UNIVERSITI TEKNOLOGI MARA

MICROBIOLOGICAL ANALYSIS OF LACTIC ACID BACTERIA (LAB) IN NATURALLY FERMENTED CARICA PAPAYA (CP) LEAVES

CAROL CAROLINE CONERLIUS

Dissertation submitted in partial fulfillment of the requirements for the degree of
Bachelor in Engineering (Hons.) Chemical and Bioprocess

Faculty of Chemical Engineering

July 2016

ABSTRACT

The present study reported on microbiological analysis of the natural fermentation of fresh CP leaves that involved isolation and cultivation of the microbes, colony counting, pH and gram staining. The microbes from naturally fermented CP leaves were isolated and cultivated on nutrient and MRS agars. The selective MRS agar used to cultivate LAB as suspected dominant bacteria which played preservative role during fermentation. Serial dilution method was used to ease the determination of number of colony presence on agar medium at different fermentation stages. The bio-preservative role of LAB was analysed through pH and its growth (colony counts). Low pH around 4.67 to 3.64 detected along fermentation process hinted the presence of LAB which inhibited the growth of other pathogenic bacteria. Gram staining results which indicated the presence of gram-positive bacteria further supported the hypothesis on the presence of LAB while colony counts on MRS medium recorded high number (between 4 to 10 million CFU/ml) These findings inferred the significant presence of LAB which could play preservative role in naturally fermented CP leaves.

ACKNOWLEDGEMENT

Immeasurable appreciation and deepest gratitude for the help and support are extended to the following person who is one way or another has contributed in making this research possible.

Foremost, I want to offer this endeavor to God Almighty for the wisdom he bestowed upon me, the strength, peace of mind and good health in order to finish this research.

I am highly indebted to Universiti Teknologi MARA, especially Faculty of Chemical Engineering for providing necessary facilities and equipment in completing this endeavor.

My special gratitude and thanks to my research supervisor, Mr. Mohamad Sufian bin So'Aib, for imparting his knowledge and expertise to finish this research. His continuous support, guidance, valuable comments and suggestions helped upon the completion and success of this research.

I would also like to express my gratitude towards my family for the encouragement which helped me in completion of this research. Special thanks to my beloved and supportive parents, Conerlius and , whom both gave me continuous love and emotional support in completion of this research. Special appreciation to my sisters, Clare Clara, Cindy Cornelia and Connie Corina who served as my biggest inspiration to pursue this undertaking.

I am highly indebted to the Laboratory staff of Chemical engineering Faculty for the assistance and for providing informative help in completing this research.

My gratitude and appreciation also goes to my fellow classmates and people who have willingly helped me out in any forms of help upon completion of this research.

TABLE OF CONTENTS

CHAPTER ONE

INTRODUCTION

1.1 RESEARCH BACKGROUND

Carica papaya (CP) is a scientific species name for a tropical plant namely known as Papaya. This tropical plant is originally a native to central and northern South America. It is then cultivated in several tropical countries such as India, Indonesia, Malaysia, Australia, Philippines, Caribbean Island, Florida and several countries of Africa as well. The reason why papaya is planted across the tropical areas is because this plant is highly frost-sensitive. Studies also state that this plant prefers a sandy, well-drained soil. The reason is because standing water will kill the plant within 24hours range. The papaya plant is known to grown in three sexes which known as male, female and hermaphrodite condition(Charles R., 2006). (C. L. & Richard M., 2001) stated that almost all commercial papaya orchards contain only hermaphrodites. By stating that, this study suggested a male type papaya only produces pollen and never fruit whereas the female only produce small inedible fruits unless it is pollinated. Supporting the statements, it is confirmed that most commercialized papaya is a hermaphrodite due to the ripe and large sized fruits in contrary with the situation of when the plane is only female or male. In trend right now, papaya managed to be ranked on top 4 of preferred tropical fruits after bananas, oranges and mangoes. This data is concludes from the increasing production of this tropical fruit due to its' increasing demands worldwide (Electronic Data Infromation Source, 2014).

Papaya consists of several parts including fruits, seeds, latex, leaves, flowers and roots. The figure of CP trees is shown as in figure 1 whilst Figure 2 and Figure 3 show the male and female fruits respectively.