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Research Article

Antibacterial Properties of Purified Sago Frond Sugar Against Food-Borne Associated Disease Bacteria

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ABSTRACT

Sago palm is recognised as key to sustainable food security due to its advantages resilient against extreme conditions such as wildfire and flood associated with adaptability to climate change. Sago palm is also known to remain solid after being attacked by pests and infected by the disease. Unfortunately, for the last ten years, the Sago palm industry experiences a significant decrease in plantation area and productivity. The long maturation period is identified to be the major factor that is responsible towards the respected issue. Thus, alternative commodities from the growing sago palm must be explored to offer a better perspective on the sago industry. Sago frond (SF) was utilised into Sago Frond Sugar (SFS) via enzymatic hydrolysis using cellulase enzyme containing cellobiose and glucose as main sugar at 9-10 g/L and 5-6 g/L concentration respectively. SFS was purified (PSFS) using Powdered Activated Charcoal (PAC) to remove the impurities. Antibacterial analysis shows that PSFS able to inhibit the growth of *Staphylococcus aureus*, *Escherichia coli* and *Salmonella typhi* at 23.5 mm, 22.5mm and 13.25 mm clearing zone respectively. However, the growth of Listeria monocytogenes seems unaffected by the presence of PSFS. Promoting the versatility of sago frond as raw material to synthesise high-value products such as SFS will extend the potential of the sago palm to be recognised as an important crop to ensure global food security and safety.

Key words: Cellobiose, enzymatic hydrolysis, food-borne disease, powdered activated charcoal

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INTRODUCTION

About 2.2 million people were estimated to be killed by diarrhoea in 1998. Most of them are kids under 5 years old. Approximately 4 billion cases of diarrhoea worldwide are reported every year with developing and poor countries being the most affected. Diarrhoea is commonly caused by the consumption of food that has been contaminated by food-borne associated viruses, bacteria and parasitic. *Escherichia coli* (*E. coli*) and *Salmonella* sp. are the most common and widely distributed food borne diseases associated bacteria that can cause diarrhoea. *E. coli* usually can be found in meat, vegetables and fruits while *Salmonella sp.* usually can be found in meat and vegetable that have been contaminated with animal manure. Both bacteria can cause infection due to improper management of food handling, storage and cooking style especially undercooked meat (WHO, 2001).

Antimicrobial agents are widely used as antibiotics in humans and animals. Antibiotics have been used in animals not only as an antimicrobial agent but also as a growth promoter and improvement in growth performance. The use of such antimicrobial agents has emerged as livestock systems intensified around the world to encounter a growing demand for meat, milk and eggs. Antibiotics are used normally in animal feed at a rate of 2 to 50 g/ton. The benefit of antibiotic use in animal feed is increasing the digestion efficiency and growth rate, treating clinically sick animals and preventing the infection of diseases (University of Delaware, 2016).

To increase the effectiveness of the antimicrobial agents and reduce production costs, artificial methods in the production of antimicrobial agents are introduced. Production of antimicrobial agents would be produced from non-natural compounds that are chemically foreign to the environment such as xenobiotics. Advances in synthetic chemistry allow the production of antimicrobial agents faster and cheaper. Rather than being limited to “one vessel, one reaction” as in most serial synthetic chemistry, combinatorial chemistry is characterized by exponential increases in the number of compounds