4TH EDITION

E-EXTENDED

ABSTRACT

INTERNATIONAL AGROTECHNOLOGY INNOVATION SYMPOSIUM (i-AIS)

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INTERNATIONAL AGROTECHNOLOGY INNOVATION SYMPOSIUM (i-AIS)

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) (4th 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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CALCIUM BIOFORTIFIED SCHIZOPHYLLUM COMMUNE AND ITS RELATION TO STUNTED GROWTH AMONG CHILDREN

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ABSTRACT - The study investigated effect of concentration on biofortified *Schizophyllum commune* with Ca. The instrument of Atomic Absorption Spectroscopy (AAS) was used to determine the concentration. The concentration of elements generally increased over concentration gradients. As a side note, a series of calcium standard were made which is 1ppm, 2ppm, 3ppm, 4ppm, and 5ppm. The usage of AAS result a match concentration of prepared standard which are 1.098 mg/L, 2.054 mg/L, 3.01 mg/L, 4.003 mg/L, 4.947 mg/L respectively. The process of cultivating of *S.commune* was shorten by using a ready-made *S.commune* block. Two modes were done which are controlled and biofortified Ca. The three controlled *S.commune* were done in three replicate. The first, second, and third replicate result a Ca concentration of 0.328 mg/L, 0.224 mg/L, and 0.175 mg/L. For the Ca biofortified *S.commune*, the concentration obtained for *S.commune* that has sterile water:Ca (v/w) 1:3, 1:7, 1:11 is 0.329 mg/L, 0.276 mg/L, and 0.219 mg/L respectively. The difference between replicate 1 and ratio 1:3 is 0.001 mg/L, for replicate 2 and ratio 2 the difference is 0.052 mg/L, and for replicate 3 and ratio 3 are 0.044 mg/L. All difference shown an increasing Ca concentration. However, replicate 2 and ratio 2 are shown to have a big difference. This indicate that the by adding 7 grams of Ca nitrate, it could favourably increase the Ca concentration.

Keywords: Calcium, *Schizophyllum commune*, Atomic Absorption Spectroscopy, Biofortified, Stunted Growth

INTRODUCTION

Schizophyllum commune whose common name is split gill mushroom, is an edible white rot fungus that rapidly grows during the rainy season and is classified under the family of *Schizophyllaceae* of *Agaricales*. Because of the appearance of round, split centrally, have a gill-like folds, *S. commune* are named after word "Schza" [3] which means split. In addition, the split was folded back to defend the fertile surface on a dry condition. This type of mushroom can be found on a broad variety of woods and other plant-based surface or substrates in all over the world, including Europe, Africa, America, Australia, and even Asia [2].

Based on World Bank, public health problems are considered severe when the stunted data exceeds 20%. Stunting can be caused by a variety of factors, one of which is dietary intake. Children who do not get enough nutrients are more likely to develop growth issues [1]. Children grow and develop at a rapid rate during their toddler years, and their nutritional needs rise in conjunction to a healthy and nutritious foods. Ca is considered as macro mineral that aids in the linear growth of children [1]. When little amount of Ca is consumed, it causes osteoblast malfunction and low matrix mineral deposition in new bone, both of which affect growth. Hence, it is important that children need to be supplied with high mineral food to prevent stunted growth in the early age.

MATERIAL AND METHOD

Preparation of Calcium nitrate hydrate

Before biofortification of Ca for selected mushrooms was conducted, Ca nitrate hydrate is first prepared. Three different solution of Sterile water:Ca (v/w) were used in ratio. Suggested ratio is 1:3, 1:7, and 1:11. The solutions was prepared by dissolving 17 mL of sterile water and 3 g of Ca nitrate to make 1:3 ratio solution. For 1:7 solution, 13 mL sterile water and 7 g of Ca nitrate were used. Meanwhile 1:11 solution need 9 mL of sterile water and 11 g Ca nitrate. The mixture was then transferred into universal bottle and shaken to be fully dissolved.

