

UNIVERSITI TEKNOLOGI MARA

**MALAYSIAN ENDOPHYTES AS A TOOL OF
CHEMICAL MODIFICATION**

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ABSTRACT

Biotransformation has been a subject of interest since centuries ago. It can be used to modify a compound into another compound, which may be hard to obtain using chemical synthesis, by using microorganisms such as endophytes. The study is aimed to carry out the fermentation of a given substrate, to identify the biotransformation product, as well as to rationalize the chemical modification induced by the endophytes and compare with standard organic chemistry procedure. It was done by culturing endophytes, feeding them with substrates, incubating the culture for one to two weeks, filtering and extracting the mycelium, and lastly analyzing the extract by using Thin Layer Chromatography, Nuclear Magnetic Resonance, and High Performance Liquid Chromatography technique. It was found that biotransformation of (+)- α -longipinene by *Burkholderia* has taken place in the experiment. In conclusion, the biotransformation of substrate had been successfully done but further study should be done to purify and identify the resulting compound since it could not be done in this study due to time-constraint.

CHAPTER 1

INTRODUCTION

1.1 Background of the study

Biotransformation refers to “chemical conversion of a substance that is mediated by living organisms or enzyme preparations derived there from” (Stephenson *et al.*, 2006). It is a natural process in which a compound is modified into another compound using a pathway that may be hard to be achieved in chemical synthesis, and does not produce byproducts that are harmful to the environment. Humans have utilized biotransformation for thousands of years, especially in the process of food fermentation.

Major discoveries in biotransformational studies were made by Louis Pasteur in 1858, who reported that *Penicillium glaucum* fed with racemic para-tartarate was found to use (+)-tartarate as carbon source, producing (-)-tartarate (Berova *et al.*, 2000). Pasteur also studied another biotransformation, which is of ethanol to acetic acid (vinegar) by *Acetobacter aceti* in 1864.

Biotransformation can easily be classified into two different approaches. “Xenobiotic” biotransformation involves the biotransformation of substrates that are