

**3<sup>rd</sup> EDITION**

**E-EXTENDED**

**ABSTRACT**

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



## COPYRIGHT

### 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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# EFFECT OF CHEMICAL FERTILIZER ON THE BACTERIA POPULATION AND ITS CHARACTERIZATION IN PADDY SOIL

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**ABSTRACT** - An experiment had been conducted to determine the effect of chemical fertilizer on the population of microorganisms and characterization of the microorganisms in fertilized and non-fertilized paddy soil. The experiment was designed by using two treatments with three replications. Two treatments consisted of chemical fertilizer treatment (with fertilizer) and the other one as control (zero fertilizer). Rice seeds were cultivated in pots. The soil samples were taken every week for serial dilution to indicate the population of bacteria in the soil. Colony Formic Unit (CFU) result of fertilized soil and non-fertilized soil indicated there is no significant differences in bacterial population (test at  $\alpha = 0.1$ ). The characteristics of bacteria were determined by using microscopic observation. Pure culture was streak on the microscopic slide glass for Gram Staining to identify whether it is positive or negative. For the result, at the end of the treatment, non-fertilized soil recorded the shape of bacilli (57%), cocci (18%), staphylo-cocci (4%) and diplo-cocci (4%). In fertilized soil recorded in bacilli (33%), cocci at (24%), strepto-bacilli (4%) and strepto-cocci (4%). Meanwhile, in non-fertilized soil, the color of bacteria recorded is milky white (39%), white (29%), brown (4%), yellow (11%) and yellowish white (18%). Fertilized soil recorded in milky white (33%), white (29%), brown (4%), yellow (0%) and yellowish white (33%) in the end of the treatment. For Gram positive, it showed higher percentage (50%) compared to Gram negative bacteria (42.86%) in non-fertilized soils. While, in fertilized soil, the result showed 42.86% in Gram positive compared to 57.14% in Gram negative. The chemical fertilizer application have no effect on microbial population. The reason might be the duration of fertilizer application. The period is too short for the microbial reaction towards the chemical fertilizer in the soil.

**Keywords:** Bacteria populations ,shape, color, Gram-staining, CFU calculation.

## INTRODUCTION

Rice is the staple food been consumed by most people in Malaysia. The cultivation of rice in Malaysia nowadays become more practicable to produce more rice to fulfil our country SSL. However ,some of the agriculture practices in rice cultivation are not good for the soil biodiversity especially microorganisms in soil. The chemical fertilizer application in rice cultivation are at dangerous level if it been applied too frequent. It will cause hazards to farmers and also the rice. The chemical fertilizer in the soil can cause soil contaminants, so the microorganisms tends to persist in the soil and nutrient absorption at the root will be disturbed. It is very important to keep the soil health maintain, so that the soil fertility can be maintain and sustain for a long time.

## MATERIAL AND METHOD

The experiment was conducted in Greenhouse no.8 and in the Bacteriology and Virology Lab located in Uitm Jasin, Melaka. The objective of this experiment is to find out the microbial population and to define its characteristics in paddy soil. Soil samples were taken from paddy field in Kampung Merlimau in Melaka. The soil samples were taken from a depth of 0 until 10cm randomly by using straight hook and hoe. The soil series is Munchong series. The soil is clay textures and red-brown to gray colour. The soil were dried naturally by exposing it to the direct sunlight. The soil were crumbed by using pestle and mortar before the soil filled into planting cup. Then, the soil were watered by tap water to maintain the moisture before sow the rice seeds. Rice variety MR 219 was selected for this experiment. The rice seeds were soaked in warm water for 30 minutes. Then, the rice seed were soaked in tap water for 24 hours in shade condition. The rice seed were rinsed using the clean water for a few times. The chemical fertilizer that was used are N.P.K Green with ratio 15:15:15. The fertilizer were applied by weekly started from 10 gram in week 1, then increased to 20 gram in week 2 and

Six sterilized test tube were prepared and placed on the test tube racks. One gram of soil were measured and were put into the first test tube then were shaken for 5 second. By using micro pipette, 0.1  $\mu$ L from the first test tube were taken and then transferred into the second test tube. The test tube were shaken for 5 seconds. Then, repeated the process was repeated until the sixth test tube.

The petri dish of nutrient agar were opened with caution to avoid any contamination. By using micro pipette , took 0.1  $\mu$ L of each dilution and then were poured onto the nutrient agar. The hockey stick were dipped into alcohol 70% and were flamed using bunsen burner for few seconds. Then, the sterilized hockey stick were let to cool for a few seconds. The sterilized hockey stick then were spread on the nutrient agar until the dilution covered the surface of the nutrient agar. The petri dish were sealed by using parafilm and then were incubated in incubator for 24 hours. After 24 hours, the petri dish stored in chiller to slow the growth of bacteria. All the activity were done in Biosafety chamber under sterilization technique. The Colony Formic Unit were measured after 24 hours of incubated. Based on James in 1978, the formula were effective measure to count the colony on the media agar.