Sample preparation

A ready-made *S. commune* mushroom block was obtained from online shop in order to eliminate the preparation of mushroom substrate. The mushroom blocks are available in polyethylene bag. For Ca nitrate hydrate biofortification, the polyethylene bag was slitted on 5 area. Then, the Ca solution of 1:3, 1:7, and 1:11 was applied by using a sprayer. For controlled mushroom sample, the mushrooms kits were left to grow in a moist environment until large size of mushroom is visible. After one week, the mushrooms were harvested after it was fully grown.

Preparation of sample (Acid Digestion)

This method was required prior to conducting AAS of mushroom samples. Before the analysis, the sample was dried in oven dryer at 105ºC for 24 hours. Then, the dried sample was allowed to cooled and turned into powder using a blender. After that, 5g of sample was weighed using analytical balance. Then, the sample was transferred into a beaker with addition of 20 mL deionized water from a measuring cylinder, followed by 5 mL concentrated hydrochloric acid (HCl). After that, the beaker was placed on a hot plate and boiled for 1 minute. The beaker is then removed from hot plate and cooled. As a safety precaution, handling HCl was done in a fume cupboard. Next, the contents were filtered using buchner funnel and Whattman filter paper into a 50 mL volumetric flask, washed with deionized water and make up the volume. Lastly, the solution was mixed well and then filter again through ashless filter paper. After that, 10 mL of the sample stock solution was pipetted into 100 mL volumetric flask and make up to the volume.

Preparation of Standard Solutions

10 mL of Calcium standard solution (1000 mg/L) was pipetted into 100 mL volumetric flask and then make up to volume with deionized water and allowed to be mixed well. A series of concentration 1, 2, 3, 4 and 5 mg/L was made in a 100 mL volumetric flask. An equation M1V1=M2V2 was used to prepare the standard solutions.

Absorbance Measurement

The AAS instrument for the element to be analysed was set up. The absorbance of each of the standard solutions prepared was measured. In a similar manner, the absorbance of the sample solution prepared was also measured.

RESULTS AND DISCUSSION

Prior in conducting analysis, a series of Ca standard was made whereby the concentration would be 1ppm, 2ppm, 3ppm, 4ppm, and 5ppm. Based in Table 1, the absorbance and concentration were calculated from the usage of AAS. The calculated calcium concentration is tally with the expected concentration which are 1.098 mg/L, 2.054 mg/L, 3.01 mg/L, 4.003 mg/L, and 4.947 mg/L. Furthermore, a calibration curve was made of absorbance versus calculated concentration as seen in Figure 3. A linear graph was obtained. In addition, this calibration curve is useful as a reference for the sample concentration.

Two mode was done in this study which are controlled and biofortified *S.commune*. The three replicate of controlled *S.commune* block was left to grow for one week with supplying the moisture everyday using a sprayer. After one week, the fruiting body of *S.commune* was harvested and dried at 60c for 24 hours before turning it into powder. After the process, the sample was diluted and using AAS to determine the Ca concentration. This also marks the initial concentration of untreated *S.commune* block which are 0.328 mg/L, 0.224 mg/L, and 0.175 mg/L as seen in Table 2. These concentrations are referred to the replicate 1, replicate 2, and replicate 3 respectively. Based in Figure 4, these concentrations were in range of the calcium standard of 1ppm, 2ppm, 3ppm, 4ppm, and 5ppm.

Second mode implies on the biofortified *S.commune*. The Ca solution was made in a ratio 1:3, 1;7, and 1:11. The volume for each ratio was done by dissolving Ca nitrate using a sterile water. Then, the solution was continuously sprayed around the block at one time. Within the one week of growth, the block is continuously supplied with water to improve growth. After one week, the fruiting body was harvested and dried to obtained a powder sample. The concentration of biofortified *S.commune* for ratio 1:3, 1:7, and 1:11 are 0.329 mg/L, 0.276 mg/L, and 0.219 mg/L respectively as seen in Table 3. To add, the concentration was also lies within the range of Ca standard such as in Figure 5. Based in Figure 6, the concentration difference between the group is likely to occur. The first group between replicate 1 and ratio 1:3 shows a difference 0.001 mg/L, for replicate 2 and ratio 2 the difference is 0.052 mg/L, and for replicate 3 and ratio 3 are 0.044 mg/L. It can be seen that the second group have the large difference compared with the other group. Hence, using 1:7 are the recommended ratio to be used as to biofortified *S.commune*.

