UNIVERSITI PUTRA MALAYSIA

PRELIMINARY STUDY OF THE ANTIBACTERIAL ACTIVITY OF FERMENTED PLANT EXTRACTS AGAINST ESCHERICHIA COLI AND BACILLUS SUBTILIS

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CERTIFICATION

This project report entitled 'Preliminary study of antibacterial activity of fermented plant extracts against *Escherichia coli* and *Bacillus subtilis'* was prepared by Nur Fitrah bt Mat Zainal and submitted to the Faculty of Agriculture in fulfilment of the requirement of PRT 4999 (Final Year Project) for the award of the degree of Bachelor of Agricultural Science.

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LIST OF ABBREVIATIONS

FPE	Fermented plant extract
FPEMK	Fermented plant extract *Murraya koenigii*
FPEEEE	Fermented plant extract *Etlingera elatior*
FPECC	Fermented plant extract *Cymbopogon citrates*
FPECL	Fermented plant extract *Citrullus lanatus*

ABSTRACT

Fermented plant extracts from 4 sources of plants *Murraya koenigii*, *Etlingera elatior*, *Cymbopogon citrates* and *Citrullus lanatus* were examined for their antibacterial activity against *Escherichia coli* and *Bacillus subtilis* by using disc diffusion technique. Fermented plant extracts from organic waste is a product produced from fermentation of organic solid waste and it can be used as surfactants, liquid fertilizer, antimicrobial agents, treatment of domestic wastewater, municipal and industrial sludge treatment. Among all of the fermented plant extracts tested, all show positive response to antibacterial activity by showing zone of inhibition after incubation period towards those bacterial strains except for *E. elatior* that did not show any activity towards *B. subtilis.* The results shown suggested a potential antimicrobial activity of the fermented plant extracts which may find its application to produce environmental friendly products that act as a surfactant in order to reduce cross contamination in laboratory to occur.

ABSTRAK

Ekstrak tumbuhan yang diperolehi daripada proses penapaian daripada 4 tumbuhan iaitu *Murraya koenigii*, *Etlingera elatior* , *Cymbopogon citrate* dan *Citrullus lanatus* telah diuji untuk aktiviti antibakteria terhadap *Escherichia coli* dan *Bacillus subtilis* dengan menggunakan teknik cakera resapan. Ekstrak tumbuhan yang ditapai daripada sisa organik adalah produk yang dihasilkan daripada proses penapaian sisa pepejal organik dan ia boleh digunakan sebagai bahan permukaan, baja cecair, agen antimikrob, rawatan air sisa domestik, rawatan kumbahan perbandaran dan perindustrian. Di antara semua ekstrak tumbuhan yang ditapai, apabila diuji, semua menunjukkan tindak balas positif kepada aktiviti anti-bakteria dengan menunjukkan zon perencatan selepas tempoh pengeraman terhadap bakteria yang diuji. Kecuali *E. elatior* yang tidak menunjukkan aktiviti kepada *B. subtilis*. Hasil yang diperolehi oleh aktiviti antimikrob daripada ekstrak tumbuhan yang ditapai boleh dikaji akan datang untuk menghasilkan produk mesra alam yang berfungsi sebagai surfactant untuk mengurangkan pencemaran silang di makmal untuk berlaku

CHAPTER 1

INTRODUCTION

At the point when working in a microbiology research facility, aseptic procedure is one of the key to the achievement of the experiment, and safety of an experiment. These aseptic systems are techniques that were performed by researchers under sterile conditions to guarantee that microbial contaminants do not hurt partners and are not brought into sterile arrangements, supplies, or other experimental culture.

Prevention of cross contamination by other microorganism can result in the success of propagation of any microbial strain. There are many sources of contamination such as non-sterile supplies, media, reagents, unclean work surfaces, airborne particles and also unclean gloves. Microscopic organisms are discovered all over the place. While most species are beneficial, some are destructive and even pathogenic. Chemical and physical agents might be utilized to control the bacterial growth and development.

There are a lot of ways that commonly been used in order to keep the laboratory from any infection of microorganism such as sterilization, disinfectant, decontamination, antisepsis and sanitization. Most of the common ways to kill the organism in laboratory are using chemical. Nowadays people are searching for more environmental friendly products that will contribute to less pollution to the earth. One of the potential environmental friendly products that can be further investigate is by using fermented plant extract prepared from organic waste products.

Fruit, vegetable markets and food processing industries create decomposable waste such as vegetables and fruit peels in a very high quantity. There is a need to manage this organic waste properly since it has becomes one of the big issues throughout the world.

Greenhouse gases like methane and nitrous oxide can be the result of disposal of the kitchen waste. In order to solve this problem the decomposable waste can be turned into value added product which can reduce production of greenhouse gas. Dr. Rosukon from Thailand introduced the used of organic solid waste in 2006 and named it as garbage enzyme. The process of fermentation of waste fruits and vegetables or peels, together with brown sugar and water can produce complex organic enzyme (Arun, 2014). This organic enzyme could degrade molecules in a short period of time and could be used as antimicrobial agent.

1.2 Problem statement

Cross contamination in the laboratory often occur and can disrupt the on-going experiments. The common used control measure is by using chemicals. In order to reduce the harmful effect to the environment, an organic product such as fermented plant extracts can be used as substitute of chemical treatment.

1.3 Objectives of the research

To examine antibacterial activity of fermented plant enzyme common bacteria used for teaching class which are isolates of *Escherichia coli* and *Bacillus subtilis*.

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