

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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# POTENTIAL OF COCOA POD AS SUPPLEMENT FOR SEED GERMINATION MEDIUM OF DWARF PAK CHOY (*Brassica rapa*)

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**ABSTRACT** - Cocoa (*Theobroma cacao*) is among the most cultivated and important tropical crops in the world. The growing demand for chocolate goods around the world is another factor driving up the amount of cocoa residue. As a result, there will be a significant impact on waste from cocoa pod waste and cocoa byproducts. It is crucial to use the waste because if cocoa pod waste is left untreated at the plantation for a few months, it will cause environmental issues. This will result in a bad smell and liquid that pollutes the environment. These wastes have the potential to become environmental problems if not treated, but it would be beneficial if it is used as a growing medium supplement for seed germination. The purpose of study to analyze and assess the effect of the cocoa pods waste as a growing medium supplement on productivity and nutrient content for seed germination. The experiment has been carried out by using a completely Randomized Complete Block Design (RCBD) with 3 kinds of treatment comparisons which are polybag and peat moss (100%), matured cocoa pod waste and peat moss (100%) and overripe cocoa pod and peat moss (100%).

**Keywords:** Cocoa pod waste, seed germination, nutrient content, growing medium

## INTRODUCTION

Cocoa (*Theobroma cacao*) is primarily grown for its bean to be further processed by the chocolate industry. The actual bean is located inside the cocoa fruit. The portion of the fruit left over after the bean is removed is known as the pod, and it typically makes up around 75% of the weight of the entire fruit. The pod is the most common byproduct of cocoa processing, while there are additional byproducts like cocoa shell and cocoa dust that can be utilised as animal feed (Aregheore, 2002).

Due to the high mineral nutritional content of cocoa pods, particularly the potassium and nitrogen nutrients, which make up 61% of the overall nutrients, cocoa pod waste can boost the nitrogen concentration in the substrate. Compost derived from cocoa pods contains 1.81% nitrogen by weight. Application of cocoa-pod compost can boost output by up to 19.48% (Baon, 2005). The cocoa pods are highly varied and contain a lot of organic material. The organic matter composition of cocoa pods is N 16.6 kg/tons, P<sub>2</sub>O<sub>5</sub> 1.7 kg/tons, K<sub>2</sub>O 55.4 kg/tons, MgO 3.0 kg/tons, and 2.3 kg CaO/tons, according to (Shepherd and Ngan, 1986). Dry cocoa pods have an organic matter concentration of 90.4% dry matter, 16.4% ash, 6.0% crude protein, 31.5% crude fiber, 1.5% crude fat, 4.52% N-free extract, 0.9% ether extract, 0.67% Ca, 0.10% P, 0.64% Mg, 3.51 kcal/g of energy, and kcal/g of energy.

The study aims to analyse and evaluate the impact of cocoa pod waste as planting medium on productivity and nutrient content of seed germination, with the benefit of which is expected to be to reduce and provide troubleshooting for industrial wastes like cocoa pod waste and creating added value through crop cultivation. Towards this end, an exact comparison planting medium with a cocoa pod waste was produced in an effort to increase production and the quality of the nutrient content of the seed (Imam Mudakir, 2014).

## MATERIAL AND METHOD

Cocoa pod, Peat moss, dwarf pak choy seedling.

**Table 1: Composition of cocoa pod husks**

Component	Measured values (average $\pm$ standard deviation, %)
N	1.21 $\pm$ 0.38
P	0.14 $\pm$ 0.04
K	2.89 $\pm$ 0.84
Mg	0.26 $\pm$ 0.06
Ca	0.26 $\pm$ 0.10

Source: (D.-G. J. M. Hougni, 2021)

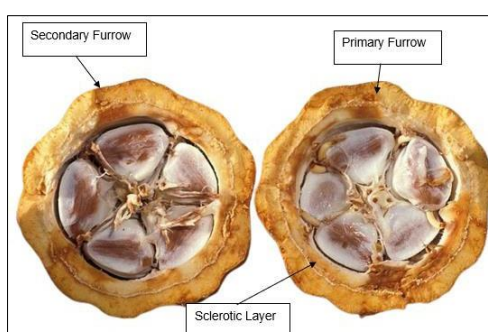


Figure 1: The Picture of Cocoa Pod

By using waste of cocoa pod which has been collected after the cocoa beans have been removed. The quantity of peat moss that is put into the cocoa pod depends on the size of the cocoa pod as much as 3/4 of the size of the cocoa that has been cut. Only certain vegetable plants such as Pak choy can use this method, this is because it has short roots and can be accommodated by the cocoa pod medium. The method of sowing seeds directly is used in this method. The lifespan of cocoa pods as a plant medium can only be used once after harvesting and the cocoa pods will be left to rot.