Figure 1: *S.Commune* Block Before Biofortification.

Figure 2: *S.Commune* Fruiting Body After One Week.

Table 1: Absorbance Reading Of Ca Standard Solution.

Standard	Mean Signal (Absorbance)	Calculated Concentration (mg/L)
Blank	0.0000	0.000
1	0.0960	1.098
2	0.1794	2.054
3	0.2629	3.01
4	0.3497	4.003
5	0.4322	4.947

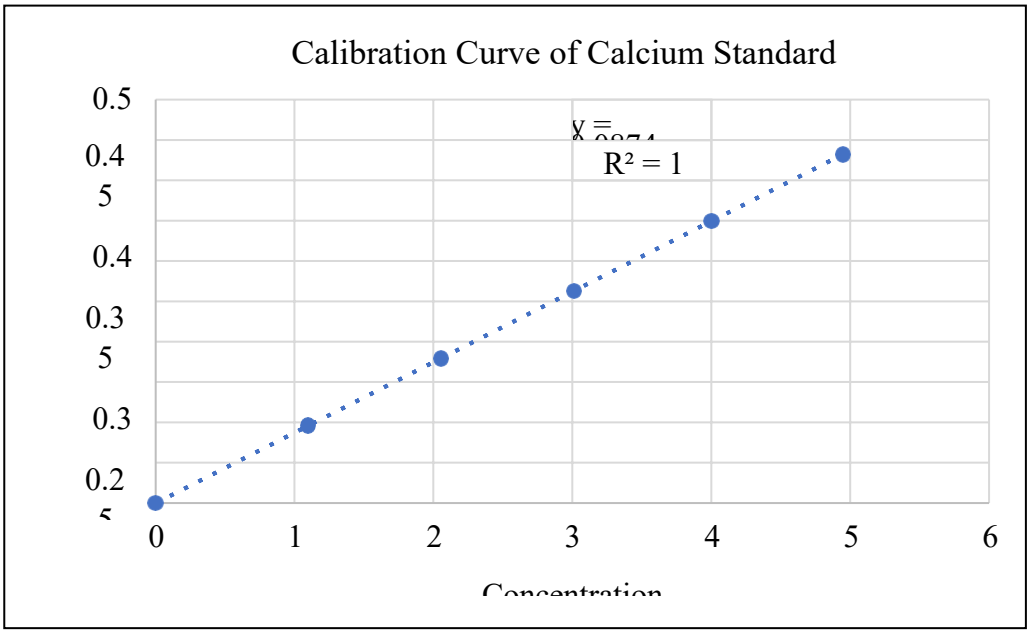

Figure 3: Standard Curve Of Calcium Standard. The Standard Was Prepared In 1ppm, 2ppm, 3ppm, 4ppm, And 5ppm.

Table 2: Concentration Reading Of Controlled *S.Commune*.

Sample	Replicate	Sample Concentration (mg/L)	Average ± Standard Deviation
1	1	0.331	0.328 ± 0.004
	2	0.329	
	3	0.324	
2	1	0.225	0.224 ± 0.001
	2	0.223	
	3	0.224	
3	1	0.177	0.175 ± 0.002
	2	0.173	
	3	0.174	

