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Selected fermented indigenous vegetables and fruits from Malaysia as potential sources of natural probiotics for improving gut health

Olaide Olawunmi Ajibola^{a,b,c,*}, Raymond Thomas^{d,e,*}, Babatunde Femi Bakare^f

^a Department of Biochemistry, Memorial University of Newfoundland, St. John's, NL A1C 5S7, Canada

^b Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, Kota Samarahan 94300, Malaysia

^c Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak, Kota Samarahan 94300, Malaysia

^d School of Science and the Environmental Science/Boreal Ecosystem Research Initiative, Memorial University of Newfoundland, Corner Brook A2H 5G4, Canada

^e Department of Biology/Biotron Experimental Climate Change Research Centre, Western University, London N6A 5B, Canada

^f Environmental Pollution and Remediation Research Group, Department of Chemical Engineering, Mangosuthu University of Technology, Durban 4031, South Africa

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ABSTRACT

In the Peninsular Malaysia and Northern Borneo island of Malaysia, various rich indigenous leafy vegetables and fruits grow and contribute to the nutritional and dietary values of the population. They have high water contents, thus, naturally vulnerable to rapid food spoilage. Food preservation and processing play a vital role in the inhibition of food pathogens in fruits and vegetables that are prevalent in Malaysia. Lactic acid fermentation is generally a local-based bioprocess, among the oldest form and well-known for food-processing techniques among indigenous people there. The long shelf life of fermented vegetables and fruits improves their nutritional values and antioxidant potentials. Fermented leaves and vegetables can be utilized as a potential source of probiotics as they are host for several lactic acid bacteria such as *Lactobacillus confusus*, *Weissella paramesenteroides*, *Enterococcus faecalis*, *Lactobacillus plantarum*, *Lactobacillus buchneri*, *Lactobacillus paracasei*, *Lactobacillus pentosus*, *Pediococcus acidilactici*, *Pediococcus pentosaceus* and *Leuconostoc mesenteroides*. These strains may be more viable in metabolic systems whereby they can contribute to a substantial increase in essential biologically active element than industrial starter cultures. This review is aimed to address some essential fermented fruits and vegetables in Malaysia and their remarkable reputations as a potential sources of natural probiotics.

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1. Introduction

Fermented beverages and foods, whether from plant or animal sources, have been developed, and enjoyed across the globe for many years, are currently of great interests in the scientific community, as well as they are an integral part of the daily diet for many consumers [1-3]. The fermentation method of preservation has allowed forbearers in tropics and arctic regions with limited growing seasons to survive

during the harsh drought and winter months. Fermentation is an anaerobic metabolism converting carbohydrates by bacterial enzymes to alcohol or organic acids (Fig. 1) [4-8].

Many practices involving traditional or indigenous fermented foods were done in an artisan method and without any idea of the potential role of the bacteria involved [9]. However, in food bioprocessing, salting and drying are commonly known as the oldest forms of food preservation technologies [10]. Fermentation technologies are thought to have evolved to preserve fruits and vegetables during shortage times; by preserving the food with alcohols and organic acids, as well as by improving the desirable flavour and texture of the food [11,12]. Fermented beverages and foods also aid in decreasing toxicity (remove antinutritional factors) [13] and cooking

* Corresponding authors.

E-mail address: olaideajibola@gmail.com/ooajibola@mun.ca (O.O. Ajibola);

rthomas@grenfell.mun.ca (R. Thomas)

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