Fatty acid profile from immobilised *Chlorella vulgaris* cells in different matrices

Abu Sepian, N. R.[a], Mat Yasin, N. H.[a], Zainol, N.[ab], Rushan, N. H.[a], Ahmad, A. L[ac]

[a]Faculty of Chemical & Natural Resources Engineering, Universiti Malaysia Pahang, Gambang, Kuantan, Pahang, Malaysia
[b]Centre for Earth Resources Research Management (CERRM), Universiti Malaysia Pahang, Gambang, Kuantan, Pahang Darul Makmur, Malaysia, Malaysia
[c]School of Chemical Engineering, Universiti Sains Malaysia, Nibong Tebal, Pulau Pinang, Malaysia, Malaysia

ABSTRACT

The immobilisation of *Chlorella vulgaris* 211/11B entrapped in combinations of natural matrices to simplify the harvesting process was demonstrated in this study. Three combinations of matrices composed of calcium alginate (CA) and sodium alginate (SA), sodium carboxymethyl cellulose (CMC) and SA, and mixed matrices (SA, CA, and CMC) were investigated. The number of cells grown for each immobilised matrix to microalgae volume ratios (0.2:1–1:1) were explored and compared with using SA solely as a control. The optimum volume ratios obtained were 1:1 for SA, 0.3:1 for CA and SA, 1:1 for CMC and SA, and 0.3:1 for mixed matrices. The immobilised microalgae of mixed matrices exhibited the highest number of cells with 1.72×10^9 cells/mL at day 10 and 30.43% of oil extraction yield followed by CA and SA (24.29%), CMC and SA (13.00%), and SA (6.71%). Combining SA, CA, and CMC had formed a suitable structure which improved the growth of *C. vulgaris* and increased the lipid production compared to the immobilisation using single matrix. Besides, the fatty acids profile of the oil extracted indicates a high potential for biodiesel production.

KEYWORDS: Chlorella vulgaris; immobilisation; matrices; fatty acid; sodium alginate

FUNDING