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# Watermelon Waste as a Growth Media Substitute for Bacterial Cellulose Production

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**Abstract.** Local fruits in Malaysia include tropical fruits that are rich in sugars. This includes watermelon which is grown largely on the east coast of Malaysia. However, due to reasons such as unpredictable weather changes, as well as the poor practice of harvesting and storage, a large portion of this fruit ends up rotten and dumped. The use of this fruit waste as a growth medium for bacterial cellulose production is seen as an excellent way to utilize it, in addition to encouraging the production of low-cost bacterial cellulose. Watermelon waste contains approximately 7 % sugars, a trace amount of protein and lipid, and the rest is moisture content. The treated watermelon waste from selected parameters was used in the fermentation of bacterial cellulose using *Gluconacetobacter xylinus* in an inoculum concentration of 8 and 10 %. The produced bacterial cellulose was quantified, analysed and compared to those using synthetic media. The moisture content, total solid, volatile solid, and fixed solid of watermelon were investigated which its recorded 97.45 %, 2.55 %, 2.18 %, and 0.76 % respectively. The carbohydrate content for treated watermelon was analysed by using phenol-sulphuric acid method, which the highest carbohydrate present was at 100 ℃ with watermelon waste to water ratio of 1:2, and 90 minutes incubation time. The BC pellicle's produced was determined based on its BC yield, thickness, carbohydrate concentration before and after 16 days fermentation, and FTIR-ATR. The highest BC yield recorded was 1.0 cm (5.8090 mg/mL), which was cultured in treated watermelon waste only at 10 % inoculum density.

## INTRODUCTION

Bacterial cellulose (BC) is a good substitute for plant cellulose in producing high-end cellulose-based products [1]. It is a pure, biocompatible, and adaptable material that may be used alone or with other materials such as biopolymers and nanoparticles. BC is also classified as the most refined cellulose structure than plant cellulose because of the absence of impurities including hemicellulose and lignin [2]. Compared to plant cellulose, BC offers a wide range of advantages, such as its ability to deliver drugs in various systems and its two-dimensional and three-dimensional scaffolds for tissue engineering and wound dressing. It can also be used to produce artificial blood vessels and biosensors [3, 4, 5]. Besides its high water-holding capacity, BC can also improve the mechanical and thermal properties of its components, other than having a notable polyfunctionality, transparency, and non-toxic [6, 7]. To culture BC, there are several characteristics that need to be followed, such as the growth media used, the concentration of oxygen in the environment, and also the pH of the media. The high content of carbon sources can help produce better quality BC pellicle with strong tensile strength. This is because simple sugars (glucose, fructose) in the media are used by BC species for the cellulose synthesis process. The cellulose synthase substrate that helps in the production of BC is uridine 5'-diphospho-glucose (UDPGlc), which formation is derived from α-D-glucose [8]. Therefore, the

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