cocoa oil had antibacterial activity against *E. coli* and *S. aureus*. Zone of inhibition is defined as a circular transparent area that free of bacterium colonies after 24 hours of incubation [1]. Amikacin and Vancomycin produced an inhibitory zone in *E. coli* and *S. aureus* plates respectively but not in the presence of DMSO. The finding validated that the role of Amikacin and Vancomycin as a positive control and DMSO as a negative control.

Based on the result, the zone of inhibition had appeared in both of sample concentration at (25, 50 and 100) mg/ml. This result indicate that extraction process did not damage the antibacterial activity of the mushroom extract and cocoa oil. However, in concentration at 12.5 mg/ml, there is no inhibitory zone present in both samples. This is because, lower concentration may decrease the antibacterial effect. To be simplified, when the samples concentration increase, the diameter of zone of inhibition also increases [5]. In term of bacteria, *E. coli* seeded plate has wider inhibitory zone compared to *S. aureus*. Last but not least, the achieved result indicates that splitgill mushroom was the best natural products with antibacterial properties followed by cocoa oil.

a) *S. aureus* b) *E. coli*

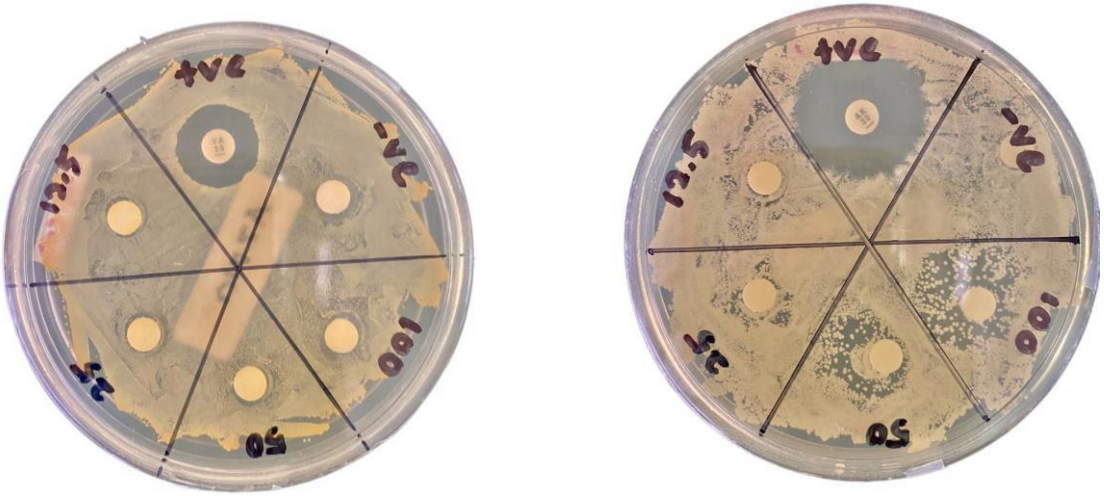

Figure 1 The Inhibition Zone Between The Gram-Positive Bacteria (*S. Aureus*) And Gram-Negative Bacteria (*E. Coli*) Of Splitgill Mushroom.

a) *S. aureus* b) *E. coli*

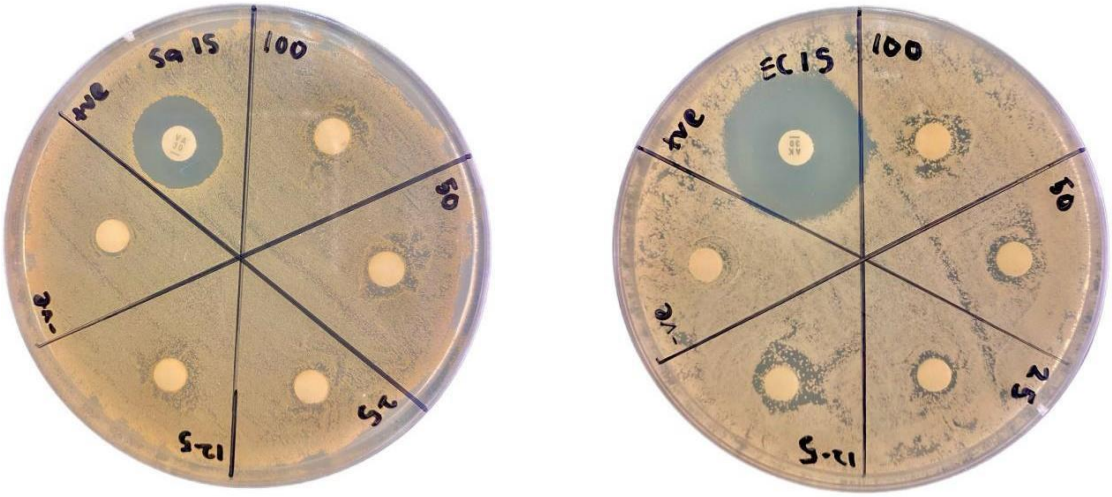

Figure 2 The Inhibition Zone Between The Gram-Positive Bacteria (*S. Aureus*) And Gram-Negative Bacteria (*E. Coli*) Of Cocoa Oil.