There are 3 treatments involved in this study:

- i. T<sub>0</sub> = Poly bag + 100% peat moss (control)
- ii. T<sub>1</sub> = Mature cacao pod + 100% peat moss
- iii. T<sub>2</sub> = Overripe cacao pod + 100% peat moss

## RESULTS AND DISCUSSION

The yield size and weight of crops will depend on the medium size of the plant. Nutrient content of compost made from cocoa pods is 1.81% nitrogen (Imam Mudakir, 2014). The research result showed that the treatment cocoa pods wastes have a significant effect N total, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O, and C-organic content (Imam Mudakir, 2014). Crop needs rich soil with plenty of nitrogen, phosphorus and potassium (Supply, 2021). Therefore, it can help to reduce and minimize cocoa pod waste.



Figure 1: The Picture of Cocoa Pod With Dwarf Pak Choy as Preliminary Study

It is crucial to valorize cocoa waste in order to comprehend the formation of cocoa pod husk biomass as well as its fundamental chemical make-up. During the earliest stages of processing cocoa beans, roughly 80% of these wastes are made up of cocoa pod, and their disposal takes up a lot of space, raising social and environmental issues. There are many nutrients N, P, K, Ca, Mg, and a few other micronutrients were present in varied concentrations in the cocoa pod and plantain peel powders. The high amounts of nitrogen and phosphate in the soil, which were also given by cocoa pod, fostered root development, reinforced stalks and stems, and increased plant resistance to diseases. Then, the cocoa pod husk raises soil macronutrient levels, demonstrated adding organic amendments to the soil boosted the number of soil microorganisms, greatly boosting the rate at which N, P, and K are mineralized for plant uptake.

In addition, composition of cocoa pod will help identify possible byproducts that can be made. The cocoa pod has been used to manufacture potassium carbonate or as a potassium fertiliser in the growth of seedlings due to its high potassium content. Although it is cost-effective and ecologically benign to produce activated carbon from cocoa pods, prior research indicates that a complete assessment of the environmental effects from the cultivation of the pods through their conversion into activated carbon is necessary. In our research, we must show a firm dedication to environmental conservation. Additionally, cocoa pod applications are found in regions with large cacao production, demonstrating a direct connection between the growth in waste and the need to discover viable uses for this material.

## CONCLUSION

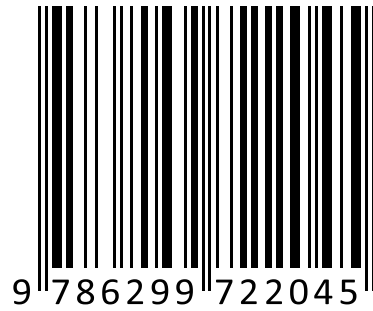
Based on their research, the productivity and nutritional content of the growth medium are significantly impacted by the use of cocoa pod waste as a growing medium supplement. Cocoa pods waste, it is recommended to be applied because the treatment would increase productivity. One method of dealing with plantation waste is to use industrial cocoa pod wastes for crop cultivation. Cocoa pods and shells demonstrated antioxidant activity and a high total phenolic and flavonoid content. Cocoa pods have higher antioxidant activity than cocoa shells. Several bioactive compounds contributed to the antioxidant activities of the extracts. The pod contains nutrients such as nitrogen, phosphorus, and potassium, which can aid in the growth and development of other plants. Furthermore, cocoa pods can be used as a mulch to help retain soil moisture and suppress weeds. So, for this research, it can be employed in beneficial ways while also creating a new innovation medium for seed germination.

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