Colony forming Units (CFU) were calculated and subjected to analysis of variance (ANOVA) using SPSS version 9.3.

## RESULTS AND DISCUSSION

The experiment was designed by using two treatments with three replications. Two treatments consisted of chemical fer- tilizer treatment (with fertilizer) and the other one as control (zero fertilizer). Rice seeds were cultivated in pots. The soil samples were taken every week for serial dilution to indicate the population of bacteria in the soil. Colony Formic Unit (CFU) result of fertilized soil and non-fertilized soil indicated there is no significant differences in bacterial population (test at  $\alpha = 0.1$ ). The characteristics of bacteria were determined by using microscopic observation. Pure culture was streak on the microscopic slide glass for Gram Staining to identify whether it is positive or negative. For the result, at the end of the treatment, non-fertilized soil recorded the shape of bacilli (57%), cocci (18%), staphylo-cocci (4%) and diplo-cocci (4%). In fertilized soil recorded in bacilli (33%), cocci at (24%), strepto-bacilli (4%) and strepto-cocci (4%). Meanwhile, in non-fertilized soil, the color of bacteria recorded is milky white (39%), white (29%), brown (4%), yellow (11%) and yellowish white (18%). Fertilized soil recorded in milky white (33%), white (29%), brown (4%), yellow (0%) and yellowish white (33%) in the end of the treatment. For Gram positive, it showed higher percentage (50%) compared to Gram negative bacteria (42.86%) in non-fertilized soils. While, in fertilized soil, the result showed 42.86 % in Gram positive compared to 57.14% in Gram negative.

**TABLE, IMAGE AND FIGURE**

**Table 4.1.1 CFU reading against**

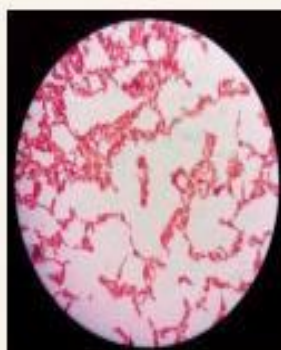
Colony Formic Unit (cfu/mL)	10 <sup>3</sup>	10 <sup>4</sup>	10 <sup>5</sup>	10 <sup>6</sup>
<b>Non-fertilized (week 0)</b>	TNTC	2433300	TFTC	TFTC
<b>Non-fertilized (week 1)</b>	TNTC	4366700	TFTC	TFTC
<b>Non-fertilized (week 2)</b>	TNTC	6666700	15666700	TFTC
<b>Non-fertilized (week 3)</b>	TNTC	5933300	14666700	TFTC

Colony Formic Unit (cfu/mL)	10 <sup>3</sup>	10 <sup>4</sup>	10 <sup>5</sup>	10 <sup>6</sup>
<b>Fertilized (week 1)</b>	TNTC	6433300	14333300	TFTC
<b>Fertilized (week 2)</b>	TNTC	4933300	15333300	TFTC
<b>Fertilized (week 3)</b>	TNTC	7000000	7666700	TFTC

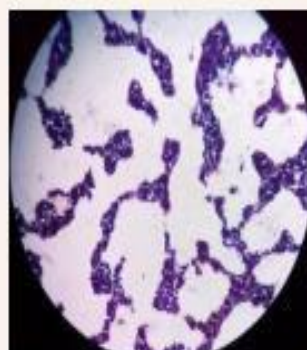
\*tntc: too numerous to count;tftc: too few to count



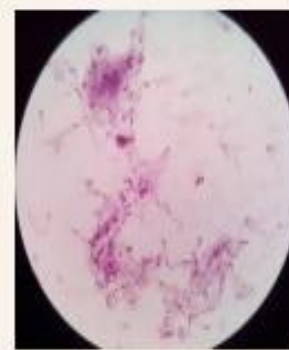
The sub-culture plates



Strepto-bacilli, Gram-negative, Milky white



Cocci, Gram-positive, Brown streak



Bacilli, Gram Positive, White streak

## CONCLUSION

In conclusion, the dependency of chemical fertilizer usage can be reduced in agricultural sector for long term planting crop. Long term fertilization can cause toxicity in soil and cause the fertility of soil reduced. The chemical fertilizer applications can be improved by adding soil amendments like bio-organic fertilizer or compost. It can help to improve the soil microbial population in soil, increase the fertility of soil and at the same time can helps farmers in reducing their cost for chemical fertilizers.

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