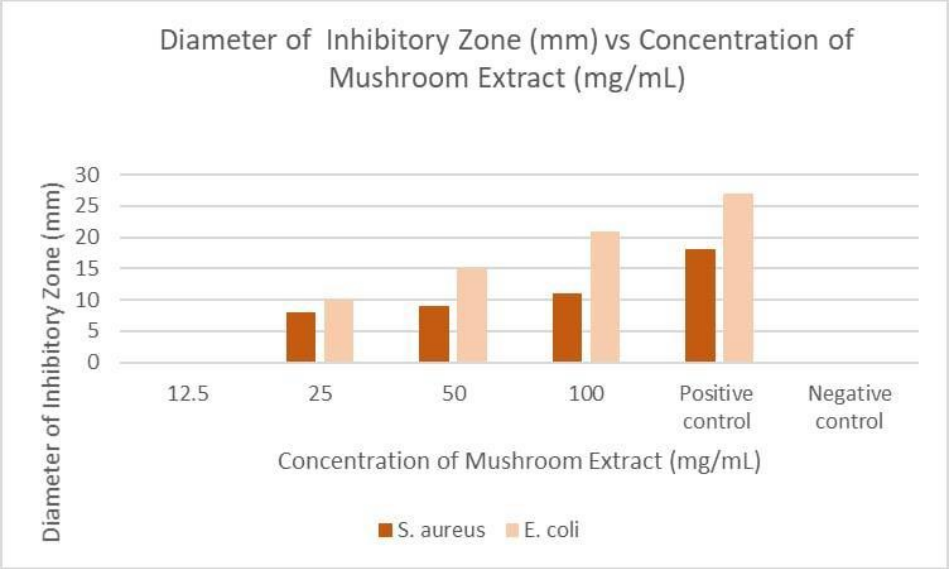

Figure 3: Diameter Of Inhibitory Zone (Mm) Vs Concentration Of Mushroom Extract (Mg/Ml)

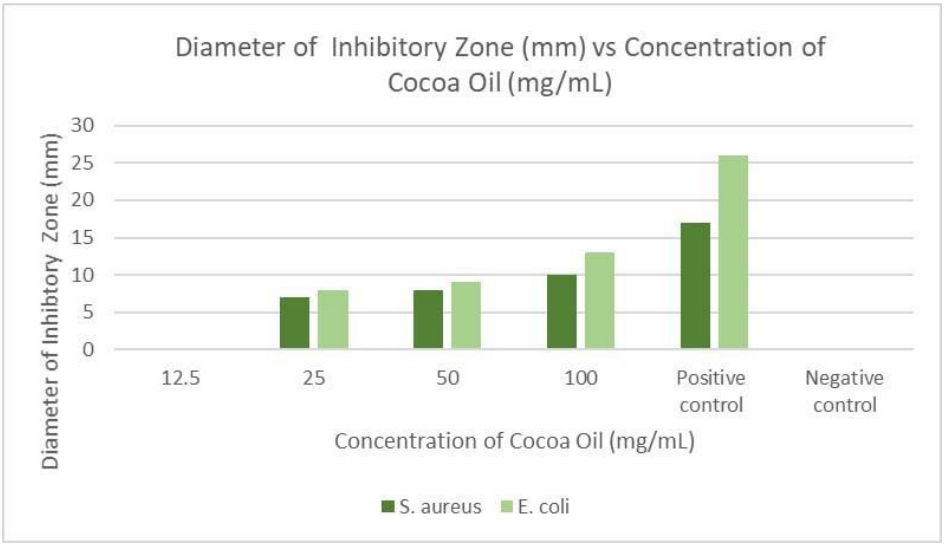

Figure 4: Diameter Of Inhibitory Zone (Mm) Vs Concentration Of Cocoa Oil (Mg/Ml)

CONCLUSION

As a conclusion, the antibacterial activity of splitgill mushroom and cocoa oil against *E.coli* and *S.aureus* has been determined, and the best sample of antibacterial activity among of these samples is splitgill mushroom followed by cocoa oil. The zone of inhibition presented at concentration (25, 50, 100) mg/ml. Therefore, as the samples concentration increase, the diameter of zone of inhibition also increases.

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