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POPULATION DYNAMICS AND MOLECULAR PROFILING OF MICROBIAL ECOSYSTEMS DURING SPONTANEOUS FERMENTATION OF *GARCINIA MANGOSTANA* PERICARPS

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ABSTRACT

The spontaneous fermentation has resultant product has inconsistent microbiological and sensory qualities. This study aims to establish the microfloral diversity of spontaneous fermentation of *G. Mangostana* pericarps, to determine population dynamics properties of spontaneous fermentation of *Garcinia Mangostana* Pericarps and to identify microorganism present at different stages of fermentation. The *Garcinia Mangostana* Pericarps fermentation was carried out anaerobically for 100 days at room temperature and sample collection was done on daily basis. Enumeration of microbial population was done on different selective media and pure culture was isolated. The Genomic DNA of pure culture was isolated and further PCR amplified using universal primer set. The 16S rRNA sequence analysis was done using Blastn and the phylogenetic tree was constructed. Due to indigenous microflora of spontaneous fermentation, 13 major genera was found which is *Klebslella, Enterobector, Msngovibactor, Escherichia, Cronobactor, Komagataeibacter, Lactobacillus, Bacillus, Meyerozyma, Saccharomycete, Hanseniaaspora, Mycobacterium and Pichia*. The predominant microorganisms present in fermented GMP were LAB (Log CFU/mL 2.723579±0.171854 to 3.74846±0.315589). *Lactobacillus brevis* and *Lactobacillus plantarum* were the dominant members of LAB. Lactic acid fermentation inhibit many pathogenic bacteria through the production of organic acids, mainly lactic acid, and cause rapid acidification during fermentation cause the dominant species of LAB survive toward end of fermentation. The survival study showed that these pathogens could survive up to 21 days. The diverse indigenous LAB microflora provides a prospective consortium for product development in future improving the quality and safety of fermented *Garcinia Mangostana* Pericarps..

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDIES

Fermentation has claimed to be a popular technique to preserve staple food, fruits, vegetables, herbs and other edible materials as well as improving their nutritional value and sensory quality (Swain *et. al* 2014, Ho *et. al.*, 2015). Some traditional fermented foods such as *kimchi* (originally Korea) (Chang, et.al., 2008) and *saeurkraut* (Holzapfel, 2002) become international delicacy. Other traditional fermented foods derived from wheat, starch, milk, maize are known by their local names such as *doklu* (africa) (Assohoun-Djenia *et.al.*, 2006), *tape* (Indonesia) (Nuraida, 2015) , *tempoyak* (Malaysia) (Chuah, et. al., 2016), *kishk* (Egypt). Despite long-time tradition of fermented foods spanning over millenia, their current production method is largely low-tech at household scale with the majority of production processes employ spontaneous fermentation using indigenous microorganisms inhabitating the raw materials. On the other hand, the use of starter culture evolved from repeated 'backslopping' processes to iterate the best-adapted strain (Holzapfel, 2002). For this reason, fermentation becomes a recommended food preservation method and nourishment programme for the population in impoverished areas (Holzapfel, 2002). Until recently, the health-promoting aspects of these fermented foods in terms of the presence of probiotics such as lactic acid bacteria (LAB) that is beneficial to cholesterol modulation, immune stimulation and toxin inactivation were revealed. In addition, the bacteriocin secretion of LAB inhibits the foodborne pathogenic growth and preventing diarrhea (Nuraida, 2015).

Numerous tropical plants have fascinating biological activities with potential therapeutic applications for example *Garcinia mangostana Linn* which belongs to the family of *Guttiferae* and is named ''the queen of fruits". It is found in the tropical rainforest of some Southeast Asian nations like Malaysia, Indonesia, Sri Lanka, Philippines, and Thailand. Citizen in these countries utilise the pericarp (peel, rind,