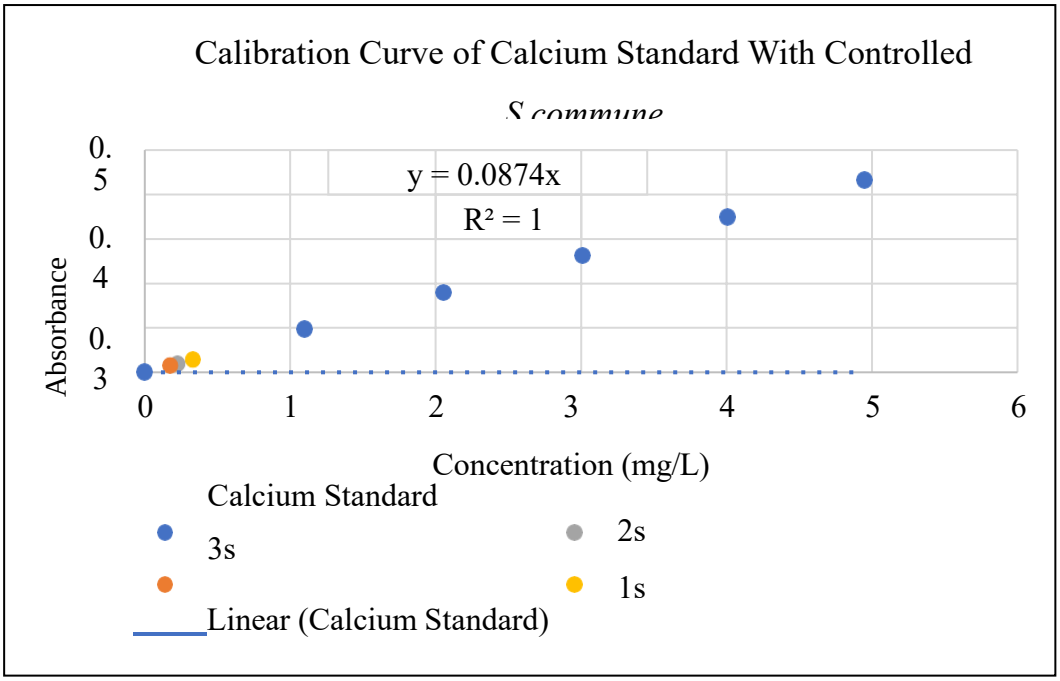

Figure 4: Calibration Curve Of Calcium Standard On Controlled *S.Commune*.

Table 3: Concentration Reading Of Biofortified *S.Commune*.

Sample	Replicate	Sample Concentration (mg/L)	Average ± Standard Deviation
1:3	1	0.329	0.329 ± 0.003
	2	0.326	
	3	0.331	
1:7	1	0.277	0.276 ± 0.001
	2	0.277	
	3	0.275	
1:11	1	0.217	0.219 ± 0.003
	2	0.218	
	3	0.223	

