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Effect of different nitrogen source combinations on microbial cellulose production by *Pseudomonas aeruginosa* in batch fermentation

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Microbial cellulose is a biopolymer that has high purity properties as it does not contain contaminants such as hemicellulose and lignin. Microbial cellulose can be produced by different types of microorganism such as *Pseudomonas, Komagataeibacter, Sarcina* and *Azotobacter* and commonly used in biomedical applications, food industry and paper industry. However, the main drawback in microbial cellulose production is low yield, which unable to meet the requirements of the industry. This study aims to determine the effects of different nitrogen sources combinations on microbial cellulose production by *Pseudomonas aeruginosa* and to maximize microbial cellulose production using the best nitrogen sources combination. To improve cellulose production, five different nitrogen sources combinations, which were yeast extract (YE)+$(NH_4)_2SO_4$, YE + NH_4NO_3, YE+urea, YE+tryptic soy broth and YE+beef extract were added into the media with the composition of 50 g/L glucose, 3/L g KH_2PO_4 and 0.05 g/L $MgSO_4$. The batch fermentation was done in incubator shaker with 150 rpm at 30°C for five days. The samples were harvested every 24 hours, centrifuged, purified and dried for microbial cellulose concentration determination. The results obtained indicated that YE and beef extract combination produced the highest microbial cellulose concentration of 1.7 g/L. To attain the second objective, optimization study was carried out by using different concentrations, which were 5 g/L, 10 g/L, 15 g/L and 20 g/L of YE and beef extract combination. An investigation using 10 g/L YE and beef extract synthesized 1.7 g/L of microbial cellulose, which proved to be the potential enhancer for microbial cellulose synthesis. It is recommended that additional morphology analyses should be done to investigate the influence of fermentation conditions and low-cost nitrogen sources media components on microbial cellulose morphology and its mechanical properties. This will help to synthesize desired and reliable microbial cellulose pellicles.

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