UNIVERSITI TEKNOLOGI MARA

BATCH SPONTANEOUS ANAEROBIC FERMENTATION OF GINGER: TIME AXIS ANALYSIS OF POPULATION DYNAMICS AND MICROBIAL DIVERSITY

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ABSTRACT

Ginger (Zingeber officinale) has lot of promising benefits especially for medicinal purposes. Naturally, fungi and bacteria can live on the outer skin of ginger as it grow on the soil and these microbe can be both aerobic and anaerobic. If ginger let to rot naturally, it will break into its basic elements by enzyme that is secreted by fungi. The enzymes will break the skin, followed by aerobic bacteria degrading it to its basic elements. However if ginger consumed by humans or other living creatures, the anaerobic microbes will be digested in the alimentary canal into bioavailable products which are readily absorbed by the body. This anaerobic fermentation in the gut can be approximated by spontaneous anaerobic fermentation of ginger to produce bioavailable products to be consumed by humans for their health benefits. In this research, the batch spontaneous fermentation of ginger is characterized by tracking the microbial diversity and population dynamics along time axis. This will create the basis for precise identification of the species in further advanced work. Together with the metabolite profile, microbial diversity and population dynamics profiles will form the basis for quality control and scale up for this fermentation. To achieve these goal, the steps that need to be carried out on each sample are serial dilutions, streaking on each agar plate with the selective media MRS, Urea, and Mac Conkey agar, incubation, colony counting, gram staining, gram staining and finally identification of cell morphology and plotting of species diversity and community dynamics. 31 batch spontaneous anaerobic fermentations of 10%(w/v) sucrose and 10%(w/v) grinded ginger in distilled water of volume 500ml were carried out for 12 weeks. Samples were taken on days 2,3,4,5,7,8,10,14,15, and week 3,4,5, 6, 7,8,9,10,11,12. After carrying out the above steps, the results shows that selected microbe that grows on each agar especially on selective medium has its own population dynamics along the time axis. Superimposing the population dynamics time-profile of each selected

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INTRODUCTION

1.1 BRIEF BACKGROUND

Ginger or its specific name known as *Zingiber officinale* have been used for centuries as one of very handy ingredient. Ginger can be used as cooking ingredient and also for medicational purposes. The component that gives out strong smell inside ginger is known as gingerol, this gingerol is categorized as pungent ketones (Brett White, 2007) [1], as for dry ginger, the pungent smell is given out by shogaols (Keith Singletary, 2010) [2]. Ginger could be proved to be useful in many areas especially for medication purposes, Ginger used to treat nausea, motion sickness, relieving inflammation, lowering blood cholesterol, reducing blood glucose level, relieving hypertension and may take part in cancer prevention (Keith Singletary, 2010) [2]. All of these benefits has been studied and some of it were proved to be true. . Each different ginger product will have different biological activity once it has been consumed (Keith Singletary,2010) [2].

Ginger rhizome grows beneath the soil and soil are the habitat for fungi and bacteria. The ginger rhizome skin may become their habitat. Those microbe may posses as aerobic or anaerobic. If ginger rotten naturally, it will break into its basic elements. Fungi secreted enzyme that will degrade ginger's skin because the skin of each plant was made by cell wall which is hard to degrade, cell wall composed of pectin, cellulose, and hemicellulose (Jaeyong Choi et al. , 2013) [3]. After that aerobic bacteria will follow on degrading the ginger.

If ginger were consumed by human or other living things like animals, anaerobic microbes will be able to survive as the conditions of our alimentary canal are anaerobic which less in oxygen as stated by the article of healthy gut bacteria. The anaerobic microbes will be digested in alimentary canal and turn