

Presentation code:

E3

Comparison of Lipid Quality of *Nannochloropsis* sp. flocculated via Autoflocculation, AFlok-BP1 and Alum

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Abstract. *Nannochloropsis* sp. contains high lipid and polyunsaturated fatty acid that can further be used as a source of pharmaceutical and nutraceutical products. Removing the culture medium from algae cells is a prerequisite process before the products can be extracted and one common technique is called flocculation. Current commercial flocculants used for microalgae are either toxic or very costly. AFlok-BP1 is a biobased flocculant derived from plant offers non-toxic and cheap; thus has the potential to be applied in dewatering of microalgae cells. However, the flocculant has high tannin content. This study examines the effect of different flocculants on *Nannochloropsis* sp. lipid yield following dewatering and extraction process. As the high tannin content presence in the spent medium and waste biomass after extraction is a concern; therefore, it was also evaluated. Cultures dewatered via autoflocculation at 10.5, 11 and 12, addition of AFlok-BP1 at 180 ppm and Alum at 300 ppm was selected for extraction of lipid. Bligh & Dryer method was used to extract the lipid and gas chromatography technique was used to analyse the fatty acid contents. The tannin content was evaluated via Folin-Ciocalteu method. AFlok-BP1 and Alum addition yielded lipid of only 18.2 and 17.2 mg/g dried biomass, respectively as compared to 34.4 mg/g when no flocculant was added. Autoflocculation using NaOH for pH 10.5, 11 and 12 resulted in even lower yield. Total fatty acid methyl ester was lowest in autoflocc treatment between 5.13 and 7.32 mg FAME/g biomass. Flocculation using AFlok-BP1 and Alum yielded slightly higher than 12 mg/g, but still lower than control (17.2 mg/g). However, the highest polyunsaturated fatty acid was found at 65.8% of the lipid extracted when added with AFlok-BP1 compared to only 11.1% in the control. Tannin was found highest in medium flocculated using AFlok-BP1 as expected at 1.428 mg/g. However, a measurable amount of tannin was also found in unflocculated medium (0.364 mg/g) and methanol-water layer during the lipid extraction. Low amount was found around 0.044 mg/g in the residual algae biomass after the extraction of lipid. The tannin amount is still low comparatively to concentrations that can be tolerated by marine animals as well as human. Based on some positive results, AFlok-BP1 is a potential to be used as green and cheap flocculants for microalgae dewatering process.

Keywords: Flocculation, microalgae, *Nannochloropsis* sp., lipid, tannin