Key Engineering Materials
ISSN: 1662-9795, Vol. 938, pp 201-207
doi:10.4028/p-57o2eb

Submitted: 2021-12-31
Revised: 2022-09-02
Accepted: 2022-10-18
Online: 2022-12-26

Preliminary Study of Glucose Removal Using Biosorbents from *Ananas comosus* Leaves

Nurul Fathira Anisa Jimali[1,a*], Yen San Chan[2,b] and Angela Siner[1,c*]

[1]Department of Basic Medical Sciences, Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia

[2]Department of Chemical and Energy Engineering, Faculty of Engineering and Science, Curtin University Malaysia, 98009 Miri, Sarawak, Malaysia

[a]fathiraanisa@gmail.com, [b]chanyensan@curtin.edu.my, [c]sangela@unimas.my

Keywords: *Ananas comosus*, pineapple leaf, biosorbent, D-glucose, post-harvest

Abstract. The usefulness of *Ananas comosus* (pineapple) is not limited its fruits. This study aims to explore the removal of glucose, which are present in clinical waste by pineapple leaf biosorbents derived through three pre-treatment methods. Particle size analysis showed the smallest particle were from the steam pre-treated biosorbents and largest particles were from the 5% alkali pre-treated biosorbents. Fourier Transform Infrared Spectroscopy showed that lignin, hemicellulose, and cellulose remained unchanged in both the used and unused biosorbents. Despite the large particle size of the alkali pre-treated biosorbents, up to 70% of glucose was removed which might be due the improvement of the interfacial adhesion during the alkali treatment process.

Introduction.

The increase in commercialization activities utilizing tropical fruits has boosted its demand [1], including that of *Ananas comosus* (pineapple). Pineapple cultivars commonly planted in Malaysia include MORIS, Josapine, N36, MD2 MORIS Gajah, Gandul, and Yankee [2]. More than 20 tonnes of fresh N36 and MD2 cultivars were exported in 2015, a sign of its promise as an income-generating crop [3], in which the fruits are consumed fresh or processed into products such as juices, and jams. The rest of the pineapple plant, which includes the leaves, are discarded as agro-waste and this led to it being the subject of studies to repurpose it into something practical. Many of these studies was to investigate its ability as a biosorbent for the removal of dyes, oils, and heavy metals [4-6] from water sources as well as on the quality if its fibre [7].

The main principle in clinical waste clean-up is containment; for example into a bin that also needs to be washed before it is reused [8]. One of the components in clinical waste is glucose, which is a potential carbon source for growth of bacteria, viruses and other types of blood-borne pathogens [9]. The potential use of pineapple leaves for removal of this type of waste is still relatively unexplored; this present study aims to investigate its removal of glucose. A biosorbent from pineapple leaves is an environmentally friendly as it will help reduce agro-waste produced from pineapple farming. This repurposing of pineapple leaves is also in line with Goal 12 of the Sustainable Development Goals [10], which is 'Responsible Consumption and Production'.

Materials and Methods.

Biosorbent Synthesis. Leaves from the MD2 cultivar were used throughout this study. Before the leaves were grind and sieved into powder, they were either pre-treated or left untreated. For untreated biosorbents, the leaves were washed with tap water followed by deionized water to remove any unwanted particles like dirt. Then, the washed leaves were sun dried for 2 hours before further drying in the oven at 80°C for 24 h [11]. For steam pre-treated biosorbents, the cleaned leaves were steamed for 1 h before they were washed three times with distilled water. Next, they were dried in the oven at 80°C for 24 h and grind to mesh size 50 to obtain the dried powder [12]. For alkali pre-treated biosorbents, the cleaned leaves were soaked in 3% or 5% sodium hydroxide (NaOH) for 1h at 80°C