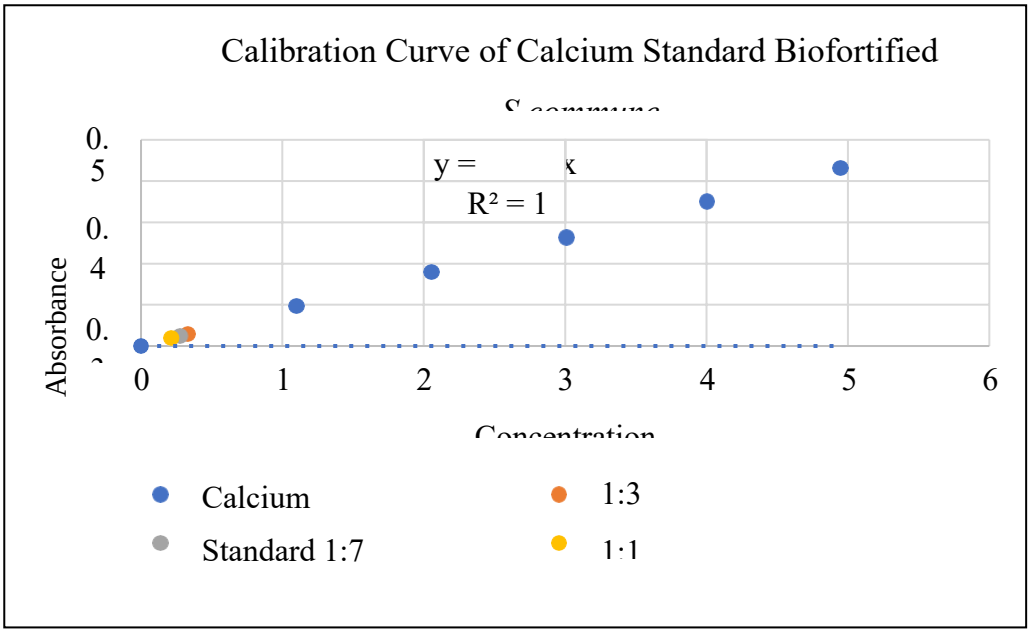

Figure 5: Calibration curve of Calcium Standard on Biofortified *S.commune*.

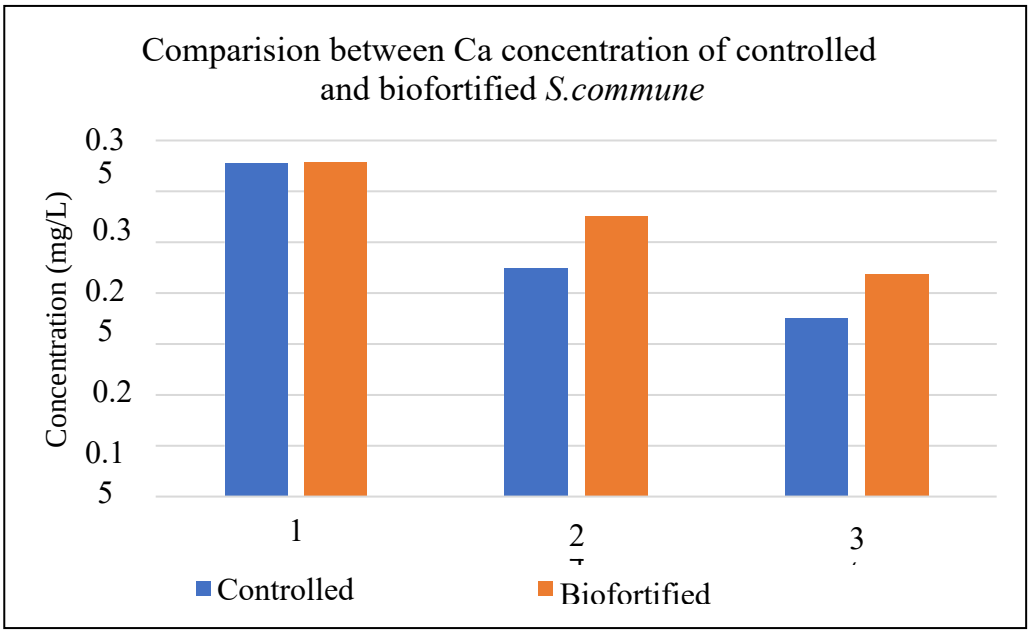

Figure 6: Comparision Between Ca Concentration Of Controlled And Biofortified *S.Commune*. Each Group Has A Difference 0.001 Mg/L, 0.052 Mg/L, And 0.044 Mg/L Respectively.

CONCLUSION

The present study highlighted the potential of *S.commune* in the production of mushroom that are rich in Ca. This species was able to grow on supplemented condition and able to elevate the calcium concentration. Although all group displayed an increasing of Ca concentration, group 2 of replicates 2 and ratio 1:7 shows a large difference. This indicate that using a ratio 1:7 is highly recommended to increase the Ca concentration. These findings marks that biofortified *S.commune* with the studied elements and could have a potential in application of stunted growth.

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E-EXTENDED ABSTRACT of the INTERNATIONAL AGROTECHNOLOGY INNOVATION SYMPOSIUM (i-AIS) (4th EDITION)

e ISBN 978-629 -97220-6-9

9 786299 722069

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