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Authors: Chai Siah Lee, Mei Fong Chong, Eleanor Binner, Rachel Gomes, John Robinson



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## Techno-economic Assessment of Scale-up of Bio-flocculant Extraction and Production by using Okra as Biomass Feedstock

Chai Siah Lee <sup>a, b</sup>, Mei Fong Chong <sup>a</sup>, Eleanor Binner <sup>b</sup>, Rachel Gomes <sup>c</sup>, John Robinson <sup>b, \*</sup>

<sup>a</sup> Centre of Excellence for Green Technologies, Faculty of Engineering, University of Nottingham Malaysia Campus, Jalan Broga, 43500 Semenyih, Selangor, Malaysia.

<sup>b</sup> Microwave Processing Engineering Research Group, Faculty of Engineering, University of Nottingham, University Park, Nottingham NG7 2RD, U.K.

<sup>c</sup> Bioprocess, Environmental and Chemical Technologies Research Group, Faculty of Engineering, University of Nottingham, University Park, Nottingham, NG7 2RD, U.K.

\* Corresponding author.

E-mail addresses: jesslyn1212@yahoo.com (C.S. Lee), MeiFong.Chong@nottingham.edu.my (M.F. Chong), john.robinson@nottingham.ac.uk (J. Robinson), rachel.gomes@nottingham.ac.uk (R. Gomes), Eleanor.Binner@nottingham.ac.uk (E. Binner).

### Highlights

- Economically-feasible okra bioflocculant production at a scale up to 220 tonnes/year
- Dewatering performance of bioflocculant product is comparable or higher than polyacrylamides
- Continuous microwave extraction is more beneficial than conventional extraction
- Optimized extraction conditions were identified based on the unit processing cost
- Payback time estimated to be 4.5 years

### Abstract

This paper reports a techno-economic assessment for industrial scale bio-flocculant production with okra as biomass feedstock. The sludge dewatering ability of the bio-flocculant was evaluated prior to economic analysis. Several optimisation strategies were investigated in order to lower the bio-flocculant production cost. The results showed that continuous mode microwave extraction was more economically beneficial than conventional extraction in batch and continuous modes. Sensitivity analysis revealed that the production cost was significantly affected by annual production and extract yield, and moderately influenced by raw material price. The optimised scheme for bio-flocculant production was continuous mode microwave extraction at 90°C, a residence time of 10 minutes, a water loading of 3.5 w/w and production

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